Ministry of Education and Science of Ukraine
Kyiv National University of Technologies and Design

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Modern Pedagogy and Andragogy: A Guide for PhD Students

It is recommended by the Academic Council of the Kyiv National University of Technologies and Design as a textbook for PhD students

Kyiv
EnterPrint, 2025

UDC: 378

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(Minutes No. 3 dated October 22, 2025)

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Y91: Modern Pedagogy and Andragogy: A Guide for PhD Students. Kyiv: EnterPrint, 2025, 288 pages.
ISBN 978-617-8792-03-9

The textbook outlines the fundamentals of the basic educational course "Pedagogical Skills in Higher Education Institutions" for higher education applicants at the academic and scientific level of "Doctor of Philosophy." It systematises graduate students' knowledge in the pedagogical and psychological cycle, helping to integrate it with the knowledge acquired while studying professional disciplines. This publication's content is structured according to the discipline's curriculum. It contains theoretical material and practical tasks aimed at mastering the essence of a higher school teacher's professional activity, as well as technologies for the development and self-development of personal and professional qualities, and features of pedagogical communication, pedagogical aesthetics, ethics, and the culture of the teacher. The textbook analyses various pedagogical situations and provides examples of how to solve pedagogical problems. It applies to graduate students and teachers of higher education institutions.

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ISBN 978-617-8792-03-9

CONTENT

Introduction

Constant and increasingly accelerated changes in higher education, expressed in the growing internationalisation, digitalisation, and democratisation of knowledge, pose new requirements for both providers of educational services (educators) and the entire educational process. This situation prompts a significant rethinking of the issues of pedagogy and andragogy, including their positions, methods, and approaches to training future specialists who can navigate complex and promising situations.

This publication, "Modern Pedagogy and Andragogy: A Guide for PhD Students", is a significantly updated and expanded version of the earlier edition, "Pedagogical Skills in Higher Education Institutions" by O. V. Yufereva and T. M. Derkach. The 2023 edition was a winner (2nd place) of the All-Ukrainian (National) competition of educational and scientific literature "Open Science, Sustainable Development and Innovative Technologies" in the nomination "Social, Humanitarian and Economic Sciences." Together, this set of two books, intended for postgraduate students of higher educational institutions pursuing an educational and scientific level of "Doctor of Philosophy," outlines the basic training course "Pedagogical Skills in Higher Education Institutions.

Based on the experience of teaching postgraduate students in recent years, the new textbook focuses on the problems of adult education. More than 50% of the material has been updated, with new sections, exercises, and examples added. It provides postgraduate students with an overview of the key theoretical and methodological principles of pedagogy and andragogy, sufficient for teaching in various higher educational institutions and modern educational environments.

The textbook presents its content with a clear and logical structure, encompassing traditional perspectives and recent educational theory and practice advancements. It skillfully integrates knowledge from the related fields such as psychology, pedagogy, instructional design, and multimedia technologies. This approach empowers postgraduate students to grasp their future profession's intricate and interdisciplinary nature. Consequently, they can make informed, thoughtful, and adaptable teaching decisions, always respecting their students' autonomy and learning objectives.

Chapter 1 revolves around the concept of education and learning in the 21st century. In this case, pedagogy is not only introduced as a field but rather as a thoughtful combination of art, craft, and science. The differences in pedagogy and andragogy are provided to gain insights into the peculiar features of adult learners. The importance of lifelong learning in the context of a knowledge-based society is highlighted in this chapter, and various instructional models, training methodologies, and curriculum design approaches applicable to higher education are reviewed. It also demonstrates how pedagogy enables learners to transform their knowledge and skills to benefit their professional and civic lives.

In Chapter 2, the historical and theoretical subjects of pedagogy and andragogy are deeply explored. It incorporates traditional views, as well as the significant schools of learning rooted in behaviourism and constructivism and their implications for teaching practice. The importance of multimedia and experiential learning is established alongside humanistic and transformative views, which emphasise the role of multimedia and experiential learning in achieving deep, purposeful, and independent knowledge. This chapter will help future teachers make sense of what to teach and how to teach, ensuring that they optimise learning and respect the individual development paths of learners.

Chapter 3 deals with pedagogical professionalism. In this context, the key elements that constitute a teacher's professionalism are knowledge, moral standards, interpersonal skills, and an advanced understanding of the basics of pedagogy and andragogy. The chapter instructs future educators to craft their teaching approach, negotiate interpersonal relationships, and evaluate their teaching behaviours, thereby building a collaborative atmosphere within the classroom. It also illustrates how identifying and resolving possible conflicts arising from differences in teaching and learning styles can help create a more effective and supportive learning environment.

Chapter 4 aims to assist educators in organising and presenting training that is familiar with their students' motivational systems, learning styles, and real-world requirements. Here, the key thread is the role of digital technologies in education and the strategies for developing active, engaged, and competency-based learning environments. This chapter demonstrates how to turn passive recipients of knowledge into independent, enthusiastic and responsible learners. Moreover, it outlines methods for evaluating the progress of adult learners and creating effective, real-world, practice-based tasks within the learning process. The postulated strategies also enable educators to develop creativity, collaboration, reflection, and innovation —essential aspects in the contemporary world, which continues to evolve.

Each chapter concludes with practice exercises and self-assessment questions that help solidify the learning and enable future educators to evaluate their professional development as it progresses. The textbook also includes numerous case studies, teaching scenarios, curriculum design, evaluation of learning outcomes, and conflict situations that may arise due to a mismatch between teaching and learning styles.

The book "Modern Pedagogy and Andragogy: A Guide for PhD Students" is expected to serve as a valuable resource for creating a new generation of educators who can meet the growing demands for high-quality, flexible, and innovative education. It equips them to develop positive learning conditions that enable every student to fulfil their potential, enhance the growth of their society, and take on the responsibility and role of a good citizen. The textbook challenges its readers to consider pedagogy and andragogy as both ways of imparting knowledge and as strong media for developing intellectual maturity, creativity, interpersonal understanding, civic responsibility, and a passion for lifelong learning engagement.

Chapter 1. Education and Learning in the 21st Century

1.1 Pedagogy and Pedagogical Process

1.1.1 Pedagogy as a Craft, an Art, and a Science

The word for pedagogues derives from the Greek paid (paed, pais) for the child (boy) and agogos for leader or escort. Escort derives from the Old Italian word "scorgere", meaning to perceive, guide, or observe. The word 'observe' has etymological connections to preserving, saving, regarding, and protecting. Ancient Greek society established a clear division between the educational functions of pedagogues and subject teachers.

Pedagogues, initially enslaved people, were responsible for the holistic development of wealthy boys. Their duties encompassed physical accompaniment, moral instruction, and disciplinary action, effectively shaping the boys' transition to manhood. So, a pedagogue leads, guides, or serves a child. In ancient Greece and Rome, a pedagogue was a slave who accompanied children to school; however, the term eventually came to mean a "trainer of boys."

Meanwhile, Aristotle's vision of pedagogy demonstrates an awareness of the basic activity principles relevant to modern understanding. Aristotle's pedagogical framework is built upon four pillars: eidos (a leading idea), phronesis (a moral disposition, or "halting"), interactive dialogue and learning, and praxis (informed, committed action).

Although European pedagogical thought had earlier origins, the 16th and 17th centuries witnessed a dramatic shift in focus towards the "how" of teaching. This period was characterised by the development of a growing body of instructional literature for teachers, the establishment of organised syllabi, and reforms in school administration. The separation of the act of teaching from the definition of what was taught was a turning point, leading to the development of didactics, the science of instruction.

Pedagogy moved from simply instruction or knowledge to the art, science, or profession of teaching.

Today, the term "pedagogy" is understood in various ways. For example:

- The function or work of teaching: the art or science of teaching, education, instructional methods,[1]
- The instructional techniques and strategies that facilitate learning are essential, referring to the interactive process between the teacher or practitioner and the learner.

[1] *Department of Education, Employment and Workplace Relations. Towards a national quality framework for early childhood education and care*: The Report of the Expert Panel on Quality Early Childhood Education and Care. Commonwealth of Australia. 2009

It is also applied to include some aspects of the learning environment (including the learning environment and the actions of the family and community.[2]

Pedagogy is about learning, teaching, and development, influenced by the cultural, social, and political values we hold for children and underpinned by a strong theoretical and practical foundation.[3] Therefore, the concept of 'educator' is often used to emphasise the unity of various functions in the teacher's activity.

Since education has been a product of the Enlightenment, the traditional concept of teaching has incorporated many of its philosophies, including an emphasis on the end product, rationality, efficiency, scientific ideals of measurement and evidence, and both an empirical and pragmatic approach to knowledge. Significantly, learners were treated almost as passive recipients of the information they received; they could be treated almost as inanimate objects. Teaching could be examined in the same way as material objects, so that the techniques by which knowledge was transmitted were considered crucial to its understanding. Teaching, as we have traditionally known it, may be regarded as a product of the Modern Era. This activity had to fit this paradigm to call for a discussion of at least three aspects of teaching: the end product of teaching, the means to the end, and an assessment of the process.

Since the emphasis of teaching has been placed on instrumentals, it is little wonder that one of the ways of measuring teaching success has been on the outcomes of the process. Teachers must be effective if they produce students with good grades, a measurable result. However, there is no direct evidence to indicate that the teaching process has been the cause of the measurable outcome. It might have been, but we do not know whether the teaching process, the teacher's personality, or the learners' efforts contributed to achieving success.

What we have begun to question in each of these points is the idea that teaching is just about technique. It is technology, but is this all it needs to be to provide learning opportunities intentionally? Is the teacher merely the instrument, choosing the proper methods, communicating the 'correct' knowledge, and getting the desired results? In this process, the students are treated as passive. They are moulded like materials in other production processes – but this does not exhaust the teaching process since students need individual help, motivation, and so on. Learning and teaching need a personal relationship to achieve the best outcomes. It is also recognised that many distance education institutions provide opportunities for face-to-face contact.

More works now focus on teaching style and method than those of previous generations – style is about the art of teaching rather than a science. It is also about the teachers' humanity and personality. Style overlaps with the method but remains distinct from it. Consequently, teachers should be concerned for their students,

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[2] Siraj-Blatchford I., Sylva K., Muttock S., Gilden R., Bell D. (2002). *Researching Effective Pedagogy in the Early Years.* URL: www.ioe.ac.uk/REPEY_research_brief.pdf

[3] *Education Scotland. Let's Talk about Pedagogy.* 2005. https://www.childaustralia.org.au/wp-content/uploads/2017/02/CA-Statement-Pedagogy.pdf

but students should also be concerned for their teachers. Many books and papers have sought to demonstrate the significance of the moral relationship in teaching and recount the lengths teachers should go to help students achieve their fulfilment through teaching and learning. It is the vocation of teaching[4].

Most academic researchers can identify with one of three core teaching philosophy streams, which are captured here as a set of three "pedagogic practice algorithms" to aid readers in identifying themselves within one of these streams when linking their teaching with their pedagogic research (Fig. 1.1).

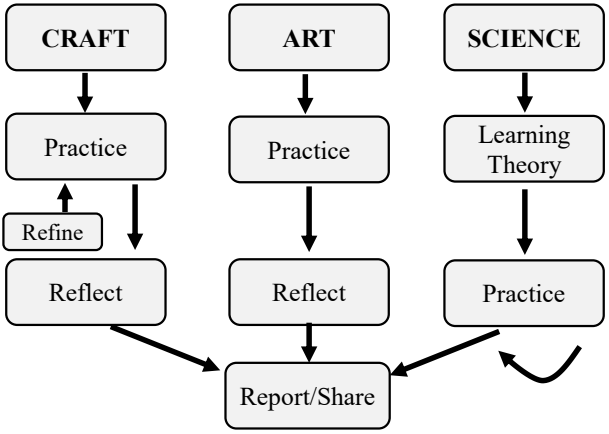

Figure 1.1 Three pedagogic practice algorithms

The CRAFT of teaching

Viewing teaching as a craft stresses the connection between practical experience and reflective practice. Teachers engage in a cyclical process where real-world challenges prompt reflection, leading to the development of sophisticated pedagogical approaches. This optimisation track, which encompasses technical skills and thoughtful analysis, defines teaching as an art. This collaborative approach fosters a body of shared wisdom, elevating teaching from a simple occupation to a true art form.

The SCIENCE of teaching

In essence, a practitioner who approaches teaching as a science will mirror some aspects of the crafting stream in their "evaluation-review" loop. A core difference is as follows. Those adopting a scientific approach to pedagogy begin with a more solid foundation in learning theory, which underlies their practice, before the evaluation steps commence.

Once the learning philosophy underpinning their thinking is in place, the evaluation and optimisation cycle can begin. One of the hallmarks of this stream is that practitioners will remain inwardly self-directed, potentially missing

[4] Jarvis P. (2012). *Teaching, Learning and Education in Late Modernity.* London: Routledge.

opportunities (again, indicated by the broken yellow arrow) to share valuable, evidence-informed lessons. In this way, the logical endpoint of the "science" of teaching focuses on the how rather than reflexively sharing best practices. It can sometimes be expanded to mean "control" of the classroom environment.

Thus, pedagogy is often viewed as a science, but many argue it is more accurately described as an art or craft. One expert group emphasises reflective practice and improvisation, challenging the "technical rationality" of scientific approaches[5]. In contrast, other research shows that experienced teachers rely on "craft knowledge", where personal experience is crucial. Practitioners find these descriptions more accurate, as pedagogical environments are challenging to control and measure scientifically"[6]. To fully understand pedagogy, one needs to move beyond teaching and embrace holistic support, care, and the integration of learning into life.

The ART of teaching

Teaching as an art generally mirrors the optimisation loops of the other two streams but, uniquely, will always result in the sharing of good practice as an integral end-point before starting the process over due to an inherent requirement within this stream for validation of ideas as a core part of the responsive, creative and intuitive nature of approaching teaching practice as an "art form".

The philosophy underpinning teaching as an art stream is the fundamental "why" of teaching, which logically results in sharing best practices as an automatic mechanism inherent to this stream. This algorithm most closely mirrors the in-built reflective practice of many postgraduate-level learning and teaching courses, which is why these courses can help professional teachers recognise and develop their reflective practices while contributing to a nascent but growing evidence base of academic knowledge.

As a science, pedagogy has its laws and regularities, a conceptual and categorical apparatus, content, principles, forms, and methods, among other elements. As an art, it reveals the mechanisms of practical pedagogical activity-action, for which little knowledge of laws is required. Still, educational skills, pedagogical intuition, and pedagogical talent are necessary.

This level is reflected in pedagogical art, which embodies a high level of practical pedagogical activity characterised by both creativity and aesthetic freedom. It is not for nothing that we talk about the beauty of pedagogical action, which is a criterion for skilful performance.

Art pedagogy is a generalisation of all the potentials of art, encompassing both the theory and practice of utilising the pedagogical potential of art in general and professional education for the development of a general and creative personality.

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[5] Eisner E.W. (2002). What Can Education Learn from the Arts about the Practice of Education? *The Encyclopedia of Pedagogy and Informal Education*. URL: [www.infed.org/biblio/eisner_arts_and_the_practice_or_education.

[6] Brown S., Mclntyre D. (1992). *Making Sense of Teaching*. Buckingham and Philadelphia. Open University Press.

Art pedagogy introduces new nuances to the relationship between the teacher and students, fostering mutual trust, openness, and respect. Pedagogical art is the perfect mastery by a teacher of the entire set of psychological and pedagogical knowledge, abilities, and skills, combined with professional enthusiasm, developed pedagogical thinking and intuition, a moral and aesthetic attitude to life, deep conviction, and a firm will.

Pedagogy is an integrated humanistic and social science that investigates the regularities of combined and unique learning interactions, focusing on the content of these interactions, communication, and mutual relations that occur during this process and constitute a specific research object. Pedagogical practice is primarily represented by organised pedagogical processes developed in the context of pedagogical theories, aiming to achieve an educational goal explicitly. The realisation of this deliberate goal occurs through internal, dynamic connections activated by targeted, organised, and goal-oriented educational processes, which transform humanity's intellectual and cultural values into meaningful educational, developmental, and educative content. It facilitates the acquisition of these values by participants in the process and fosters their personal development and self-actualisation.

> "It is necessary to build a holistic process of acquiring knowledge, adequate for life, building an organic complex of humanitarian, social-historical, natural-scientific and artistic disciplines, united by the unity of humanistic meanings and spiritual and moral goals."[7]

The interpretation of pedagogy as a strategy for forming valuable humanistic foundations in Ukrainian philosophy of education was developed by I. Zyazyun.

Further Reading: Bohdanova A.M. (2008). *Pedagogical Skill: textbook, 3rd ed.. K.: SPD (in Ukrainian)*

1.1.2 Pedagogical Process and Education: A Broad and Narrow Meaning

In general, the *pedagogical process* refers to the purposeful formation of a personality under conditions of a specially organised educational system, in a narrow pedagogical sense: the purposeful interaction between teachers and students to develop qualities, properties, and relationships.

The pedagogical process consists of two fundamental components.

Education is the process and the result of an individual's mastering experience, achieving a significant educational level and introducing an individual to the cultural values of humankind. In a broad social sense, education transfers accumulated experience from older to younger generations.

In a narrow pedagogical sense, teachers and students intentionally interact to

[7] Bohdanova A.M. (2008). *Pedagogical Skill*: textbook, 3rd ed. K.: SPD (in Ukrainian)

form qualities, properties, and relationships. The pedagogical process consists of two fundamental components.

Education is the process and result of an individual mastering an experience, achieving a significant educational level, and becoming familiar with the cultural values of humanity. In a broad social sense, education transfers accumulated experience from older to younger generations.

In a narrow social sense, social institutions deliberately shape a person's formation of a particular system of knowledge, attitudes, beliefs, and moral values.

In a narrow pedagogical sense, education results from educational work aimed at solving specific educational problems. Education changes students' understanding of the world and attitudes towards people and themselves. Nowadays, we comprehend pedagogy as a system of human education sciences.

Educational sciences can be classified according to their relation to the process of obtaining education:

1. Pedagogy is the theory and practice of formal and non-formal (organised) education. It has developed general pedagogy and its sub-branches with two common essential features:

(a) It investigates the dynamic links between learners, teachers, and the subject matter, with teacher-learner mutual relations at the centre;

(b) It analyses the data according to pedagogical criteria denoted by the dynamic links. The science and practice of pedagogy evolve through the elaboration of its theory, methodology, profession, and tertiary programs, as well as rigorous scientific methods of investigation, international cooperation among professionals and researchers, professional working areas, the history of tertiary educational institutions, and the discipline of universities and colleges.

2. Essential parts of pedagogy, especially in Anglophone countries, are Education Sciences in lesson planning, lesson design, strategies/methods of teaching, and evaluation. We can investigate these items and define appropriate objects of research. Still, they lose their value if not related to the pedagogical process as a whole: target, learners' and teachers' activities, mutual relations, the priority of self-evaluation and achievements—all that the science of pedagogy deals with as philosophy-in-use, as well as investigates the educational process as a system.

3. Pedagogical disciplines related to the pedagogical process, contextualised or integrated into the science and practice of pedagogy, constitute the core part of teacher educational programs, including those that aim to work with learners with special needs and specialised goals.

4. Education sciences consider and incorporate many other sciences that relate to critical areas of education, such as educational psychology, education policy, educational philosophy, etc. These branches of science investigate their specific object in education and analyse data according to their criteria. These can only inform pedagogy and the field of education about some of its contexts, but will never solve specific pedagogy problems or the process of obtaining an

education. Therefore, it will never function as pedagogy, whether in science, practice, or an academic discipline.

5. Targeted branches of sciences or techniques that learners acquire in an organised process using specific teaching-learning methods belong to the subject didactics (by non-professionals often hastily considered an old-fashioned notion). Any branch of science offered to learners, authentic or transformed into a subject matter for their acquisition (transformed according to stable and developing didactic principles into the content to be learned), becomes a pedagogical/didactic reality and category and adds to the learning content. Other sciences and practices designed as a formal setting for the learner's knowledge creation, skill development and attitude formation can be referred to as education sciences. When transformed into learning or study content, these sciences become a pedagogical content category and a component of pedagogical or didactic processes.

6. Context sciences are also transformed and integrated into the aims, content, methods/strategies, and evaluation and, therefore, belong to pedagogy's teaching/learning or practice (for instance, history, economy, literature, etc.). Their functions within the program denote their relations to the target academic education or degree and/or qualification students obtain. Curricula or programs comprise many branches of science and techniques to be acquired[8].

1.1.3 Philosophical Foundations of Education

Philosophy of education is a branch of philosophy that focuses on studying education, its goals, nature, and values. It examines the fundamental principles and concepts of education in relation to society. One of the fundamental questions is: What is education? Education is not only the acquisition of knowledge and skills, but it is primarily the formation of values and attitudes that will influence the development of society.

A significant issue is the essence of knowledge and how it is organised, assimilated, and transmitted. Knowledge is not a set of facts but a dynamic system that is constantly changing. The value of critical thinking is also one of the essential questions of the philosophy of education. This branch of philosophy also focuses on understanding the role of the teacher and student in the educational process.

The following philosophical schools affected pedagogical theories (Table 1.1). The directions of the philosophy of education are not limited to those shown in the table and continue to evolve, but are primarily based on the four schools mentioned.

Nowadays, the direction of postmodernism is shaped by the concepts of pragmatism and existentialism. Affirming the subjectivity of reality, representatives of this school (M. Apple, S. Aronowitz, J. Derrida, H.A. Giroux, J. Kincheloe and P. McLaren) argue for the value of individual experience. Critical thinking and critical pedagogy are the centres of this philosophy.

[8] Zogla I. (2018). Science of Pedagogy: Theory of Educational Discipline and Practice. *Journal of Teacher Education for Sustainability*. 20(2), 31–43.

Table 1.1

Characteristics of philosophic schools[9]

Philosophers	Main Features	Educational Implications
School of thought: IDEALISM		
Plato, Socrates, Immanuel Kant	Encourage conscious reasoning in the mind. Look for and value universal or absolute truths and ideas. Believe that ideas should remain constant throughout the centuries.	The curricular focus is on ideas rather than the student or specific content areas. Learning is also intrinsically motivated. Teaching methods include lectures, discussions, and Socratic dialogue. Essential to these teaching methods is posing questions that generate thoughts and spark connections
School of thought: REALISM		
Aristotle, John Locke	Argue for using the senses and scientific investigation to discover the truth. Applying the scientific method also enables individuals to categorise things into groups based on their fundamental differences.	The curricular focus is on scientific research and development. Outcomes of this thinking in classrooms today include the prevalence of standardised tests, serialised textbooks, and specialised curricula. Teaching methods used in realism include demonstration, recitation, critical thinking, observation, and experimentation.
School of thought: PRAGMATISM		
Charles Sanders Peirce, John Dewey	We believe that reality constantly changes, so we learn best through experience. The learner is continuously interacting with and being influenced by the environment. Based on what is learned at any point in time, the learner or the world in which they interact can be changed.	There is a need for teachers who can support students' learning by promoting questioning and problem-solving during lesson delivery. The curriculum is also interdisciplinary. Teaching methods used in pragmatism include Hands-on problem-solving, Experimenting, Projects, and Cooperative Learning.
School of thought: EXISTENTIALISM		
Soren Kierkegaard, Friedrich Nietzsche	Believe that our reality comprises nothing more than our lived experiences. Therefore, our final realities reside within each of us as individuals. The physical world has no real meaning outside our human experience.	The subject matter should be a matter of personal choice, as the teacher views each student as an individual. Answers come from within the individual in an existential classroom, not from the teacher. By examining students' lives through authentic thinking, students are actively engaged in the learning experience. They oppose considering students as objects to be measured, tracked, or standardised.

[9] The comparative table based on Perez D. Social Foundations of K-12 Education. 2022. URL: https://kstatelibraries.pressbooks.pub/dellaperezproject

Michel Foucault's poststructuralist perspective has provided educational thought with new concepts (e.g., discipline and problematisation), analytical techniques (e.g., archaeology and genealogy), and arguments (e.g., in terms of knowledge/power relations). The critical point Foucault referred to is that power, combined with knowledge, can punish students in non-violent, elegant ways. However, pushing students softly toward norms and formalities using techniques such as the laws of learning discovered through psychological knowledge can be as detrimental to students' psychology as violent methods are.

In particular, progressivism, which emerged in the mid-20th century, is based on the philosophy of pragmatism. Perennialism, on the other hand, absorbs the ideas of idealism and realism. While recent philosophies of education have limitations, they offer valuable new perspectives.

One key example is new pragmatism. Building on Dewey's connection between democracy and education, new pragmatists argue that curricula should centre on shared problem-solving experiences, not just traditional subjects.

The meaning, nature and dynamics of the education philosophy

Postmodern thought has introduced transformative ideas to education, challenging traditional hierarchies and promoting inclusivity. It fosters a "different way of seeing things," blurring rigid distinctions and advocating relativism.

Postmodernist thinkers urge educators to be reflective and create inclusive learning environments. It also challenges the dominance of a "mainstream" culture, often associated with white men. It emphasises the importance of "other" voices from local and minority cultures, leading to concepts like "border pedagogies."

However, postmodernism does not advocate for the complete rejection of tradition. Instead, it calls for a critical engagement with tradition, where authority is earned and transmission is vital, not unthinkingly followed. Postmodernism challenges the modernist emphasis on objectivity, advocating for a learner-centred approach where students construct knowledge through their skills and experiences by presenting them with problems and pre-prepared questions that encourage independent thinking and knowledge discovery. This shift alters the traditional teacher-student dynamic.

***Further Reading**: Perez D. Social Foundations of K-12 Education. 2022. URL: https://kstatelibraries.pressbooks.pub/dellaperezproject/*

1.2 Andragogy: A Framework for Adult Learning

1.2.1 Understanding Andragogy: Principles and Practices

The National Centre for Education Statistics' National Household Education Surveys Program defines the adult learner as a civilian, non-institutionalised adult 16 years and older pursuing formal education. Andragogy is actually a European concept that means “the art and science of helping adults learn”.

The terms andragogy and pedagogy are sometimes considered equivalent. Alexander Kapp, a German educator, first used the term **andragogy** in 1833. In the book entitled "Platon's Erziehungslehre" (Plato's Educational Ideas), he describes the lifelong necessity to learn. Kapp argued that education, self-reflection, and character development are the primary values in human life. He then referred to the vocational education of the healing profession, soldier, educator, orator, ruler, and man as the family father. Here we find patterns which repeatedly can be found in the ongoing history of andragogy: the education of inner, subjective personality ("character"); outer, objective competencies (what later is discussed under "education vs training"); and that learning happens not only through teachers but also through self-reflection and life experience, which makes it more than "teaching adults"[10].

E. Lindeman's 1926 work, "*The Meaning of Adult Education*", marked an early recognition that traditional teaching methods were not well-suited for adults. Adult learning thrives when individuals actively decide on the content, process and timing of their education. Lindeman outlined 4 key assumptions for adult learners, emphasising that education is integral to life itself, centred on personal growth, driven by real-life situations rather than academic subjects, and fundamentally built upon the learners' own experiences. He believed learning was to enrich life by understanding our experiences, offering a significant new perspective on how adults learn, even though he did not explicitly use the term "andragogy".

M. Knowles encountered the term "andragogy" from D. Savicevic in 1966 and developed its meaning through his substantial experience in adult education. He solidified his andragogical framework through his global practice, university teaching and the publication of "The Modern Practice of Adult Education". Knowles' andragogy emphasised a process design outlining key assumptions and processes for adult learning. His core assumptions included self-direction, the value of experience, role-based learning needs, and an immediate application perspective, internal motivation, and the need for learning rationales.


Andragogy with Malcolm Knowles

M. Knowles also outlined key learning processes: preparation, climate setting, cooperative planning, needs assessment, objective setting, sequence design, activity implementation, and progress evaluation.

Knowles[11] contrasts self-directed learning, rooted in andragogy, with teacher-directed learning, based on pedagogy. Andragogy and pedagogy represent distinct sets of assumptions about learning. A key characteristic of self-directed learners is their self-perception as independent. Andragogy differs from pedagogy and is

[10] Henschke J.A. (2016). A History of Andragogy and its Documents as they Pertain to Adult Basic and Literacy Education. *PAACE Journal of Lifelong Learning,* 25, 1–28.

[11] Knowls M.S. (1970). *The Modern Practice of Adult Education. From Pedagogy to Andragogy.* Cambridge Adult Education. Prentice Hall Regents, Englewood Cliff, 44–45.

closely linked to concepts of experiential and self-directed learning. The latter encompasses methodologies specific to how children learn (Table 1.2).

To summarise, andragogy is premised on at least these four crucial assumptions about the characteristics of learners that are different from the assumptions on which traditional pedagogy is premised. These assumptions are that as individuals mature: 1) their self-concept moves from one of being a dependent personality toward being a self-directed human being; 2) they accumulate a growing reservoir of experience that becomes an increasingly rich resource for learning; 3) their readiness to learn becomes oriented increasingly to the developmental tasks of their social roles; and 4) their time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly, their orientation toward learning shifts from one of subject-centeredness to one of performance centeredness.

Table 1.2

Comparative table for andragogy and pedagogy

Andragogy	Pedagogy
Self-directed learner	Learners depend on the teacher's decision.
A larger number of life experiences	Few life experiences
Learning needs are closely related to social roles	The teacher dictates learning needs
Problem-centred	Subject/content-centred
Intrinsically motivated	Extrinsically motivated

The 'theory' of andragogy was criticised for implying that all adult learners are self-directed and that children are not, and for lacking "the reflective, personal and serendipitous aspects of adult learning while suggesting a reductionist and behaviouristic, competency-based approach to practice."[12] In addition to this critical remark, the theory of andragogy faces several critical challenges:

Limited Representation of Adult Learning: Andragogy fails to capture the full spectrum of adult learning experiences, particularly in vocational and occupational contexts.

The Overemphasis on Learner Autonomy: The assumption that all adults are capable of and desire complete autonomy in learning is questionable.

The Over-Simplification of Adult Motivation: Adults have many motivations for learning, and those motivations are not uniform.

Weak Relationship Between Motivation and Learning: The theory does not adequately explain the complex interrelationships of these factors.

While andragogy gained popularity and widespread use in various fields, it faced significant opposition. Even Knowles later revised his stance, suggesting that

[12] Tight M. (2002). *Key Concepts in Adult Education and Training.* 2nd ed. London: Routledge Falmer.

pedagogy and andragogy are not strict opposites but two ends of a spectrum. He acknowledged that the most suitable approach often lies somewhere between the two and that either model could apply to children and adults, depending on the situation. Some research has challenged common myths about self-directed learning, emphasising that adults' capacities vary, exist on a continuum, and do not necessarily mean learning in isolation. According to P.O. Ozuah (2005), the relationship between andragogy and pedagogy is one of opposition but not mutual exclusivity. He argues that while the fundamental assumptions of pedagogy (learner dependency, subject-centeredness, extrinsic motivation, disregard for prior experience) are contrary to the principles of andragogy, andragogy can still acknowledge and accept the use of pedagogy in specific situations. For instance, andragogical practitioners recognise that pedagogy might be appropriate when adult learners are dependent and lack relevant prior experience. Furthermore, Ozuah suggests a dynamic relationship where andragogy aims to gradually move learners away from the dependence inherent in pedagogy towards greater autonomy and self-direction[13].

The interplay between pedagogy (teaching children) and andragogy (teaching adults) is a basis for a flexible approach to modern education. Learners can utilise pedagogical and andragogical principles simultaneously, but their reliance on each varies. The 4 stages represent different combinations of pedagogy and andragogy:

- **Stage 1 (High Pedagogy, Low Andragogy):** Learners depend highly on the instructor and structured teaching methods, similar to children's learning styles.
- **Stage 2 (High Pedagogy, High Andragogy):** Learners benefit from a structured approach and engage in self-directed learning. They are becoming more active participants.
- **Stage 3 (Low Pedagogy, High Andragogy):** Learners are primarily self-directed and prefer less structured learning environments. They take ownership of their learning.
- **Stage 4 (Low Pedagogy, Low Andragogy):** Learners are self-directed. This stage is very independent; the learner can learn without structure or assistance.

This model suggests that learners progress through these stages from dependence to independence[14].

S. Pew (2007) critiques rigid pedagogical and andragogical approaches. Pew argues that professors often adhere to either a purely pedagogical or andragogical approach, which can be detrimental. Mismatched approaches (pedagogy when

[13] Ozuah P.O. (2005). First, there was pedagogy and then came andragogy. *The Einstein Journal of Biology and Medicine,* 21, 83–87.

[14] Delahaye B.I., Limerick D.C., Hearn, G. (1994). The Relationship between Andragogical and Pedagogical Orientations and the Implications for Adult Learning. *Adult Education Quarterly*, 33(4), 187–200.

Tight M. (2002). Key Concepts in Adult Education and Training. 2nd ed. London: Routledge Falmer

andragogy is needed, or vice versa) can negatively impact student motivation. The researcher highlights that even in student-centred approaches, instructors often maintain control over motivation, reverting to pedagogical practices. Moreover, faculty often revert to traditional pedagogical methods. Pew suggests that faculty should assist students in developing themselves rather than trying to fix them. The changing learning environment necessitates a shift towards more andragogical approaches[15].

Although andragogy has been widely critiqued, it has nonetheless exerted significant influence, as many university instructors identify features they observe in their students. Various learning approaches frequently applied and debated in higher education – such as experiential learning, learner independence, and self-directed study – are associated with or rooted in adult education. In addition, substantial domains within higher education, including enhancing the student experience, providing support, and promoting broader participation, remain strongly connected to adult education practices and concepts.

According to the researchers, forms of psychology, particularly humanistic versions, have significantly influenced pedagogy in adult education. Humanistic education emerged as a reaction to the behaviourist concern with the external environment. The underpinning philosophy of humanistic education is that each individual must determine and control their development path. Andragogy is based on humanistic assumptions that the adult learner is a self-directed human being who possesses rich prior experiences, has a readiness and orientation to learn related to the roles and responsibilities of adult life, and is internally motivated.

Andragogy is based on the following four assumptions. The assumptions are that, as a person matures,

1. Their self-concept moves from one of being a dependent personality toward one of being a self-directed human being;

2. s/he accumulates a growing reservoir of experience that becomes an increasing resource for learning;

3. Their readiness to learn becomes increasingly oriented to the developmental tasks of their social roles;

4. Their time perspective changes from the postponed application of knowledge to the immediacy of application, and accordingly, their orientation toward learning shifts from subject-centeredness to problem-centeredness.

> "I have described this faith in the ability of the individual to learn for himself as the 'theological foundation' of adult education."[16]

[15] Pew S. (2007). Andragogy and Pedagogy as Foundational Theory for Student Motivation in Higher Education. *InSight: A Collection of Faculty Scholarship. 2*, 14–25.

[16] Knowles M.S. et al. (1998). *The Adult Learner.* 5th ed. Houston: Gulf Publ. Co.

Further Reading: Knowles M. et al. *The Adult Learner. 5th ed. Houston: Gulf Publishing Company, 1998.*

1.2.2 The Adult Learner: A Multifaceted Definition and Its Implications

Defining "adult learner" goes beyond the age of 18. Diverse definitions of adult learners exist, acknowledging factors such as age, prior education, and life roles. Adult learners seek education to enhance their skills and meet their responsibilities. They come from varied backgrounds and occupations, and their learning is often goal-directed.

Adulthood is acknowledged as a multifaceted developmental process, manifesting in psychological, social, and professional spheres. Rather than a distinct event, it reveals a continuous trajectory of growth and adaptation. Psychological maturity is characterised by the rational deployment of individual capacities, effective emotional regulation, and reasoned conduct in daily life. Successful interpersonal relationships, coordinating individual and collective needs, and accepting societal norms and responsibilities are evidence of social maturity. Professional maturity is characterised by achieving a stable and fulfilling career, which is attained through informed choices and the capacity for self-sufficiency. In essence, adulthood requires a sustained effort to harmonise these domains, fostering emotional stability, meaningful relationships, and productive engagement, thereby contributing to well-being.

The most commonly used definition of adult learning is based on the definition adopted by UNESCO in 1976:

The term "adult education" denotes the entire body of organised educational processes, whatever the content, level and method, whether formal or otherwise, whether they prolong or replace initial education in schools, colleges and universities as well as in apprenticeship, whereby persons regarded as adult by the society to which they belong develop their abilities, enrich their knowledge, improve their technical or professional qualifications or turn them in a new direction and bring about changes in their attitudes or behaviour in the two-fold perspective of full personal development and participation in balanced and independent social, economic and cultural development; adult education, however, must not be considered as an entity in itself, it is a sub-division, and an integral part of, a global scheme for lifelong education and learning[17]. Thus, adult education is provided for adults after initial education and training for professional and/or personal purposes, and it aims to:

– provide general education for adults in topics of particular interest to them (e.g., in open universities);

– provide compensatory learning in basic skills which individuals may not

[17] UNESCO. *Recommendation on the Development of Adult Education*, adopted by the General Conference ,19th session. Nairobi, 26 November 1976.

have acquired earlier in their initial education or training (such as literacy, numeracy) and thus to;

– provide access to qualifications not gained, for various reasons, in the initial education and training system; – acquire, improve, or update knowledge, skills, or competencies in a specific field: this is continuing education and training.

The andragogical model, developed by M. Knowles, provides a theoretical lens for examining the differentiated learning experiences of adults. This theory emphasises the importance of instructors recognising and addressing the distinct motivations of adult learners, as well as a stronger focus on task completion with clear, need-based goals. Particularly during economic downturns, many adults pursue further education to maintain professional competitiveness.

The six principles of Knowles' andragogy theory:

Self-Concept

As a person matures, their self-concept evolves from that of a dependent personality to that of a self-directed individual. Children maintain a self-concept of total dependency, but a self-concept of self-direction characterises adulthood. Once this psychological maturation occurs, the adult naturally feels most comfortable in situations that allow them to self-direct independently.

Role of Experience

As people mature, they accumulate a growing reservoir of experience that becomes an increasing resource for learning. Unlike children, who often define themselves in terms of other people (such as teachers, parents, or siblings), adults tend to define themselves by their experiences. Experience, in itself, can be a form of expertise that teachers should draw upon and use as a resource for learning.

Readiness to Learn

As a person matures, their readiness to learn becomes increasingly oriented towards the developmental tasks of their social roles and life situations. Adult learners want to learn because of their roles in their current stage of life, whether at work or home, as parents or spouses.

Orientation to Learning

Traditional pedagogy assumes that young students have a subject-based approach to learning, partly because they lack extensive life experience. Andragogy assumes that adults approach learning with a problem-based approach.

Need to Know/Why

Adults often pursue education because they need to acquire new knowledge and skills. Adult learners carefully consider *why* they are learning something. In pedagogy, students are assumed to learn what they are told to learn. Adults want to understand how the information will benefit them in life and what impact it will have if they do not learn it.

Intrinsic Motivation

Adult learners are responsive to some external motivators (better jobs, promotions, higher salaries). Still, the most potent motivators are internal pressures (the desire for increased job satisfaction, self-esteem, or life quality).

The Figure (Fig. 1.2) visually represents andragogy as a framework built upon six core adult learning principles: the learner's need to know, self-concept, prior experience, readiness to learn, orientation to learning, and motivation. These principles, located at the model's centre, are influenced by external factors, including individual and situational differences, as well as learning goals, depicted in the outer rings. The strength of andragogy lies in its adaptability; it functions best when tailored to specific learners and learning environments.

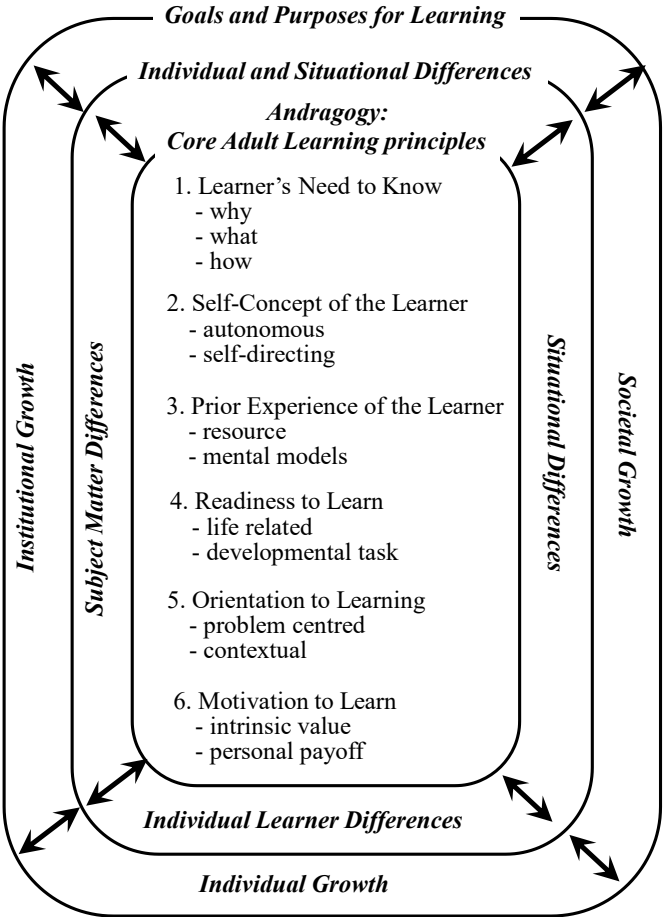

Figure 1.2 Andragogy in Practice[18]

[18] Knowles M., Holton III E., Swanson R. (1998). *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development.* San Diego, CA: Elsevier.

Table 1.3[19]

The Difference Between Adult Learning and Childhood Learning

LEARNING PRINCIPLE	HOW KIDS LEARN	HOW ADULTS LEARN
Learning from Life Experiences	Children have limited life experiences to draw from, so they often rely more on imagination and curiosity to make connections.	Adult learners come with a wealth of life experiences. They tend to engage more deeply with learning when they can relate the content to their personal and professional experiences.
Motivation and Goal Orientation	External factors, such as parental guidance, curriculum, and societal expectations, play a significant role in guiding children's learning.	Adults are often self-motivated learners. They seek knowledge and skills that align with their personal goals, career advancement, or practical needs.
Self-Directed Learning	Children's learning is more structured and guided by teachers, parents, and educational systems.	Adult learners prefer to have a say in what and how they learn. They value autonomy and appreciate the opportunity to control their learning path.
Readiness to Learn	Children are often required to learn a broad range of subjects, regardless of their immediate practicality, and their readiness to learn can vary based on their developmental stages.	Adults are more likely to be receptive to learning when they perceive a need for the knowledge or skills being taught. They appreciate the practical application.
Problem-Cantered Learning	Children's learning often involves the acquisition of foundational knowledge and is more teacher-centred.	Adult learners thrive in problem-centred learning environments. They prefer to tackle real-world challenges and apply solutions to their contexts.
Learning Pace	Children often follow a predetermined curriculum schedule, regardless of individual learning pace.	Adult learners generally have a self-regulated learning pace. They may want to delve deeper into topics of interest or spend more time on areas where they struggle.
Integrating the New and Old	Children are building their foundational knowledge and may not have as much existing information to connect with.	Adults bring a wealth of prior knowledge to the learning process. New information is often integrated with existing knowledge frameworks.
Learning Environment	Children's learning environments are often structured to encourage cooperation and socialisation.	Adult learners benefit from collaborative and interactive learning environments that allow them to share experiences and insights with peers.

[19] *Everything You Needed to Know About Adult Learning Theory.* URL: https://www.neit.edu/blog/what-is-adult-learning-theory

W.L. Schroeder (1980) proposed a classification of adult education providers based on their organisational focus. Type I agencies are solely dedicated to adult education. Traditionally, youth-oriented type II has expanded to include adult programs as a secondary function. Type III agencies offer adult education in conjunction with other community services, such as libraries or health programs. Type IV agencies, such as businesses or unions, utilise adult education to further their internal objectives. In addition, there are also further classifications of adult education: formal, nonformal, informal, and self-directed.

Robert W. Pike, author of "Creative Training Techniques" and an internationally recognised expert in human resources development, has a significant impact on adult training. He developed "Pike's Laws of Adult Learning", which enhances existing adult learning philosophies and provides practical direction for trainers.

Law 1: Adults Learn Best Through Experience. Adults, like babies, thrive on experiential learning. Babies enjoy discovery because every new exploration is a fresh experience. Educators traditionally view experiential learning as a limited approach for children, resulting in few secondary and higher education courses prioritising it. However, educators now recognise that hands-on experience enhances adult learning. Moreover, trainers must acknowledge and respect adults' wealth of prior experience.

Law 2: Self-Generated Ideas Drive Belief. People do not argue with their data. People believe in the ideas they generate themselves. Therefore, when training adults, trainers should present structured activities that develop students' ideas, concepts, or techniques rather than simply providing adults with information to memorise.

Law 3: Fun Maximises Learning. Humour helps individuals cope with stress and anxiety, promoting a more comfortable learning environment. When you actively participate in learning and understand how it will improve your job or chosen task, you experience the joy of learning.

Law 4: Behaviour Change Demonstrates Learning. Learning occurs only when behaviour changes. Action, not just knowledge, matters. The ability to apply new material to measure learning. Experiences that facilitate the successful practice of a new skill enhance retention and on-the-job application.[20]

To truly understand adulthood, it is essential to look beyond age and consider psychological, social, and professional growth. Effective adult learning, as described by andragogy, is characterised by self-direction, the application of experience, timely readiness, problem-solving, and intrinsic motivation. The learning environment for adults should be collaborative and interactive. Various agencies offer adult education with distinct organisational focuses.

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[20] Pike R.W. (1989). *Creative Training Techniques Handbook*. Minneapolis, MN: Lakewood Books.

1.2.3 Self-directed Learner

The term "Self-directed learning" is closely connected to the corresponding term in the resolutions of the Ministers of Education of the OECD countries (January 1996), the Conference of Ministers of Education of the Nordic Council (October 1996), and the Delors Commission's Report on Learning in the 21st Century. In contrast to traditional, content-focused education, self-directed learning prioritises the learner's autonomy and independence. This fundamental difference explains its varied reception. However, the increasing need for self-directed individuals and work environments necessitates a stronger focus on this learning method. Thus, self-directed learning lacks a unified definition. However, the core principle remains: these learners manage their learning. Self-directed learning, where adults take ownership of their education, is a widely recognised characteristic of adult learners, although its application varies greatly. S.B. Merriam outlines three distinct goals of this approach:

- Humanistic: This perspective emphasises the potential for adults to enhance their self-directedness. Learners possess varying degrees of this ability, influenced by their experiences and motivations, and can further develop it through intrinsic or extrinsic guidance.
- Transformational: Self-directed learning can trigger transformative experiences through critical self-reflection. This process, often initiated by a "disorienting dilemma" – such as job loss – encourages adults to reevaluate their beliefs and perspectives. Through reflection and discourse, they gain a deeper understanding of themselves, paving the way for further growth.
- Emancipatory: This view argues against a purely individualistic approach, advocating for collective and cooperative learning.[21]

For many professionals, fostering personal autonomy is the core objective of self-directed learning. However, the notion that all adults are inherently capable of complete self-teaching in every learning context is widely disputed. Learner capabilities and preferences fluctuate based on the specific learning situation.

G.O. Grow (1991) argues that self-directed learning is situational. He creates a staged model, paying attention to teaching approaches (Table 1.4).

Acknowledging that insufficient and excessive self-directedness can present challenges is crucial. Learners with advanced subject knowledge and strong learning skills may find highly structured environments stifling. Conversely, those new to a subject or lacking self-directed learning skills might feel overwhelmed in completely autonomous settings. Given the diverse range of learner readiness within a group, educators must design learning experiences that cater to various stages of self-direction. Furthermore, a learner's stage of development may be influenced by self-teaching skills, personal autonomy, or a combination of both.

Self-directed learning is situational, not a universal trait of adulthood. It varies based on context, not just age. Andragogy's idealised view of adults as inherently

[21] Merriam S.B., Brockett R.G. (2007). *The Profession and Practice of Adult Education: An Introduction.* San Francisco: Jossey-Bass.

self-directed often clashes with reality, as many lack motivation and personal responsibility. Traditional school settings can confuse students who expect teacher-led instruction. Teachers must recognise that self-directed learners may be a minority and adjust their approach accordingly.

Table 1.4

Staged model of G.O. Grow[22]

Stage	Student	Teacher	Examples
Stage 1	Dependent	Authority, coach	Coaching with immediate feedback, drill. Informational lecture. Overcoming deficiencies and resistance
Stage 2	Interested	Motivator, guide	Inspiring lecture plus guided discussion. Goal-setting and learning strategies
Stage 3	Involved	Facilitator	Discussion is facilitated by a teacher who participates equally. Seminar. Group projects
Stage 4	Self-directed	Consultant, delegator	Internship, dissertation, individual work or self-directed study group

A key competence: the ability to pursue and persist in the Recommendation of the European Parliament and learning, to organise one's learning, including through effective management of time and information, both individually and in groups. This competence encompasses awareness of one's learning process and needs, identifying opportunities, and overcoming obstacles to achieve successful learning. It also involves gaining, processing, and assimilating new knowledge and skills, as well as seeking and utilising guidance. Learning to learn enables learners to build on their prior knowledge and life experiences, using and applying these skills in various contexts, such as at home, at work, in education, and during training. Motivation and confidence are crucial to an individual's competence.[23]

Clearly, both SDL and SRL carry an element of student control. However, the degree of control the learner has, specifically at the beginning of the learning process when the learning task is defined, differs in SDL and SRL. In SDL, the learning task is always defined by the learner. A self-directed learner should be able to define what they need to learn to achieve their goals. In SRL, the learning task can be generated by the teacher. So, SDL can encompass SRL, but the opposite does not hold.[24]

[22] Grow G.O. (1991). Teaching Learners to Be Self-Directed. *Adult Education Quarterly*, 41, 125–149.

[23] *Recommendation of the European Parliament and of the Council, 18.12.06 on Key Competences for Lifelong Learning.* https://eur-lex.europa.eu/eli/reco/2006/962/oj/eng

[24] Loyens S.M.M., Magda J., Rikers R.M.J.P. (2008). Self-directed Learning in Problem-based Learning and its Relationships with Self-regulated Learning. *Educ. Psych. Rev.* 20(4), 411–427. https://doi.org/10.1007/s10648-008-9082-7

Chapter 4 of this guide will examine the concept of the self-regulated learner, which is related to the idea of the self-directed learner. The distinction between self-regulated and self-directed learning is a subject of ongoing debate, with some considering them synonymous while others perceive a difference.

1.3 Learning Society in the Lifelong Learning Context

1.3.1 From Education 1.0 to 4.0: A Transition to Society 5.0

Society 5.0 is a concept originating from Japan, referring to a future vision of society that integrates the physical and virtual worlds to create a more sustainable and inclusive society. It builds upon previous societal stages and aims to leverage advanced technologies to address various social challenges. Society 5.0 represents the latest stage in the evolution of human life. According to F. Fukuyama (2018), Society 1.0 represents a community of hunter-gatherers living in harmony with nature (the Hunting Society). Society 2.0 transitions to agrarian societies characterised by communal agricultural practices, fostering improved organisation and nation-building (known as the Agrarian Society). Society 3.0 emerged as a pro-industrial society shaped by the Industrial Revolution and widespread mass production activities (termed the Industrial Society). Society 4.0 denotes an information-centric society, recognising the value of intangible assets interconnected within an information network (dubbed the Information Society). Fukuyama further outlines Society 5.0 as an advancement from the information-based Society 4.0, emphasising human-centric social welfare as its overarching goal (referred to as the Super Smart Society)[25].

Following the first Industrial Revolution at the end of the 18th century, the education sector expanded, marking the beginning of the Education 1.0 era. It was characterised by the mechanisation of systems, which resulted in the emergence of enabling technologies for education, such as the paper-making machine, mechanical printing, the graphite pencil, the ballpoint pen, and the typewriter.

During this period, they stood out due to educational philosophies based on essentialism, behaviourism, and instructivism. The educator was seen as a sage, and the student had a mostly passive role. Therefore, in the Education 1.0 period, the teacher was the centre of education, tasked with determining and disseminating the essential information the students needed.

Education 2.0 coincided with the Second Industrial Revolution in the early 20th century, characterised by mass production, industrialisation, and the widespread adoption of electricity. In this period, the primary information sources were open-source materials from libraries. The technological advancement in Education 2.0 brought relevant contributions to this sector, and the first electronic devices used in education, such as printers, calculators, and computers, emerged.

The educational philosophies of this period were primarily andragogical and constructivist in nature. The teacher's role shifted from that of a sage to a reference

[25] de Villiers C. (2024). The Impact of Society 5.0 on Curriculum Development in Higher Education. *J. Ethics in Higher Educ.* 4, 1–25. DOI: 10.26034/fr.jehe.2024.5953

and information source, helping to develop the tools for professional implementation. The student's role remained passive. However, an active role for students emerged, where students became 'owners of the knowledge.' The learning approach was also teacher-centred, but peer assessment was encouraged, with the teacher still being a fundamental component. During this period, practices such as correspondence education and broadcast education emerged.

Education 3.0 emerged during the third industrial revolution at the end of the 20th century, revolving around computerisation, automation and control. In this new era of communication, students and teachers are beginning to transition to a vision in which they no longer need to participate in synchronous sessions for learning to occur. Multimedia, online tools, and virtual laboratories supported the teaching-learning processes by utilising multiple resources. This teaching-learning approach was more heutagogical[26] and connective. Each teacher was considered an orchestrator or collaborator, empowering students to build their knowledge.

S. Hase and C. Kenyon first proposed heutagogy, or self-determined learning, in Australia in 2000. It is the next stage in learning's evolution, following pedagogy (teacher-led) and andragogy (instructor-guided, self-directed). Heutagogy emphasises self-determined and self-adjusting learning, incorporating double-loop learning—a process that involves reflection and public testing of knowledge, followed by adjustments to methods and assumptions. Problem-based learning thrives in this model. Unlike andragogy, where the curriculum or instructor often defines questions, heutagogical learners formulate their questions. However, self-determined learning is not a solitary endeavour. Learning is inherently social, and a crucial part of heutagogy is testing acquired knowledge in diverse social contexts to examine information, refine assumptions, and critically adapt approaches.

The fourth industrial revolution encompasses innovative pedagogical procedures and best practices that characterise this period, comprising what is known as Education 4.0. The researchers suggest the following definition:

"Education 4.0 is the current period in which Higher Education institutions apply new learning methods, innovative didactic and management tools, and smart and sustainable infrastructure, mainly complemented by new and emerging ICTs (Information and Communication Technologies) to improve knowledge generation and information transfer processes. Combining these resources during teaching-learning processes will support the training and development of desirable critical competencies in today's students".[27]

[26] Hase S., Kenyon C. (2000). From Andragogy to Heutagogy. *Ultibase Articles*, *5*(3), 1

[27] Miranda J., Navarrete Ch., Noguez J. et al. (2021). The Core Components of Education 4.0 in Higher Education: Three Case Studies in Engineering Education. *Computers & Electrical Engin.* 93(c). https://doi.org/10.1016/j.compeleceng.2021.1072

The diagram (Fig. 1.3) compiles the relevant concepts of the higher education transition from Education 1.0 to the current industrial and educational paradigm of Education 4.0.[33] Digital transformation will intensely reshape society, impacting everything from personal lives and government operations to industrial infrastructure and education. Society 4.0, also known as the Information Age, has connected people to a global network of information.

	Education 1.0	Education 2.0	Education 3.0	Education 4.0
Period	**Late 18th century**	**Early 20th century**	**Late 20th century**	**Present**
Philosophy	Essentialism, behaviorism, and instructivism	Androgogical, constructivist	Heutagogical, connectivist	Heutagogical, peeragogical and cybergogical
Educator role	Sage	Guide, information source	Orchestrator, curator and collaborator	Mentor, coach, collaborator, reference
Student role	Largely passive	Emerging active, "owning of the knowledge"	Active, Knowledge ownership", initial independence	Active, high independence, trajectory designer
Approach	Teacher-centred	Peer assessment encouraged, high teacher importance	Co-constructured, first student-centred	Mostly student-centred
Learning outcome	Grades, graduation degree	License to professional practicing	Prepared for practice and scenario analysis	Training of key competencies both soft and hard
Enablers	Mechanical printing, graphite pencil, ball-point pen, typewriter	First computers, electronic devices and calculators	Computers and widespread use of the internet	ICTs tools and platforms powered by IoT
Information source	Standard texts	Adopted texts and open-source material (physical)	Texts, case studies, second hand experience	Based on online sources
Facilities	Universities classrooms	Blended laboratories and classrooms	Blended and flexible physical shared spaces	Cyber and physical spaces both shared and individual
Industrial technology	Mechanical systems, steam powered	Mass production, industrialisation and electricity	Internet access, automatization and control	Connectivity, digitalisation & virtualisation technology

Figure 1.3 Concepts of the higher education transition from Education 1.0 to Education 4.0

Society 5.0 is built on key elements, including upgraded infrastructure, the growth of technologically advanced industries (such as fintech, agritech, edtech, healthcare, and logistics), and the widespread integration of artificial intelligence. Society 5.0, driven by AI, empowers individuals with access to advanced skills and abilities, regardless of location. This "distribution and commoditisation of abilities" significantly increases individual potential. Digitalisation and digital transformation will be inclusive, making technology more accessible and available to everyone.

Key elements of Society 5.0 include:

Human-Centred Approach: Society 5.0 places a strong emphasis on

improving the quality of life for individuals. It aims to address societal challenges while ensuring that technology serves the needs and well-being of people.

Integration of Physical and Virtual Worlds: The concept envisions a highly connected society where the digital and physical worlds interact seamlessly. This integration enables enhanced data sharing, analysis, and decision-making, allowing for more effective addressing of societal issues.

Sustainable Development: Society 5.0 aims to create a sustainable society that balances economic growth with environmental preservation. It seeks to leverage technology to develop clean energy solutions, minimise waste, and promote environmentally friendly practices.

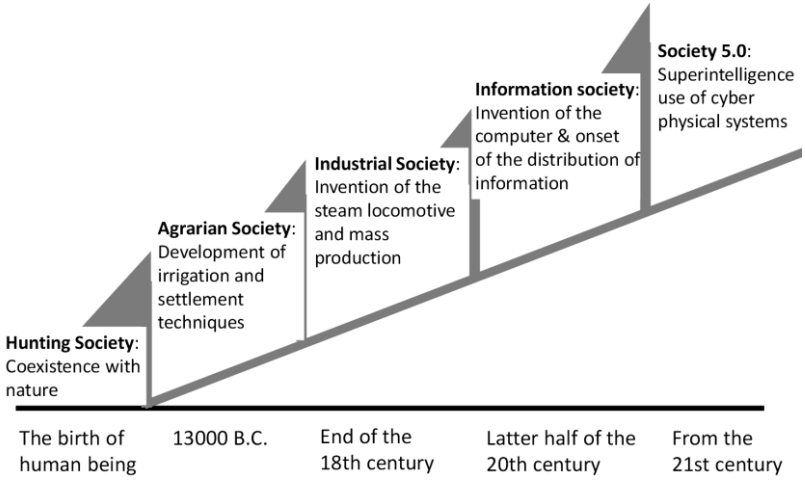

Figure 1.4 Societies in human history[28]

Cross-Sector Collaboration: Society 5.0 emphasises the importance of collaboration among various sectors, including government, industry, academia, and citizens. It encourages partnerships and cooperation to address social challenges collectively[29].

Society 5.0 has a profound impact on the development of higher education curricula. To prepare students for this technologically advanced era, institutions are adapting in several key ways:

- emphasising technological literacy (AI, big data, cybersecurity, IoT, robotics);
- promoting interdisciplinary problem-solving (critical thinking, creativity, communication, teamwork);

[28] Adapted from: Ramírez Ibarra, P. I. (2023). Society 5.0, beyond Industry 4.0. A documentary investigation with a national perspective. *Entretextos, 15(39), 1–20. https://doi.org/10.59057/ibe-roleon.20075316.202339674.*

[29] Suzuki K. (2021). Contribution of the Japan Society for Educational Technology toward a Super-Smart Society (Society 5.0). *Information and Technology in Education and Learning,* 1(1), 1–7. https://doi.org/10.12937/itel.1.1.Inv.p001.

- integrating ethical and social implications of technology (privacy, equity, social justice);
- fostering entrepreneurship and innovation;
- cultivating lifelong learning and adaptability (critical thinking, problem-solving, learning agility).

Table 1.5

Active Teaching Methodologies in Education 5.0 *

Methodology	Description	Key Features	Relationship to Education 5.0 (Distributed/Collective Learning)
Reverse Teaching (Flipped Learning)	Students learn basic concepts independently (often at home) while the teacher guides them through more complex material in class.	Focus on learning outcomes; Blended learning approach; Student autonomy for foundational knowledge.	Supports distributed learning by allowing students to learn at their own pace and on their own schedule for basic concepts. Facilitates collective learning through in-class discussions and problem-solving.
Game-Based Learning (GBL)	Uses games in the classroom to teach content, develop skills, and assess learning.	Engages students through play, motivates learning, and provides immediate feedback.	It can be used in distributed and collective learning environments, fostering engagement and collaboration.
Project-Based Learning	Students work on a project (often in groups) to acquire knowledge and skills.	Student-centred; Develops problem-solving and collaboration skills; Real-world application of learning.	Aligns with collective learning by encouraging teamwork and shared problem-solving. It can also incorporate distributed learning elements through online collaboration tools.
Experience-Based Learning (Learning-by-Doing)	Students learn through direct experience within a structured conceptual and operational framework.	Hands-on learning; Practical application of knowledge; and Develops critical thinking and reflection.	Supports distributed learning by allowing students to explore and experiment independently. It can be combined with collective reflection and discussion.
Role-Playing Games (RP)	Uses simulations to analyse and optimise current and future processes.	Provides a safe environment for experimentation, develops problem-solving and decision-making skills, and applies to various fields.	It can be used in distributed and collective learning, allowing students to explore complex systems and scenarios collaboratively or independently.

* *For more information on learning and teaching strategies, see Chapter 4.*

Society 5.0 significantly reshapes Media and Design curricula. Key changes include a strong emphasis on digital media proficiency (graphic design, video,

animation, interactive media), data visualisation, ethical and responsible design, AI and automation integration, content creation for emerging platforms, transmedia storytelling, cultural sensitivity and global perspective, sustainability and green design, critical media literacy, interdisciplinary collaboration, and entrepreneurship skills.

1.3.2 Navigating the Learning Society: Trends, Theories, and Transformations

A learning society is connected to the concept of lifelong learning. It recognises that learning is not limited to schools or universities; it is a continuous process that occurs everywhere and at any time, encompassing both structured and informal learning experiences. The notion of a 'learning society' goes back to ancient Greece in the West and to Confucius in the East. The concept has reappeared and gained fresh attention since the late twentieth century. This renewed focus reflects shifting views of learning that move beyond the usual divide between formal and continuing education, expanding to lifelong learning and learning throughout life. The concept of a learning society originates from thinkers like D. Schön (1973), who recognised the need for continuous learning in the face of ongoing change within modern societies.

> We must, in other words, become adept at learning. We must become able not only to transform our institutions in response to changing situations and requirements; we must invent and develop institutions which are 'learning systems', that is to say, systems capable of bringing about their continuing transformation[30].

R.M. Hutchins (1970) expanded this idea to the business world, arguing that educational institutions alone cannot keep pace with the dynamic nature of the business world.

> Education was not a segregated activity, conducted for certain hours, in certain places, at a certain time of life. It was the aim of the society. The city educated the man. The Athenians were educated by culture and by paideia[31].

Schön emphasised how various entities, including businesses, function as learning systems that can be improved, particularly as they transition from product-based to systems-based organisations. Hutchins, writing in 1968, emphasised that a learning society is essential because traditional education systems are unable to meet the demands of a rapidly changing world. He viewed learning as crucial for societal change, drawing a parallel to the learning culture of ancient Athens.

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[30] Schön D.A. (1973). *Beyond the Stable State. Public and Private Learning in a Changing Society*, Harmondsworth: Penguin.

[31] Hutchins, R.M. (1970). *The Learning Society*, Harmondsworth: Penguin. P. 133

Two key reports commissioned by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) have been important catalysts for renewed thinking on the meaning of a learning society in modern times:

- The first is "Learning to Be: The World of Education Today and Tomorrow", known as the Faure Report, which proposed that lifelong education is a "master concept" at the heart of learning societies.
- The second report, "Learning: The Treasure Within," commonly known as the Delors Report, highlighted the importance of learning throughout life through its "four pillars of learning".

The enhanced Delors framework emphasises the importance of learnability, or the ability to learn, the skills that can be applied to various collective contexts (i.e., the workplace, education systems, family, community and caring for our world).

A learning society effectively mobilises its resources in every sector to

- promote inclusive learning from basic to higher education,
- revitalise learning in families and communities,
- facilitate learning for and in the workplace,
- extend the use of modern learning technologies,
- enhance quality and excellence in learning, and
- Foster a culture of lifelong learning. It will foster and promote individual empowerment and social cohesion, as well as economic and cultural prosperity, ultimately leading to sustainable development.

The World Economic Forum (WEF) reports that the world of work is undergoing a dramatic shift as automation (particularly robotics), AI, and other emerging technologies are developing at an unprecedented rate. It significantly impacts the industry, as well as the required jobs, tasks, and skills. Indeed, the future "employment landscape" will undergo dramatic changes due to the increasing rate of computerisation and AI. It is not just routine tasks that will be impacted. Increasingly, computers are handling more complex and variable data, which means that jobs that were thought to be "uncomputerisable" are being affected; for example, in diagnostic ... It is, therefore, more urgent than ever to rethink elements and principles of what should be a good standard of work and living for all. It has implications for the content and approaches to education in schools, as well as the characteristics of a learning society.[32]

The "learning organisation" branch of research focuses on identifying the organisational culture and climate factors contributing to an organisation's recognition as a learning organisation. Several models outline these key variables. For instance, some researchers have identified seven dimensions crucial for achieving this status: creating continuous learning opportunities, fostering inquiry and dialogue, promoting collaboration and team learning, establishing systems for capturing and sharing knowledge, empowering individuals towards a shared vision,

[32] *Education in the Asia-Pacific Region: Issues, Concerns and Prospects* / Eds. Sungsup Ra Shanti Jagannathan, Rupert Maclean. Volume 58, 2021. P. 19–20.

connecting the organisation to its external environment, and having leaders who model and champion learning.

Let us look at the case[33]:

Managing a Learning Society in a Manufacturing Plant: The University of Vermont
The state's largest private employer in Vermont is IBM's microelectronics manufacturing plant, which employs over 7,500 people. This company's function includes an academic partnership with the University of Vermont and Vermont Technical College. This higher education partnership has created an industrial training "company" that provides over 2,000 courses and 250,000 contact hours of training each year to the employees of one industrial site partnership. There are several reasons for the continued success of this university- or college-based training company. One significant factor in the ongoing operation resulted from the team leaders' insistence on creating an Education and Training Council that would guide the company's work and include leadership from both the educational institutions and IBM. The practical result of this unique organisational component has been a commitment to learning throughout the partnership. The first group of council members has taught the higher-education members to operate using an outcomes model that seeks quick results. In return, higher education provides new facts about skill gaps in the workforce and the educationally best practices to close them. This unique partnership works to improve IBM's bottom line. The University of Vermont offers many graduate and engineering courses at the IBM site through compressed video broadcasts. University and college faculty are working much more closely with their colleagues at IBM to add value to their credit courses. Through these contacts, higher education has helped establish a women's and minority engineering scholarship program. Qualified undergraduates will receive work experience and a guarantee of an engineering position upon successfully completing their degree programs.

The case highlights the power of collaboration between industry and higher education in addressing workforce development needs, promoting lifelong learning, and driving economic growth. It demonstrates a practical approach to building a learning society within a specific organisation and its surrounding community.

With the emergence of new learning dimensions, it is crucial to actively explore how to build *a learning culture* in the new context, motivating individuals

[33] *According to: Returning to Our Roots, A Learning Society. Fouth Report Kellogg Commission on the Future of State and Land-Grant Universities.* Kellogg Commission on the Future of State and Land-Grant Universities, 1996. P. 42

and organisations to thrive at both the community and societal levels. The cultural elements of a learning organisation often include a market-oriented and entrepreneurial approach, characterised by facilitative leadership, a flexible and open structure, and decentralised planning.

Learning is the process by which an individual assimilates social experiences. In the 21st century, cognitive and social theories are among the best-known. Early 20th-century conceptions of learning often overlooked the social context of individual development. By mid-century, learning theories began to incorporate the influence of broader contexts and the importance of emotional and social impacts.

Learning culture has several definitions, including related concepts such as the learning organisation and learning climate. While there is no unifying definition or theory of learning culture, there are several common concepts that can be found in many of the definitions:

• supporting individual learning and transformation, and allowing this knowledge to shape strategy and process,

• encouraging teams to learn and reflect on their work and proactively influence strategy and process change,

• a willingness to learn and improve from the wider organisation and key decision-makers.

While there is no unifying definition or theory of learning culture, there are several key themes:

• A learning culture embeds learning into how things are done at an individual, team and organisational level.

• This requires strong leaders to follow a strategic learning model and support employees towards a shared vision and positive change through open dialogue and reflection.

• The factors that underpin a learning culture could be reframed as the "learning environment", allowing workplaces to tie these factors to tangible practices and behaviours rather than attempting to undergo dramatic cultural change.

• There is a large theoretical evidence base on learning culture, but there is less robust, controlled research that demonstrates its impact on organisational outcomes in practice.[34]

Figure 1.5 illustrates a holistic approach to building a learning culture, emphasising the interplay among individual initiative, organisational support, and a social vision. A thriving learning culture requires attention to personal development, structural enablement, and a collective understanding and appreciation of learning (Table 1.6).

Nearly all definitions emphasise that the learning climate is a "shared perception" among team members, highlighting the collective and social nature of

[34] *Creating Learning Cultures: Assessing the Evidence.* Report Chartered Institute of Personnel & Development. The Broadway London https://www.cipd.org/globalassets/media/knowledge/knowledge-hub/reports/creating-learning-cultures-1_tcm18-75606.pdf

the concept. Most definitions mention specific learning behaviours that a positive climate fosters, including Inquiry and Dialogue, Collaboration, Experimentation, Innovation, and Risk-Taking. Creating an environment where trying new things and learning from mistakes is accepted.

Some definitions, like Maruping and Magni (2012), explicitly mention "tolerance for learning-related errors".

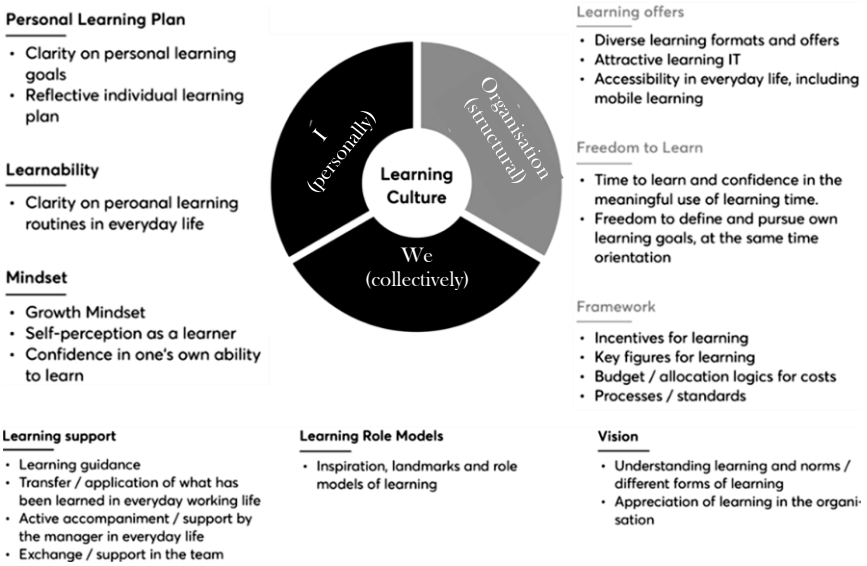

Figure 1.5 Learning culture by I. Schüßler and C.M. Thurnes[35]

Table 1.6

Learning Culture Concepts

Concept	Key characteristics and measures
Learning culture	• Embeds learning into the systems, values and resources of an organisation • Promotes and rewards learning at an individual, team and organisational level
Learning organisation	• Supports the transformation of an organisation by allowing it to develop and adapt • Aims to enhance organisational capability
Learning climate	• How employees perceive workplace practices and processes that relate to their learning

[35] Schüßler I., Thurnes C.M. (2005). *Lernkulturen in der Weiterbildung*. Bielefeld: Bertelsman.

They[36] emphasise the importance of learning from mistakes.

V. Ghosh and N. Tripathi (2021) also mention the "error-avoiding learning climate"[37], which is a different concept. It raises the idea that there are various types of learning climates, with some focusing on preventing errors while others emphasise learning from them. The core concept of the learning environment revolves around a shared perception of support for understanding behaviours. The learning climate is a multifaceted concept that can manifest in various ways, depending on the organisational context.

The "learning society" framework offers a distinct perspective on growth and development compared to the traditional model. Instead of focusing solely on economic factors, it emphasises the collective knowledge of individuals, businesses, and society, analysing how this knowledge is created, shared, and utilised. A key element of this framework is the recognition that knowledge is not evenly distributed; individuals possess varying levels of expertise and understanding. Like information, knowledge is asymmetric; each person possesses unique insights. Individual knowledge growth typically involves acquiring information already known by others, although it can occasionally include discovering genuinely novel insights.

The National Strategy of Higher Education (StraNES) report envisions creating a continuously evolving "learning society" where individuals are equipped with lifelong learning skills to improve professionally and as citizens.

> "Innovative higher education of the 21st century is supposed to move to an active education, integrating the contributions of digital and supported by research, which could benefit from a major program of research on the learning society. The transformation of the relationship between knowledge and the digital era means significant improvements in the way teaching is conducted: the use of digital tools must be systematised in the training and evaluation of students. It is also a strengthening of collaborative activities, promoting teamwork and contribution, which is offered. All this assumes that the system becomes more agile and, in particular, adopts a "yes culture" to encourage experimentation and innovation." [38]

[36] Maruping L.M., Magni M. (2012). What's the Weather Like? The Effect of Team Learning Climate, Empowerment Climate, and Gender on Individuals' Technology Exploration and Use. *Journal of Management Information Systems.* 29(1), 79–113

[37] Ghosh V., Tripathi N. (2021). Perceived Inclusion and Team Creativity Climate: Examining the Role of Learning Climate and Task Interdependency. *Management Research*, 44(6), 849–866.

[38] Becchetti-Bizot C., Houze G., Taddei Fr. (2022). *Report on the Research & Development for Life Long Education.* URL: https://www.learningplanetinstitute.org/wp-content/uploads/2022/12/ENG-1.pdf

Learning (whether in cognitive, affective, or interpersonal domains) involves a process of individual transformation. Thus, people actively construct their knowledge. 21st-century learners are characterised by autonomy, technological fluency, adaptability, and a shift towards knowledge as a dynamic force rather than a static entity.

The current critique challenges the simplistic approach to the "21st-century learner". Emphasising the crucial role of intergenerational relationships and teacher expertise highlights the potential dangers of overly individualised and technologically driven learning. These trends risk undermining the teaching profession and exacerbating educational inequalities.

> "*The term '21st-century learner*' emerged at the turn of the millennium and evoked a certain type of learner – one who holds a suite of new' 21st-century skills that are strongly connected to digital technology, digital communication, and notions of flexible approaches to knowledge. <...> The 21st-century learner has become, in many ways, a catch cry for the changes that some say are needed in schools to meet the demands of a rapidly changing globalised and digital society. Such changes require new ways of learning, new skills, new approaches to knowledge and new pedagogies."[39]

Globalisation and the knowledge economy have fuelled the "21st-century learner" concept. Proponents argue that traditional education systems are ill-equipped to meet the needs of technology-fluent learners and advocate for a shift toward models that better align with their needs. The concept of "digital natives", popularised by M. Prensky[40], posits that young people possess fundamentally different cognitive processes and learning styles, demanding radical changes in teaching. Prensky argues for a "generational rupture" between "digital natives" and "digital immigrants", those who adapt to technology but retain older thinking patterns.

However, critics challenge these notions. They argue that technological access and skills are not uniform among young people; there is no evidence of a distinct, universal learning style. Moreover, they warn that simplistic generational narratives, often driven by adult anxieties about social change, can lead to flawed policymaking and educational practices. They contend that the "digital native" concept oversimplifies complex realities and ignores the diverse experiences of young people in the digital age.

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[39] Hirschmana K., Wood E. B. (2018). 21st Century Learners: Changing Conceptions of Knowledge, Learning and the Child. *New Zealand Annual Review of Educ.* 23, 20.

[40] Prensky M. (2001). *Digital Natives, Digital Immigrants. On the Horizon.* 9(5). URL: http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

> "We have argued this creates a gulf between teachers/adults and 'tribal' learners, thus overlooking the significance of intergenerational and relational aspects of pedagogy and agency and the deep differences that exist within one cohort of both children and adults. We have also suggested that claims about the capabilities of 21st-century learners are unsubstantiated and serve to undermine the role and expertise of teachers. Furthermore, if we become facilitators of 'real-life' learning experiences and student-led learning, the next step may be the digitalisation of the profession. This threatens the deeply important relational work of teachers and renders a highly automated and impersonalised future of education".[1]

Learnability is a critical feature that ensures learners in schools, training institutions, universities, and other settings become capable of keeping pace with change, adapting to the emerging needs of the economy and society, and navigating their lives productively. Longevity is essential to a learning society, as people live longer and remain productive members of the labour force for much longer. There is, therefore, an increasing need for them to be effective participants in lifelong learning for an extended period and to be fully contributing members of a learning society.

1.3.3 Lifelong Learning Concept

Human beings have a fundamental need to learn, which may be as essential as any of the needs identified by Maslow in his well-known hierarchy of needs (Fig. 1.6). Education helps us fulfil this basic need, especially in our rapidly changing world, where we are constantly seeking meaning. Learning is so fundamental that it is almost a part of our existence.

Knowledge is changing so quickly that the old "front-end" education model (where you learn everything you need early in life) is outdated. This model assumes that education stops when you become an adult. By the 20th century, it was clear that an "intergenerational" view was not enough.

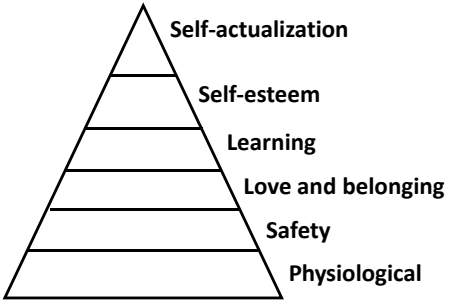

Figure 1.6 Maslow's hierarchy of needs[41]

[41] https://www.simplypsychology.org/maslow.html

J. Dewey added the word “formal” to education to describe this traditional idea of passing down knowledge. Today, “formal education” refers to both structured learning in institutions and a specific teaching method. It is also often referred to as initial education, encompassing everything from nursery school to various training. Once we move past the idea that education only occurs at the beginning of life, we can explore other models, such as lifelong education. In the late 1970s - 1980s, defining “continuing education” was a challenge. Continuing education is learning after your initial education (including university), but it's not the same as lifelong learning. Lifelong learning encompasses all education, while continuing education focuses on the part that follows initial education.

While lifelong learning can be traced back to the 1800s, the term gained prominence in English publications around 75 years ago, with key modern concepts developing shortly after World War II. International organisations have increasingly focused on lifelong learning, with the EU declaring 1996 the “Year of Lifelong Learning” and UNESCO adopting it as a core concept in their 1996 report. The Faure Report (1972), discussed earlier in this chapter, championed lifelong and universal education, arguing that education precedes economic development and prepares people for a future society that's still evolving. It emphasised the crucial role of education in human development and called for a comprehensive rethink of education. The Delors Report (1996) echoed these ideas, defining learning by four pillars:

1) learning to know, 2) to do, 3) to live together, and 4) to be.

While the term "lifelong learning" from the Faure Report has superseded "lifelong education", many of the original goals and strategies of "lifelong education" are still in practice. "Lifelong education" often focuses on adult programs and championed concepts like distance learning, open learning and combining work and study. "Lifelong learning," however, prioritises building a strong foundation for learning throughout life, focusing on developing self-directed learners of all ages. “Lifelong education” tends to lean more heavily on formal educational institutions, whereas “lifelong learning” encompasses all types of learning.

Despite these concepts being integrated into national reforms, concerns arose about “lifelong learning” becoming too focused on labour market demands and employability. Questions also emerged about what constitutes valuable knowledge in a knowledge-driven society and the increasing emphasis on individualism.

Lifelong learning has become increasingly popular due to several modern developments, including advancements in educational psychology and educational philosophies, industrialisation, globalisation, rapid knowledge obsolescence and technological advancements. Communities now prioritise individuals who can adapt and continually learn. Lifelong learning aims to enhance self-understanding and understanding of the world by acquiring new knowledge, skills and competencies. It involves self-investment, creation and exploration. Lifelong learning is a learning habit that involves a range of learning activities pursued throughout life to improve one's knowledge, skills, interests and competencies,

encompassing personal, community, social and employment-related aspects.

Education policymakers, researchers, and other informed commentators refer to the COVID-19 pandemic as a catalyst for the biggest revolution in education, a once-in-a-lifetime opportunity for reimagining the notion of learning in societies. Lifelong learning systems such as learning communities, learning cities, and learning regions (under the umbrella of a learning society) are an essential part of this revolution. There is also a growing body of knowledge on developing and sustaining a learning city.[42]

The World Economic Forum's Future of Jobs Report 2020 highlights "active learning and learning strategies" as top skills for the future. Training and skills development will be essential, as skills shortages in many sectors and demographic shifts lead to longer working lives. Higher Education Institutions (HEIs) are vital for developing future-oriented skills. However, to be lifelong learning partners and ensure equal access, they must adapt their teaching to meet the diverse needs of adult learners.

Let us examine the example provided in the Research report "International Trends of Lifelong Learning in Higher Education" (2023). The TUM Institute for Lifelong Learning at the Technical University of Munich (TUM), Germany, has several initiatives to support innovation in teaching and continuing education, experimenting with new technologies and pedagogical concepts. The Centre for Digital Leadership Development creates tools to enhance learning experiences, including, for example, the digital coach Emma, which was developed for the Executive MBA. It accompanies participants throughout the leadership training and helps them to integrate their learning into their daily work practice. Another initiative is the Extended Reality Lab, which promotes the use of virtual reality, apps, and social media tools for both formal training sessions and informal learning in the workplace. In addition, the university offers a wide range of Massive Open Online Courses (MOOCs) on international platforms, such as Coursera and edX, and the media centre provides active support for teaching staff to produce these formats (Technical University of Munich, 2022).

"Lifelong" learning refers to continuous learning throughout one's life, encompassing formal, non-formal, and informal experiences. It also raises questions about transitions and pathways between different educational sectors, as well as between education, training, and work, and vice versa.

Lifelong learning is often understood in terms of three principles: the principles of "lifelong", "life-wide", and "learning vis-à-vis education". "Lifelong" learning implies that people should continue learning throughout their lives through organised learning in formal and non-formal settings, as well as in informal ways. This concept raises questions about the transitions and pathways between different sectors of the educational system, including school and work, as well as

[42] Maclean R., Wheeler L. (2021). Conceptualising the Meaning, Theory, and Practice of Learning Societies During an Age of Disruption. *Powering a Learning Society During an Age of Disruption. Education in the Asia-Pacific Region: Issues, Concerns and Prospects.* 58. https://link.springer.com/chapter/10.1007/978-981-16-0983-1_2

the reciprocal relationships between work, education and training.

The "life-wide" approach emphasises the integration of learning and living in contexts across family and community settings, study, work and leisure, and throughout the individual's life. The life-wide component also recognises that organised learning occurs in various forms and many different settings, such as workplaces or communities. The significance of assessment and recognition mechanisms is emphasised in a system of "life-wide" learning.

Lifelong learning?

They argue that the evaluation and recognition of knowledge, skills and competencies learned outside the formal educational system is necessary because the mechanisms need to assess and recognise individual expertise and know-how (i.e. the applied knowledge form), understandings, values and attitudes, instead of simply formal qualifications, or the reputation and quality of accredited or otherwise recognised formal educational institutions and programmes.[43]

1.3.4 Formal/Informal/Nonformal Learning within the Lifelong Learning Approach

Lifelong learning recognises the value of all learning experiences, whether formal, non-formal, or informal, and aims to broaden individual opportunities within society. Learning occurs in many forms, each contributing to the greater good. Skills and knowledge gained through informal and non-formal avenues are essential for success in employment, education, community engagement, and volunteer work. We are perpetual learners, constantly absorbing information and developing skills, even if we do so unconsciously.

Formal learning occurs in a structured and organised environment, such as a training or education institution or on the job (Fig. 1.7). It is designed to provide education regarding time, objectives, and resources. It is intentional learning from the learner's perspective, leading to degrees and certifications. Formal learning is a structured model that presents a rigid curriculum corresponding to laws and norms; it is often referred to as presentational education.

Informal learning is education that extends beyond traditional limitations and occurs outside formal learning environments, such as universities, schools, or colleges. It is an education that is seen as learning that occurs in our daily lives or through learning projects undertaken by us to teach ourselves.

Formal learning is not a lifelong process, but it offers results within a predefined time frame. For instance, students take a particular certification course for two months, which is not a learning process that will continue throughout their lives. The program is designed for a specific duration, with guidelines in place to help achieve the targeted objective.

[43] Schuetze H.G., Casey C. (2006). Models and Means of Lifelong Learning: Progress and Barriers on the Road to a Learning Society. *Compare*, 3(3), 279–287.

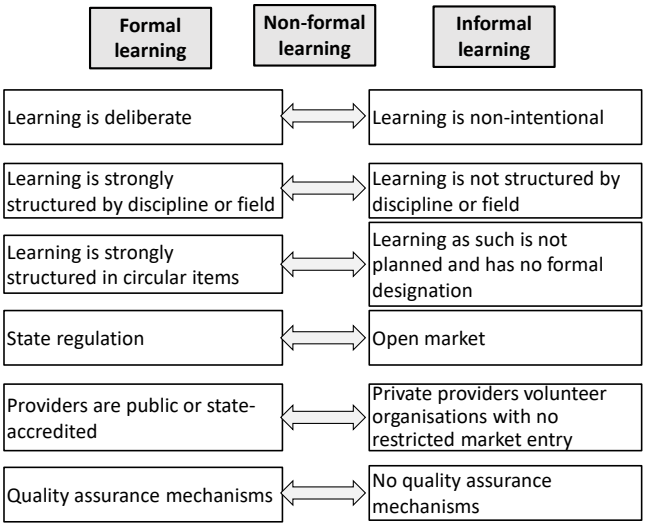

Figure 1.7 Characteristics of formal, non-formal, and informal learning[44]

Informal learning is a spontaneous and lifelong learning activity. At an early age, we learn from our parents, and as we grow older, we also learn from peers, friends, our job and coworkers. As you age, the learning process continues, and you continue to learn from younger individuals, such as by adopting new technologies and techniques. The "anywhere, anytime learning" movement originated in the late 1990s, with the concept of "just-in-time" learning borrowed from the industry's focus on waste reduction and efficiency. This concept aimed to expand access to education and dismantle the restrictive structures and policies that tied learning to specific locations. These technological advancements were also envisioned as tools for instructional improvement, with the expectation that faculty roles would evolve in tandem with the technology.

Workplace informal learning extends beyond individual self-study, such as independently mastering work procedures and processes. It also includes the interactions and relationships among colleagues in the specific work context. For instance, informal learning can occur through coaching, mentoring, or participation in workplace discussions and committees. This kind of work-related learning is a complex process shaped by employee initiative, workplace relationships, the interconnectedness of the broader environment, and the opportunities it provides. The following definitions are used in the UNESCO Guidelines on the Recognition, Validation and Accreditation of the Outcomes of Non-formal and Informal Learning:

[44] Werquin P. *Recognising Non-formal and Informal Learning: Outcomes, Policies and Practices. 2010.* URL: https://www.researchgate.net/publication/291725145_Recognising_Non-Formal_and_Informal_Learning_Outcomes_Policies_and_Practices

Non-formal learning refers to learning that occurs in addition to or as an alternative to formal learning. It is sometimes more flexibly structured according to educational and training arrangements. It usually occurs in community-based settings, the workplace and through the activities of civil society organisations.

Non-formal learning includes active, participatory, democratic, responsible, reflexive, critical and intercultural elements. Non-formal skills tend to be similar to everyday life skills, or at least, a means by which individuals can cope with their lives in different contexts. Non-formal competencies could be specified in terms of acting as a bridge between formal knowledge on the one hand and informal aspirations, wishes and perceptions on the other.

They constitute prerequisites for participating in life professionally, socially, and personally. Employers increasingly demand non-formal competencies alongside formal qualifications. They offer an additional way to differentiate between potential employees in a situation where more and more young people are well-qualified in formal terms. Non-formal competencies are most visible and best recognised when people participate in some activity or programme.[45]

Effective learning strategies are crucial for building learning societies. These strategies employ cutting-edge teaching methods and technologies to break down traditional learning barriers and foster a more inclusive environment. Examples include intergenerational learning, blended learning, gamification, adaptive learning systems, virtual and augmented reality, virtual visits, and collaborative online platforms. These approaches create more engaging and personalised learning experiences. Furthermore, these strategies integrate learning across different settings, fostering lifelong learning and continuous development. By weaving formal, non-formal, and informal learning into local ecosystems, these strategies form robust learning societies.

Further Reading: Formal vs. Informal Learning: Key Differences Explained. URL: https://raccoongang.com/blog/difference-between-formal-and-informal-learning/

Intergenerational Learning: Based on Erik Erikson's work, this approach recognises the parallel developmental needs of younger and older generations. Younger people educate older adults, fostering intergenerational communities and combating social isolation.

Collaborative Learning: Recognising that everyone has something to contribute to knowledge. This strategy fosters a dynamic environment where individuals collaborate and learn from one another's expertise and knowledge. It encourages diverse perspectives and experiences, leading to innovative solutions.

Immersive Learning: Using virtual and augmented reality technologies, immersive learning provides realistic and engaging experiences. Immersive learning conceptualises education as active phenomenological experiences based

[45] Singh M. (2015). Global Perspectives on Recognising Non-formal and Informal Learning. Why Recognition Matters. In: *Technical and Vocational Education and Training: Issues, Concerns and Prospects,* 21, 36–39.

on presence. Immersive learning can be implemented using physical and digital means, such as virtual and augmented reality.

The framework for immersive learning is illustrated in Table 1.7.

Immersion can be the result of

- Affordances of a technological system that monopolises users' senses;
- the psychological appeal of an imaginary or fictional world or narrative;
- challenges, tasks or actions to achieve an objective or overcome obstacles.

In the context of extended reality and the Metaverse, immersion has also been used to point to objective, exocentric technological features. Immersive learning, orchestrated through role-playing, simulations, games, gamification, storytelling, and play continuums, can unearth immense creative potential for effective prescriptive and emergent formal and informal learning in virtual worlds.

1.4 Learning Models and Adult Learning

1.4.1 Learning Pyramid Model

The National Training Laboratories Institute developed a pyramid model in the early 1960s (Fig. 1.8). The Learning Pyramid recognises the different learning methods. It evaluates their percentage effectiveness in terms of learning retention. It is displayed visually as a pyramid, but is broken down as follows:

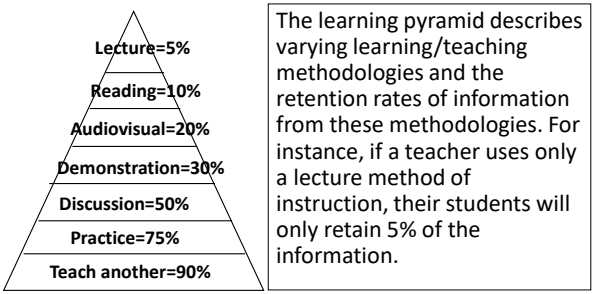

Figure 1.8 The Learning Pyramid

- Lecture (5% Retention) – This is the most passive form of learning, as the student sits back and receives information with no requirement to demonstrate understanding or apply the knowledge. However, it is the most effective way to deliver information to students quickly and efficiently.
- Demonstration (30% Retention) – Demonstration is considered the first active learning method in the Learning Pyramid. In short, it means a teacher showing a student something practically, step by step. A common working example is teaching how to change a flat tyre, and showing this in practice is much more effective than simply describing the process.
- Discussion (50% Retention) – This is sometimes referred to as cooperative learning. It involves dividing a larger group into smaller groups to engage with a subject in an active manner. Listening to others share their

interpretations of learning enables individuals to reflect on their understanding of the subject. It develops their critical thinking and deepens knowledge retention.

- Practice Doing (75% Retention) – This is called 'hands-on' experience. It is considered one of the most effective learning methods, enabling individuals to apply their knowledge in practical settings. The practical application helps recall information in the long term, leads to deeper critical thinking and a better understanding of knowledge, and, therefore, enhances retention of higher learning. Returning to the flat tyre as an example, in terms of knowledge retention, it is even more effective to practice changing a tyre oneself than to watch a demonstration of the process.
- Teach Others (90% Retention) – This is considered the most effective method for learning retention. To pass on knowledge to others, an individual must thoroughly understand the concepts and details surrounding a subject and be able to recall them easily. Engaging with students and responding to questions deepens an individual's critical thinking and cements knowledge retention.
- Reading (10% Retention) – Although still passive, reading is considered a slightly more effective learning mode. A student can regularly refer to the material as a reference and potentially highlight key learning sections.
- Audio-visual (20% Retention) – With the growth of digital technology, this has become an increasingly common learning mode. Although still considered a passive learning approach, it is considered more effective due to its incorporation of other learning elements, such as lectures, and the use of visual tools, which are expected to enhance learning retention.

> "If we were to draw any conclusion based on the pyramid, it would be that the methods should be thought of as on a continuum instead of in a hierarchy. Therefore, the less prior knowledge students have, the more likely it is that effective methods will be found toward the direct instruction end of the continuum. As students' knowledge increases, they will be more capable of learning through methods that involve discussion and teaching. However, because learning is an ongoing process, this will not preclude further learning through more direct methods. Thus, even the most experienced learners, such as successful heart surgeons, could learn from a more experienced learner, a surgeon with a new technique, and the best initial methods would likely be lecture/demonstration, which would lead to practice by doing and possibly teaching others."[46]

This model (Table 1.7) aligns with the current approach of modern pedagogy, which emphasises a student-centred approach and active learning methods.

[46] Lalley P.J., Miller H.R. (2007). The Learning Pyramid: Does It Point Teachers The Right Direction? *Education*. 128(1), 76.

Table 1.7

Framework for Immersive Learning

Component	Features	Description	Relationship to Immersive Learning
Pedagogical Methods	Theory-driven Curriculum Design & Learning Activities	Conscious application of pedagogical and andragogical principles.	Guides the learning process and ensures alignment with goals.
Representational Features	Sensory (Vision, Sound)	Fidelity of the virtual environment. Linked to System Immersion.	Creates a believable and engaging sensory experience.
	Actional (User Control, Virtual Body Movement)	User Interaction and Agency in the Virtual World. Linked to Challenge Immersion.	Allows learners to participate in and actively manipulate the environment.
	Narrative/Diegesis (Roles, Contextual Stories, Challenges / Achievements)	Story and content of the learning experience. Linked to Narrative Immersion.	Provides context and meaning to the learning activities.
	Social (Peer Interaction)	Opportunities for collaboration and communication. Linked to Challenge Immersion.	Fosters social learning and knowledge sharing.
AR-based (augmented reality) Instructional Methods	Visualisation (3D Object Manipulation)	Initial exploration of 3D content.	Foundation for understanding complex concepts.
	Integration (Activities with 3D Content)	Applying knowledge through interactive tasks.	Enhances learning through practice.
	Cooperation/Collaboration (Inquiry Tasks)	Working together to solve problems.	Develops teamwork communication skills.
	Immersive Experiences (Simulations, Games)	Learning through realistic scenarios.	Provides engaging and immersive learning experiences.
	Skill Mastery (Self-Regulated Learning, Artefact Production)	Achieving proficiency through autonomous practice.	The learning goal is to demonstrate competency.
VR (virtual reality) Learning Designs	Passive Observation	Observing virtual environments.	Initial exposure to content.
	Virtual Object Manipulation	Interacting with virtual objects.	Develops practical skills & understanding.
	Active Context Participation	Engaging within the virtual context.	Enhances immersion and interaction.
	Realistic Practice	Practising skills in a simulated environment.	Prepares learners for real-world situations.
	Repetitive Practice (Social Feedback)	Refining skills through repeated practice.	Improves performance and mastery.

However, debates surrounding this model continue, with many researchers disputing its effectiveness. While acknowledging that it is effective for solving certain pedagogical tasks, they argue that it is not universally applicable. In the 21st century, this model is being rethought in the context of postmodernist theory and a lifelong approach to education. For example, reading is recognised as one of the most effective methods for developing lifelong educational skills.

1.4.2 Learning Taxonomies: Bloom and Fink

Bloom's Taxonomy is a system of models (arranged in a rank, with some elements at the bottom and some at the top) used to categorise learning objectives into varying levels of complexity. Benjamin Bloom led a team of researchers in the 1950s to establish behaviours associated with learning; the outcome of this study was Bloom's Taxonomy of Learning. Educators using Bloom's taxonomy aim to encourage higher-order thinking in their students by building up lower-level cognitive skills.

Key phrases can be used (e.g., Example Assessments) to prompt the assessment of these skills during the evaluation process. Bloom's taxonomy specifically targets these by seeking to increase knowledge (cognitive domain), develop skills, or create emotional aptitude or balance (affective domain). Learning outcomes might be identified by someone outside the teacher, such as state-wide or departmental standards.

The taxonomy provides a basis for developing sub-goals and assessment methodology to meet these goals. It is essential to distinguish between learning outcomes, which are the goals themselves, and the activities performed to achieve those goals. Outcomes can be categorised into broad, global outcomes that may take many years to achieve and provide direction for education, educational purposes that guide curriculum development over the weeks or months it takes to complete a specific course, and instructional goals that narrowly focus on the daily activities, experiences, and exercises used in a particular lesson plan.[47]

Thanks to Bloom's Taxonomy, teachers have a tool to guide the development of assignments, assessments, and overall curricula. This model helps teachers identify the key learning objectives they want students to achieve for each unit, as it provides a succinct overview of the learning process.

The taxonomy explains that

1) Before you can understand a concept, you need to remember it;
2) To apply a concept, you need first to understand it;
3) To evaluate a process, you first need to analyse it;
4) To create something new, you need to have completed a thorough evaluation.

Bloom's Taxonomy includes six levels.

The first level is to remember. Example activities at the Remembering level: memorise a poem, recall state capitals, and remember math formulas.

[47] Bloom B.S. (Ed.). (1956). Taxonomy of educational objectives, Book 1: the cognitive domain. New York: Longman.

The second level is to understand. Example activities at the Understanding level include organising the animal kingdom based on a given framework, illustrating the difference between a rectangle and a square, and summarising a simple story's plot.

The third level is to apply. Example activities at the Application level include using a formula to solve a problem, selecting a design to meet a specific purpose, and reconstructing the passage of a new law through a given government or system.

The fourth level is to Analyse. Example activities at the Analysis level: identify the 'parts of' democracy, explain how the steps of the scientific process work together, and identify why a machine is not working.

The fifth level is to evaluate. Example activities at the evaluation level include making a judgment regarding an ethical dilemma, interpreting the significance of a given law of physics, and illustrating the relative value of technological innovation in a specific setting—a tool that helps recover topsoil farming, for example.

The sixth and highest level is Creation**.** Example activities at the Creation level: design a new solution to an 'old' problem that honours/acknowledges the previous failures, delete the least helpful arguments in a persuasive essay, and write a poem based on a given theme and tone.

Therefore, a 21st-century version was adopted and is now more commonly used as a taxonomy for business; see Table 1.8 below.

D. Fink (1998) formulated a taxonomy addressing this paradigm in adult education that forms a coherent design supporting significant learning. His taxonomy builds on using learning goals to connect learning activities and assessment. His theory takes into account the number of students, their level of education, the frequency of class meetings, and the physical aspects of the learning environment. Fink posits that these factors impact motivation and the dynamics of class activities. He created a pie chart that illustrates the flow of significant learning for adults, which builds upon the theories of Bloom's taxonomy.[48]

This hierarchy guides students through a process of synthesising information, enabling them to think critically. Students start with a piece of information and are motivated to ask questions and seek out answers. Furthermore, L. Anderson and D. Krathwohl (2001) revised Bloom's Taxonomy, replacing Knowledge with Remembering, Synthesis with Evaluating, and Evaluation by Creating (Table 1.8).[49]

Fink's Taxonomy of Significant Learning (Fig. 1.9) differs from Bloom's in that it broadens the learning goals to encompass cognitive skills, as well as affective, interpersonal, and lifelong learning competencies. Fink's work is not hierarchical but interactive, meaning that each learning level can stimulate the others. It extends beyond cognitive processing and encompasses a human element of caring and ongoing evolution.

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[48] Fink L.D. (2013). *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses* (2nd ed.). San Francisco, CA: Jossey-Bass.

[49] Anderson L.W., Krathwohl D.R. (2001). A Taxonomy for Learning, Teaching, and Assessing, Abridged Edition. Boston, MA: Alyn and Bacon.

Table 1.8

Revised Bloom's taxonomy action verbs

Remembering	Understanding	Applying	Analysing	Evaluating	Creating
Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers	Understanding facts and ideas by organising, comparing, translating, interpreting, describing, and stating main ideas.	Solve problems in new situations by applying acquired knowledge, facts, techniques, and rules in a flexible manner.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalisations.	Present and defend opinions by making judgments about information, validity of ideas, or the quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Choose	Classify	Apply	Analyse	Agree	Adapt
Define	Compare	Build	Assume	Appraise	Build
Find	Contrast	Choose	Categorise	Assess	Change
How	Demonstrate	Construct	Classify	Award	Choose
Label	Explain	Develop	Compare	Choose	Combine
List	Extend	Experiment with	Conclusion	Compare	Compile
Match	Illustrate	Identify	Contrast	Conclude	Compose
Name	Infer	Interview	Discover	Criteria	Construct
Omit	Interpret	Make use of	Dissect	Criticise	Create
Recall	Outline	Model	Distinguish	Decide	Delete
Relate	Relate	Organise	Divide	Deduct	Design
Select	Rephrase	Plan	Examine	Defend	Develop
Show	Show	Select	Function	Determine	Discuss
Spell	Summarise	Solve	Inference	Disprove	Elaborate
Tell	Translate		Inspect	Estimate	Estimate
What			List	Evaluate	Formulate
When			Motive	Explain	Happen
Where			Relationships	Influence	Imagine
Which			Simplify	Interpret	Improve
Who			Survey	Judge	Invent
Why			Take part in	Justify	Makeup
			Test for	Mark	Maximise
			Theme	Measure	Minimise
				Perceive	Modify
				Prioritise	Originate
				Prove	Plan
				Rate	Predict
				Recommend	Propose
				Rule on	Solve
				Select	Suppose
				Support	Test
				Value	Theory

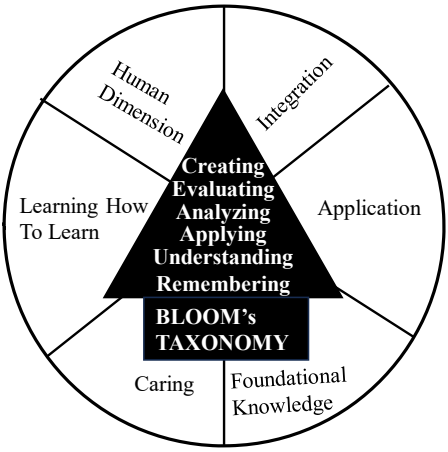

Figure 1.9 Fink's Taxonomy of Significant Learning

Below are suggested questions for creating learning outcomes across each of Fink's categories, with examples illustrating each goal:

Foundational Knowledge

Guiding Questions: What essential facts, terms, or concepts should students understand and retain?

1. Application

Guiding Questions: What should students be able to do with what they have learned? Which critical or creative thinking processes are essential?

2. Integration

Guiding Questions: What connections among ideas should students make within the course, across disciplines, or in their lives?

3. Human Dimension

Guiding Questions: What should students learn about themselves and others? How can they develop self-awareness or empathy?

4. Caring

Guiding Questions: What values or attitudes do you want students to develop? How can students connect their learning to personal or societal issues?

5. Learning How to Learn

Guiding Questions: What strategies will help students become self-directed learners in this course and beyond?

According to Fink (2003), one way significant learning experiences can be categorised is in terms of the changes they cause in the learner. These changes are at the very root of what learning does (and intends to do), but can take diverse forms (Table 1.9).

Table 1.9

Category and description of Fink's taxonomy

Category	Description	Special Value
Foundational Knowledge	At the base of most other kinds of learning is the need for students to "know" something. Knowing, as used here, refers to students' ability to understand and remember specific information. It is essential for people today to possess a basic knowledge of subjects such as science, history, literature, etc. They also need to understand major concepts, such as what evolution is and what capitalism is.	Foundational Knowledge provides the basic understanding necessary for other kinds of learning.
Application	This familiar kind of learning occurs when students learn how to engage in a new type of action, which may be intellectual, physical, social, or otherwise. Learning how to engage in various kinds of thinking (critical, creative, and practical) is an important form of application learning. However, this category of significant learning also encompasses developing specific skills in managing complex projects.	Application learning enables other types of learning to become more effective.
Integration	When students can see and understand the connections between different things, learning has occurred. Sometimes, they connect specific ideas, whole realms of ideas, people, and various aspects of life (e.g., between school and work or between school and leisure life).	Making new connections empowers learners in a new and profound way, particularly in terms of intellectual growth.
Human Dimension	When students learn something important about themselves and/or others, it enables them to interact more effectively with themselves or with others. They discover the personal and/or social implications of their learning. What they learn or how they learn sometimes gives students a new understanding of themselves (self-image) or a new vision of what they want to become (self-ideal). At other times, they gain a better understanding of others, including how and why others act the way they do and how the learner can interact more effectively with them.	This kind of learning informs students about the human significance of their learning.
Caring	Sometimes, a learning experience changes the degree to which students care about something. New feelings, interests, and/or values may reflect it. Any of these changes means that students now care about something to a greater degree or in a way that they did not before.	When students care about something, they have the energy to learn more about it. Without the energy for learning, nothing significant happens.
Learning How to Learn	It occurs when students learn something about the process of learning itself. They may be learning how to become better students, engage in a particular kind of inquiry or develop into self-directed learners. All of these constitute necessary forms of learning how to learn.	This kind of learning enables students to continue learning in the future and to do so with greater effectiveness.

As the category of integration seeks to capture, change occurs in how the learner views a specific type of knowledge and its connections to other content matter. Fink (2003) states that there are three main ways educators can integrate empathy into lesson design. These means are not discipline-specific and are designed to apply in every college class regardless of specific content. They are (1) through thematic-based, interdisciplinary learning, (2) the use of learning communities and student interaction, and (3) by connecting academic work with other areas of life. These avenues of integration will serve as the lens through which the learning experiences in this religious studies class will be considered and their effect on students' conceptual understanding.

1.4.3 Surface/Deep Approaches to Learning

The researchers, investigating the interaction between a student and a set learning task, concluded that students' approaches to the task (their intention) determined the extent to which they engaged with their subject, affecting the quality of the outcomes. These were classified as deep and surface approaches to learning (Fig. 1.10).

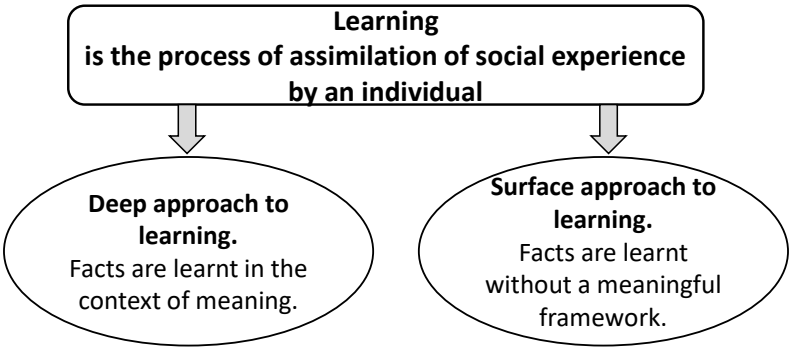

Figure 1.10 Classification of deep and surface approaches in learning[50]

The concepts of deep and surface learning were first established in the work of F. Marton (1976)[51]. Both ideas, however, remain highly relevant today, as they offer valuable insights into the limitations of current learning and teaching strategies in higher education. In deep learning, students attempt to make sense of their learning, which involves integrating ideas, concepts, and their thoughts with learning components and tasks. In surface learning, there is the tendency for students to 'reduce learning' to the level of unconnected facts, which are only memorised to be reproduced at a later date without necessarily being fully

[50] Biggs J., Tan C. (2011). *Teaching for Quality Learning at University What the Student Does.* 4th edition. New York: Open University Press, 24–27.

[51] Marton F., Saljo R. (1976). On Qualitative Differences in Learning - Outcome and Process. *British Journal of Educational Technology,* 46, 115–127.

understood. Surface learning, however, often results in students facing heavy workloads, relatively high contact hours and excessive course materials. Their focus is thus limited to specific facts or pieces of disconnected information that are routinely learned.

The deep approach to learning is typified by an intention to understand and seek meaning. It leads students to attempt to relate concepts to their existing understanding and each other, to distinguish between new ideas and existing knowledge, and to evaluate and determine key themes and concepts critically. In short, such an approach stems from the students' intention to gain maximum meaning from their studying, which they achieve through high levels of cognitive processing throughout the learning process. Facts are learned in the context of meaning.

There is some evidence that lecturers who adopt a student-focused approach to teaching and learning encourage students to adopt a deep approach to studying. The surface approach to learning is characterised by an intention to complete the task, memorise information, and make no distinction between new ideas and existing knowledge, treating the task as externally imposed. Rote learning is the typical surface approach. Such an approach results from students' intention to offer the impression that maximum learning has occurred, which they achieve through superficial levels of cognitive processing. "Facts" are learned without a meaningful framework.

The following illustrates these concepts. The learning outcomes for social science students who adopt a deep approach to reading a set text include full engagement with the text's central theme and an understanding of contributing arguments. In contrast, those who adopt a surface approach would fail to identify the central themes, primarily because they would be engrossed in progressing through the text sequentially, attempting to remember the flat landscape of facts.

Further Reading: Biggs J. Tan C. (2011). *Teaching for Quality Learning at University What the Student Does. 4th ed. New York: Open University Press. P.24 –27.*

Maintaining standards when students' commitment and range of ability are so varied presents an interesting teaching challenge, which, in previous editions, they have referred to as the 'Robert and Susan problem' (Fig. 1.11).

Let us look at two students attending a lecture. Susan is academically committed, bright, and interested in her studies, and she wants to excel. She has clear academic or career plans, and what she learns is essential to her. She approaches learning in an 'academic' manner. She comes to the lecture with sound, relevant background knowledge and possibly some questions she wants answered. In the lecture, she finds an answer to a pre-formed question; it forms the keystone for a particular arch of knowledge she is constructing. Alternatively, it may not be the answer she is looking for, and she speculates about why this is the case. In either event, she reflects on the personal significance of what she is

learning. Students like Susan often teach themselves, requiring minimal help. Academics like the Susans – indeed, they were once Susans themselves – tend to assume that she represents how most students learn, and they teach accordingly.

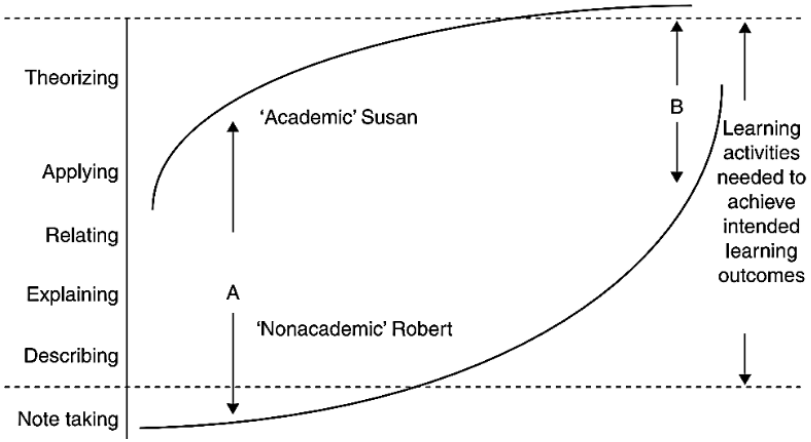

Figure 1.11 The Figure of "Robert and Susan Problem"

Now, take Robert. He is at university, not driven by a curiosity about a particular subject or a burning ambition to excel in a specific profession, but rather to obtain a qualification for a decent job. A few years ago, before the Bologna Process (see below), he would never have considered attending university. He is less committed than Susan and may not be as academically bright. He has little background or relevant knowledge. He attends lectures with few or no questions. He wants to put in just enough effort to pass and get that meal ticket. Robert hears the lecturer say the same words as Susan is listening, but he does not see a keystone; he sees another brick to be recorded in his lecture notes. He believes that if he can record enough of these bricks and remember them on cue, he will keep out of trouble come exam time.

Students like Robert are in higher proportions in today's classes, and they need help to reach acceptable levels of achievement. To say that Robert is 'unmotivated' may be true, but it is unhelpful. All it means is that he is not responding to the methods that work for Susan, the likes of whom were sufficiently visible in most classes in the good old days to satisfy us that our teaching did work. However, it was the students who were doing the work and getting the results, not our teaching.

The teacher's challenge is to teach in a way that allows Robert to learn more like Susan. Figure 1.11 suggests that the present differences between Robert and Susan (point A) may be lessened by appropriate teaching (point B).

A lecture would be an example of such passive teaching, and we get the picture just described: Susan works at a high level of engagement within the target range of learning activities, while Robert takes notes and engages in memorising activities below the target range. Susan uses a "deep" approach, comprising

learning activities appropriate to the outcomes, whereas Robert uses a "surface" approach, meaning he operates at a level below the required cognitive level. The changing scene in university teaching is needed to achieve the intended learning outcomes.

Problem-based learning is an example of an active teaching method, as it requires students to question, speculate, and generate solutions. Robert is encouraged to use the higher-order cognitive activities that Susan uses spontaneously. The teaching has narrowed the gap between their learning methods and their respective performances.

The principle of optimality yields the maximum possible results with a minimal required expenditure of time and effort. It requires a vision of the main thing in the systematic selection process. Choosing the best variant is carried out using a pedagogical approach to thinking. No universal solutions can solve every problem, and there are defining prescriptions within which you, as a teacher, look for individual solutions.

1.4.4 Constructive Alignment Approach

Constructive alignment refers to a specific approach to designing courses that emphasises the alignment of learning objectives, instructional methods, and assessment methods. The term constructive alignment refers to the congruence between what the teacher intends learners to be able to do, know, or understand, how they teach, and what and how they assess (Fig. 1.12).

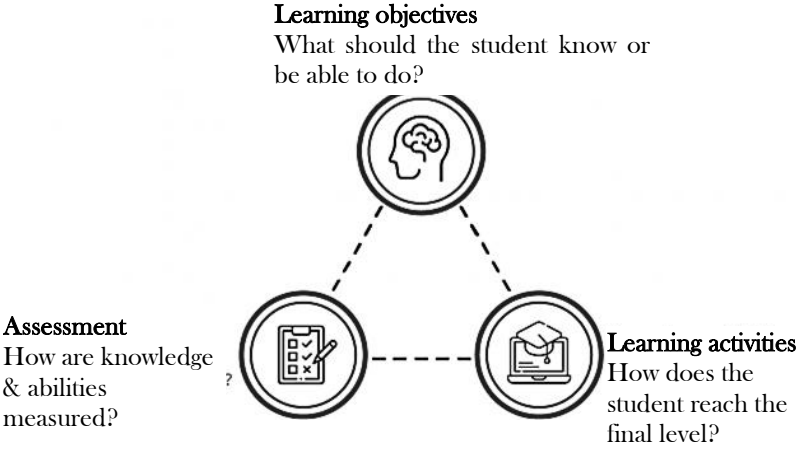

Figure 1.12 Constructive alignment scheme

The approach is based on formulating clear questions regarding the goals, content and features of the methodology for implementation:

- What are "desired" outcomes?
- What teaching methods require students to behave in ways likely to achieve those outcomes?

• What assessment tasks will tell us if the outcomes match the intended or desired outcomes?

Constructive alignment builds on the work of constructivist psychologists, such as Piaget, and the Learning Theories of educationalists like Marton and Saljo (1976). Furthermore, constructive alignment has three fundamental tenets, as it provides:

1. A curriculum design framework in which intended learning outcomes, teaching methods, assessment and evaluation are all interdependent, and we get efficient student learning by truly integrating these components.

2. Staff involved in teaching must develop a Reflective Practitioner approach to their work and be prepared to learn from their mistakes and successes

3. Meaning not imposed or transmitted by direct instruction but created by the student's learning activities[52].

The goal is to align learning outcomes, activities, and assessment tasks to ensure consistency and coherence across the curriculum (Table 1.10). The following steps must be taken to do that: describe the intended learning outcome in the form of a verb (learning activity) and its object (the content) and specify the context and a standard the students are to attain; create a learning environment using teaching/learning activities that address that verb and therefore are likely to bring about the intended outcome; use assessment tasks that also contain that verb, thus enabling you to judge with the help of rubrics if and how well students' performances meet the criteria; transform these judgments into standard grading criteria.

Table 1.10

Anticipated learning outcomes, methods and a constructive activity approach

Learning outcomes	Method	Activity
Students will understand the main features of a teacher's professionalism	Experiential learning	Fishbowl
Students will analyse and design a course plan (a syllabus)	Guided instruction	Showing and explaining examples, scaffold steps
Students will develop methods and activities for the course	Interactive lecture. Case-based study	Multiple-choice terms, solving problems, and applying knowledge to a realistic situation

It is suggested that the approach to learning was not inherent in the student's makeup but rather something that evolved between the student and the task, and thus was both personal and situational. Therefore, an approach to learning should be viewed not as a purely individual characteristic but rather as a response to the teaching environment in which the student is expected to learn. The term

[52] Madichie N.O. *Constructive Alignment: Evaluating a Programme of Learning*. April 29, 2012. http://dx.doi.org/10.2139/ssrn.2047866

constructive alignment has been popularised to describe the congruence between what the teacher intends learners to be able to do, know, or understand, how they teach, and what and how they assess.

> ***Further Reading**: A Handbook for Teaching and Learning in Higher Education Enhancing Academic Practice. 3d edition. Ed. Heather Fry. New York, London: Routledge, 2008. P. 45 – 55.*

1.5 Higher Education Pedagogy: Modern Didactic Principles

1.5.1 Andragogical Perspectives on Didactics

The word "didactics" emanates from the Greek word "didaskein", which means to teach or to know how to teach. Didactic structures comprise a threefold relationship, known as the didactic triangle or triad (Fig. 1.13).

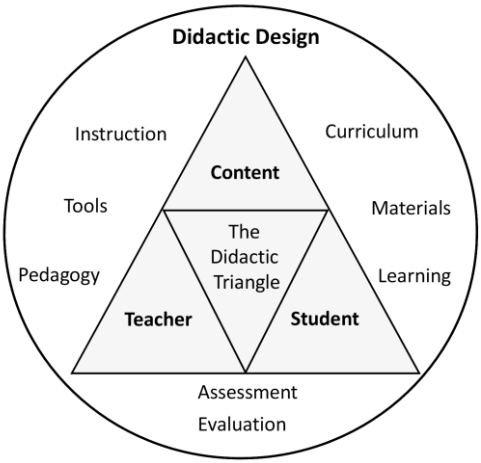

Figure 1.13 The Didactic Triangle

A history of didactics

The Didactic Triangle

This triad comprises the teacher, the learner, and the content, all of whom actively engage in interwoven activities within the classroom. For the first time, this word appeared in the works of the German teacher Wolfgang Rathke (1571–1635) to denote the art of learning. One of the important landmarks here was the publication of John Amos Comenius's book "The Great Didactic" [Didactica Magna] (first published in Czech in 1648, Latin in 1657 and English in 1896). For Comenius, the fundamental aims of education generate the basic principle of Didactica Magna, *omnis*, *omnia*, *omnino* – to teach everything to everybody thoroughly, in the best possible way. Comenius believed that every human being should strive for perfection in all that is fundamental for life and do this as thoroughly as possible.

He developed sets of rules for teaching and set out basic principles. His

fundamental conclusions remain valid:

- Teaching should be tailored to the student's stage of development...
- All learning happens through the senses...
- One should proceed from the specific to the general, from what is easy to the more difficult, from what is known to the unknown.
- Teaching should not cover too many subjects or themes simultaneously.
- Teaching should proceed slowly and systematically. Nature makes no jumps.

Following Kant and Comenius, another significant turning point in thinking about teaching came through the growing influence of one of Kant's successors in the Chair of Philosophy at Königsberg University: Johann Friedrich Herbart (1776-1841).

The classical pattern used to conceptualise teaching and learning is a didactic triangle in which the student, teacher, and content form the vertices of a triangle. It is usually depicted as a triangle to show that all three relations are equally important or should be considered equal. In teaching and learning, everything is vital in all three links, connecting them and in the field determined thereby.

A key aspect of the German Didaktik tradition and pedagogy is that it encompasses both descriptive and normative elements, as well as the science and art of teaching. In a descriptive sense, Didaktik means the science of teaching. It is research on the instructional process in its entirety, encompassing the key actors – teachers and students – in institutional and educational contexts, as well as the relationships between these key actors and the procedures related to learning, studying, and teaching. The descriptive Didaktik also informs the instructional practice and its normative aspects. Pedagogy emphasises values in the teaching, analysing and learning process, and these are also important issues in teachers' planning, action and reflection. It means that education is normative, and teachers have important roles as moral educators. Regardless of the subject matter or grade level taught, teachers are moral educators. Pedagogy also differs from educational psychology in its context dependency. It has implications for the teaching, studying and learning process, which is intentional in nature. Teachers' actions are based on values and purposes, and the entire process takes place within an educational institution. Moreover, the teachers are educated in established educational programs, and their studies and learning are guided by a curriculum that defines learning goals[53].

The relations between the basic elements in the didactical triangle play an important part. Naturally, teachers have a link to the curricular content they teach. This aspect, in particular, refers to teachers' mastery of the discipline-specific knowledge and skills outlined in the curricula. Additionally, students have a connection to the curricular content they are about to learn. It encompasses

[53] Kansanen P. (2002). Didactics and Its Relation to Educational Psychology: Problems in Translating a Key Concept across Research Communities. *International Review of Education.* 48(6), 427–441.

students' attitudes, motivations, conceptions, and experiences related to curricular themes. This relation is realised in students' content learning.

The special qualities of the pedagogical relation between the teacher and student stem from the teacher's and student's roles in the didactical context. Interaction between the teacher and students is essential for the teaching-learning process and optimal student learning. The pedagogical relationship is inherently asymmetrical, as the more experienced teacher aims to support students in acquiring specific capabilities.

The pedagogical relationship is always interactive and dialogical rather than one-way, influencing or forcing a student to learn. The teacher acts altruistically by caring for and encouraging students. The pedagogical relationship is always impermanent, a characteristic that defines it from the outset. The relationship changes and becomes gradually unnecessary while students learn, develop, and become independent and mature. Related to this aspect, pedagogical relationships are always future-oriented. The aim is to support student learning toward future possibilities and challenges by trusting in students' capabilities and success.

The didactical relation, meaning the teacher's relationship to the student's relationship with the content, is the core of the teaching-studying-learning process in the pedagogical context. It combines the teacher's relationship with the content and students, essentially describing the teacher's main task in an institutional, educational context. This relationship encompasses all the teacher's actions aimed at promoting student learning and achievement.

The model of the didactic triangle has undergone several alterations; recent concepts, in particular, emphasise that the various relationships within the model are not of the same type. For example, according to a more andragogical concept, the teacher serves as a mere moderator of the relationship between the other two parties. A shift in how we understand the "didactic triangle" (teacher, learner and subject matter) is reflected in W. Gieseke's (2007) "relational didactics" as a more comprehensive approach[54], particularly for adult education. Gieseke's approach focuses on the *relationships* within learning, particularly in adult education, highlighting two key relationships:

- **Learner-Subject Matter:** This emphasises how learners construct their understanding and change their perspectives.
- **Learner-Society:** This acknowledges the influence of social context on learning, from small groups to broader societal structures.

Gieseke critiques traditional psychological theories (behaviourism and cognitivism) for focusing on isolated levels of learning. She argues that learning is a holistic process that involves both individual and social interactions.

Gieseke emphasises that learning is a "process of social exchange" with more knowledgeable partners and stresses the crucial role of emotions in learning, both individually and socially. Emotions are essential for building relationships and

[54] Gieseke W. (2007). *Lebenslanges Lernen und Emotionen [Lifelong learning and emotions].* Bielefeld: W. Bertelsmann.

facilitating communication in learning environments. In essence, Gieseke's relational didactics provide a more nuanced and comprehensive understanding of learning, particularly in adult education, by emphasising the importance of relationships, social context, and emotions.

1.5.2 Curriculum, Practice and Didactic Principles

The term "curriculum" refers to the lessons and academic content taught in a school, as well as in specific courses or programs. In dictionaries, the curriculum is often defined as the courses offered by a school; however, it is rarely used in such a general sense within schools. The word "curriculum" is derived from the Latin word "currere", which means "to run" and is related to the concepts of "running, course, career". The terms "curriculum" and "syllabus" are sometimes used interchangeably, yet some confusion exists between the two terms. A syllabus that prescribes the content to be covered in a given course is only a part of the programme. In contrast, curriculum is a broader concept that encompasses learning activities, what is being learned, how it is taught, the types of supporting materials that can be used, the assessment methods employed, and the facilities required to perform these actions.

Depending on how broadly educators define or employ the term, curriculum typically refers to the knowledge and skills students are expected to learn, which includes the learning standards or learning objectives they are expected to meet, the units and lessons that teachers teach, the assignments and projects given to students; the books, materials, videos, presentations, and readings used in a course; and the tests, assessments, and other methods used to evaluate student learning. For example, an individual teacher's curriculum would be the specific learning standards, lessons, assignments, and materials used to organise and teach a particular course[55].

When framing curriculum aims, three particular features have a significant impact on formative assessment practice within the intended curriculum. The first of these concerns the general aims related to the habits and capacities for learning that students should develop. Lifelong learning focuses on a very important aim that contributes to their ability to learn in the long term. Specific examples of such contributions are:

- capacity to work strategically by first clarifying the aims of a learning activity and then auditing the present state of one's understanding of these aims;
- developed habits of productive engagement in dialogue so that one can use discussion to try out and reformulate one's ideas, learning from the reactions of others and deriving benefit from their feedback;
- a realisation, learned from experience, that task-related feedback is a help to one's learning and that one should not react to it as if it were an attack on one's ego;
- confidence, arising from the experience of success, in one's capacity to learn.

[55] *The Glossary of Education Reform.* URL: https://www.edglossary.org/

The second feature relates to curriculum content. The apparent need to define aims clearly has rather demanding implications. The planning of progression is an essential part of any teaching plan, and the assessment of one's progress against aims by a learner both call for a framework or model of progression in learning relevant to each particular content, conceptual understanding, or skill.

The curriculum theory is an interdisciplinary field that addresses curriculum across various dimensions, including historical, sexist, political, racial, international, postmodern, autobiographical, and religious perspectives[56].

Table 1.11

Curriculum types identified by A.K. Ellis (2004) and M.S. Schiro (2012)[57]

Curriculum Type	Description
Knowledge-centred/Academic (Ellis, 2004)	It focuses on providing students with a liberal education, prioritising academic subjects.
Learner-centred (Ellis, 2004)	Focuses on the interests and needs of students.
Society-centred (Ellis, 2004)	Focuses on identifying and solving community problems through the curriculum.
Scholar Academic (Schiro, 2012)	Emphasises learning the accumulated knowledge of culture and understanding academic disciplines in depth.
Social Efficiency (Schiro, 2012)	It focuses on preparing students for their future societal roles, enabling them to become well-functioning adults.
Learner-centred (Schiro, 2012)	Advocates for ensuring students' natural development by considering their intellectual, social, emotional, and physical features within the curriculum.
Social Reconstruction (Schiro, 2012)	It aims to raise awareness of social problems and injustices (e.g., racial, sexual, social, and economic inequalities) and to promote a fairer social structure through the curriculum.

A curriculum in which teachers try to "cover" a large number of topics in a short time creates the prerequisites for cognitive overload. When students receive an excessive amount of new information at once—especially without proper structuring and consistent introduction of concepts—the risk of overloading working memory increases. It significantly reduces the quality of learning. In such situations, teachers focus more on "transferring" knowledge than on its meaningful formation, and students focus more on memorising fragments than on building comprehensive knowledge structures.

[56] Kridel C. (2010). *Encyclopaedia of curriculum studies*. California: Sage.

[57] Ellis A.K. (2004). *Exemplars of curriculum theory*. New York: Eye on Education; Schiro M.S. (2012). *Curriculum theory: conflicting visions and enduring concerns*. USA: Sage Publications.

Cognitive load theory (CLT), as discussed in detail in Section 2.4, provides a conceptual framework for optimising instructional design. It helps to distinguish between intrinsic (related to the complexity of the content), extrinsic (unnecessary or distracting), and relevant or germane (aimed at the formation of new knowledge) load. Designing a curriculum with these types of loads in mind helps to avoid overload, which is especially important in digital and blended education.

Effective course design should involve not only content selection but also its structured presentation, consistency, modelling and reliance on key thought patterns, which reduces unnecessary cognitive load and supports active knowledge construction.

For teaching science subjects and conducting hands-on science activities, it is essential to use integrated instructions, including equations on question sheets, to reduce cognitive load.

This issue is notably at the core of the notion of 'recontextualisation' developed by B. Bernstein (2000)[58]. This term refers to the mechanisms by which knowledge (scientific, professional, experience-based...) is selected – or excluded – in teaching and how it is shaped, retranslated, and reformulated throughout the process. For example, the physics taught at university does not exactly reflect the scientific knowledge researchers use in physics. It is a reconstruction designed according to specific pedagogical means and objectives, produced by various social actors: government departments, learned societies, and teachers. This recontextualisation does not just boil down to "technical" or "neutral" processes, which would consist, for example, of "simplifying" knowledge to make it teachable.

The third feature relates to the different possible learning activity types and styles. For example, suppose the capacity to carry out holistic, authentic, and thereby complex tasks — such as solving real-world mathematics problems or conducting realistic science investigations — is an aim of the curriculum. In that case, practice in component knowledge and skills is not enough – learners also have to experience the real complex activity. It follows that formative and summative assessments must focus on such holistic activity[59].

While the teacher has a central role in the didactic tradition, the curriculum tradition mainly develops a system perspective on education. Additionally, when the curriculum tradition discusses content as objectified, the didactic tradition emphasises the purpose and meaning of subjective content. The dominant tradition of curriculum theory has been primarily concerned with curriculum development at the institutional and programmatic level, while didactics is centred upon curriculum making at the classroom level.

Content – knowledge selected into the curriculum – is indispensable in talking and thinking about classroom teaching. In everyday language, the term

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[58] Bernstein B. (2000). *Pedagogy, Symbolic Control and Identity (Revised Edition).* New York and Oxford. Rowman & Littlefield Publishers.

[59] Black P. (2001). Formative Assessment and Curriculum Consequences. *Curriculum and assessment.* D Scott (ed). Westport, Connecticut, London. Ablex Publishing. P. 7–25.

'teaching' means imparting content or knowledge. In the German Didaktik tradition, teaching is conceptualised using the Didaktik triangle, comprised of three general, essential elements: content, teacher, and student. In the US curriculum theory, teaching consists of four indispensable and equally important curriculum commonplaces: subject matter (content), teacher, learner, and milieu[60].

M. Young (2014) formulates "powerful knowledge" as a curriculum principle. Young developed the concept to re-emphasise the role of knowledge and teaching in curriculum design and educational research. He felt they had been undervalued. In contrast, Young advocates for "better" knowledge, stressing that all knowledge is fallible and open to challenge. This tension is a core aspect of his theory. "Powerful knowledge" is not just another lesson or textbook chapter. It is not simply about making existing material relevant to students' lives. This knowledge has value in and of itself, regardless of its immediate educational or practical application. It is something worth learning for its own sake. "Powerful knowledge" is typically generated and transmitted within specific academic disciplines. It is produced through specialised methods (workshops, seminars, labs) and taught in formal educational settings (schools, universities). It is based on the discipline rather than the context. Young argues that the importance of teaching students specialised, disciplinary knowledge extends beyond everyday experiences and immediate practical applications. This knowledge has an intrinsic value and provides a foundation for deeper understanding and critical thinking within specific fields. The researcher characterises powerful knowledge as follows:

• It is distinct from "common sense" knowledge acquired through everyday experience, limited and context-bound.

• It is systematic; therefore, its concepts are systematically related to each other as part of a discipline with specific rules and conventions. It can serve as the basis for generalisations and thinking beyond specific cases or contexts.

• It is specialised and developed – and developing – by specialists within defined fields of expertise and inquiry.

• It is revisable and open to criticism.[61]

Young acknowledges that his concept of "powerful knowledge" and subject-based curricula struggle to address the need to connect different subjects to tackle overlapping thematic issues. He suggests that the "connection problem" is primarily a pedagogical issue, meaning teachers must find ways to connect subjects within the classroom rather than fundamentally changing the curriculum structure.

W. Klafki (1985) was a prominent researcher in German didactic theory. Building on his general Didaktik and Bildung theories, he presented a model of categorical Bildung, which he developed into a model for critical-constructive

[60] Deng Z. (2021). Brining Content Back in Rethinking Teaching and Teachers. *Didactic and Curriculum in Ongoing Dialogue*. Eds. E. Krogh, A. Qvortrup, S.T. Graf. New York, London. Routledge. P. 25.

[61] Young M., Lambert D., Roberts C., Roberts M. (2014). *Knowledge and the Future School: Curriculum and Social Justice*. London. Bloomsbury Academic.

didactics in the 1970s. “Bildung”, as we use it today, stems from “eruditio”, but it is not adequately captured by simple translations like “formation” or “education”. Instead, it emphasises internal, personal growth. Didaktik supports the idea that education encompasses not only teaching methods but also the selection and justification of educational content.

The concept of Bildung is rich and complex. Generally, it consists of two elements: an ideal picture of desirable knowledge and skills and free learning processes, or in other words, both “the process of personal development and the result of this development process”. The objective of the theory of categorical Bildung consists of the concept of “educational potential”. Klafki develops three elements of categorical Bildung:

Content-Focused Learning (Material Bildung) prioritises the acquisition of specific knowledge, particularly within established subject areas or "canons";

Personal Development Learning (Formal Bildung) centres on cultivating the individual's character and skills.

Integrated Learning (Categorical Bildung) recognises the importance of content knowledge and developing the learner's skills.

> Bildung is the phenomenon through which we realise, directly in our own experience or in understanding other men and women, the unity of a subjective (formal) and an objective (material) moment. The attempt to express the experienced unity of Bildung can only be realised with formulas that have combining power: Bildung is opening a reality of things and ideas for somebody (this being the objective aspect), but this means at the same time the opening of this person for this reality, which becomes his or her reality (subjective aspect). The attempt to express the experienced unity of Bildung in language can only be realised with the help of formulations pre-supposing each other: Bildung is a successful development (“Erschlossensein”) of reality for somebody concerning body and mind (objective aspect), but this means at the same time: successful development of man concerning this reality as it is his reality (subjective aspect). – The same holds for Bildung as process: In the confrontation of man and the world, of child and content, the subject and its mind world win order, structure, and shape, one only through the other and with the other. Bildung is a concept of processes in which the content of a definite intellectual and corporal reality is realised. This process, viewed from the other side, is nothing but the active opening (“Sich Erschließen”), and it is being opened in the passive sense (“ErschlossenWerden”) of somebody for that content and its interdependencies as reality. Bildung is indeed this unifying happening (“Geschehen”) and, at the same time, its product.

Table 1.12

Comparative table of Young's and Klafki's concepts:

Characteristic	Young's Concept ("Powerful Knowledge")	Klafki's Concept ("Categorical Bildung")
Starting Point	Content knowledge	Content knowledge
Core Principle	"Powerful knowledge" is a foundational material formation theory that emphasises content structure, central concepts, big ideas, and perspectives.	Educational potential is a key selection principle, emphasising the teacher's didactic choices.
Relationship to Pedagogy	The dualistic nature of the interplay between curriculum and pedagogy requires further development to understand this relationship fully.	Relational approach to the relationship between curriculum and pedagogy, characteristic of didactics.
Interpretation of "Powerful Knowledge"	Sometimes interpreted as "what the knowledge does for those who have it," it is aligned more closely with Klafki's formal Bildung.	Categorical Bildung emphasises formal (and categorical) education.
Relationship to Disciplines	It is essential to maintain the fundamental boundaries of disciplinary knowledge and maintain strong classification.	Disciplines are a resource for the teacher in didactic choices, not as a mirror reflection.
Role of Values	The tension between knowledge and values requires further consideration.	The problematisation of the role of disciplines involves examining the connection between knowledge and values.
Disciplinary vs. Thematic	Supports a disciplinary approach.	Open questions about the disciplinary or thematic approach.

It is a concept indicating that, in their “didactical analysis”, teachers should reflect on the knowledge aspects, meanings, and values that their selected content and chosen teaching methods could have for their students in a broader and deeper sense. In the model of categorical Bildung, he distinguishes between the material and formal theories of the formation and their respective educational content. Material formation theories centre on objective knowledge content (Bildungsinhalt), while formal theories prioritise subjective content, which is its educational substance (Bildungsgehalt).

Bildung provides guidance on how to select content and learning objectives for this direction through its tools, such as Didaktik analysis or society-oriented approaches to science teaching. On the other hand, it also provides criteria to assess teaching practices and determine whether they have the potential to promote Bildung, enabling the young generation to become responsible citizens.

Bildung-centred Didaktik offers a theory of teaching and learning, focusing on implementing a curriculum in the classroom. The concept of Bildung comprises two elements: an idealised picture of desirable knowledge and skills, and free learning processes. Standing for the German ideal of education, Bildung refers to the formation of the full individual, the cultivation of human powers, sensibility, self-awareness, liberty, freedom, responsibility, and dignity. Klafki extends the concept to include the development of self-determination (autonomy), co-determination (participation), and solidarity.

German Didaktikers establish a theory of educational content that informs Bildung's curriculum planning and classroom teaching. It consists of four related concepts: contents of education (Bildungsinhalt), educational substance (Bildungsgehalt), the elemental (das Elementare), and the fundamental (das Fundamentale). The contents embodied in the state curriculum are characteristically referred to by curriculum designers as 'contents of education,' which result from a deliberative process of selecting and organising Bildung's wealth of academic knowledge, experience, and wisdom.[62]

The content is essential in Klafki's analysis; the basic model consists of five questions that could be applied in analysing the didactic situation from the perspective of the teacher:

1. What general sense, basic phenomena, or fundamental principle does this content exemplify and open up to the learner? (exemplary significance)?

2. What significance does the content in question already have in the students' minds in my class? (Contemporary significance)?

3. What constitutes the topic's significance for the student's future? (future significance)?

4. How is the content structured (which has been placed in a specific pedagogical perspective by questions 1, 2, and 3)? (the structure of the content)?

5. What are the special cases, phenomena, situations, experiments, persons, elements of aesthetic experience, and so forth, in which the structure of the content in question can become interesting, stimulating, approachable, and conceivable?[63]

The perspective chart (Fig. 1.14) provides a more systematic view of the issues to be considered when planning a lesson.

It is well-informed by theory, with the philosophy of education and Bildung playing a predominant role, but it cannot be called very practical. If phase schemata or cognitive apprenticeship are regarded as planning tools, then critical-constructive didactics is more of a means for reflection and justification. Still, all three perspectives contribute to the whole picture, as, for instance, critical-constructive didactics may provide a more thorough understanding of our

[62] Deng Z. (2021). Brining Content Back in: Rethinking Teaching and Teachers. *Didactic and Curriculum in Ongoing Dialogue*. Eds. E. Krogh, A. Qvortrup, S.T. Graf. New York, London. Routledge, pp. 25–41.

[63] Bladh G., Stolare M., Kristiansson M. (2018). Curriculum Principles, Didactic Practice and Social Issues. *Thinking Through Teachers'* Knowledge Practices in Collaborative Work. *London Review of Education*, 16(3), 398–413.

reflections on the person as a learner – a good deal of what belongs to a person is reflected in issues such as present meaning.

In line with Klafki's thinking, Bildung can be suggested as a critical concept in a late or postmodern world. It can form the basis for new interpretations of Bildung to address the challenges of our contemporary society as a risk society, making education an eco-reflexive and transformative practice and providing relevant education in all its dimensions. Klafki's approach adds a crucial dimension to recontextualisation: it is not just translation but also compression (simplification) and decompression (expansion).

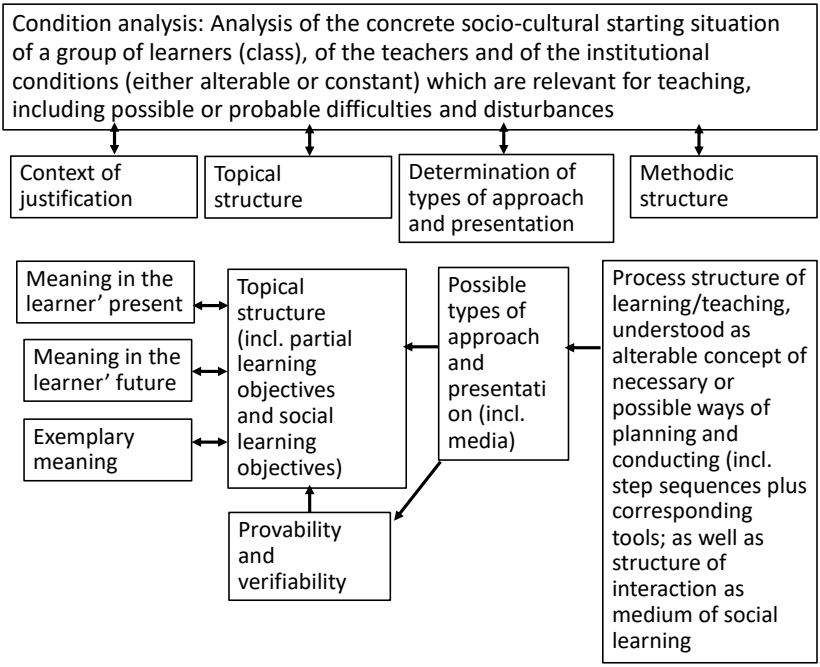


Figure 1.14 Klafki's preliminary perspective chart[64]

Analysing the impact of Bildung on science education, researchers identified three key approaches (Fig. 1.15): Content-focused, emphasising scientific content for future use; context-focused, highlighting the real-world applications of science; and Engagement-focused, which aims for 'knowing-in-action' and developing skills to address global sustainability.

The third one is inspired by education for sustainability and critical Bildung and goes beyond content and context to develop essential skills for addressing

[64] Klafki W. (1985). *Neue Studien zur Bildungstheorie und Didaktik [New studies on education theory and didactics]*. Weinheim.

societal and global sustainability issues and promoting active participation in shaping a sustainable future[65].

German Didaktik, rooted in Bildung, emphasises that disciplinary knowledge should serve a higher purpose: the intellectual and moral development of individuals. These are the specific topics and materials included in the curriculum. They are the result of a deliberate selection process, drawing from the vast pool of academic knowledge, experience, and wisdom, all in service of Bildung. It provides a structured approach to curriculum development, ensuring that content is selected and presented in a way that promotes Bildung.

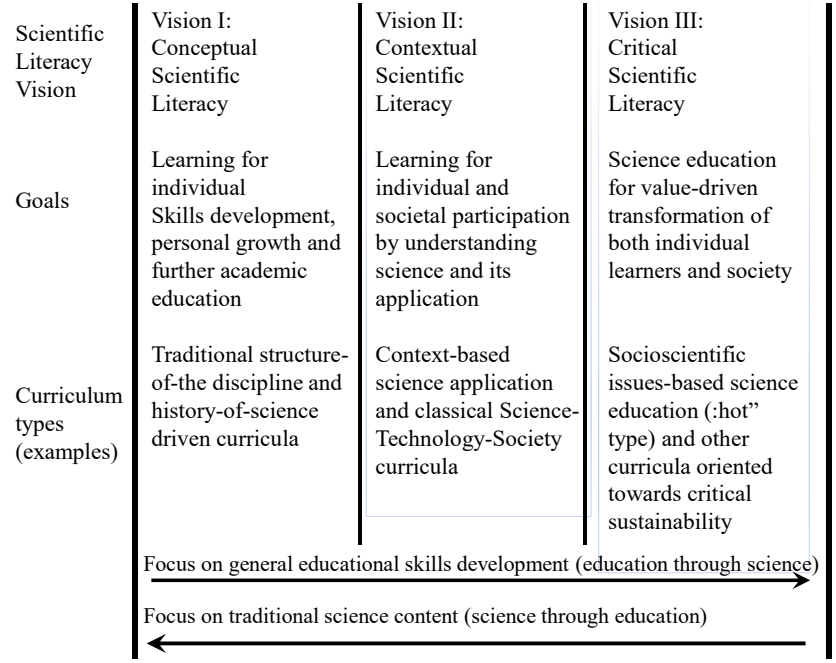


Figure 1.15 Three Approaches to the Bildung Theory

1.5.3 Pedagogical and Andragogical Principles of Higher Education

The aim of helping students inspire higher education for sustainable development (HESD)

- develop sustainability attitudes, skills, and knowledge that inform decision-making for the benefit of themselves and others, now and in the future,

[65] Sjöström J., Eilks I. (2020). The Bildung Theory – From von Humboldt to Klafki and Beyond. *Science Education in Theory and Practice.* Springer Texts in Education. Springer, Cham. https://doi.org/10.1007/978-3-030-43620-9_5

- act upon these decisions.[66]

Therefore, high school pedagogy is the science of the regularities of studying and educating. Let us consider the subject of high school pedagogy, which includes the following links:

- A higher education institution as a pedagogical system,
- effectiveness of the pedagogical process,
- pedagogical and scientific activity, their professional pedagogical training,
- formation and development of students' personalities,
- education and self-education of students,
- forms, methods, and pedagogical technologies in a higher educational institution,
- pedagogical aspects of the continuous independent work of the students,
- scientific and pedagogical interaction in the pedagogical process.

Pedagogy is considered a science and a practice of teaching and educating individuals at all stages of their personal and professional lives.

The structure of pedagogical activity relies on the functions of a high-quality educational system:

1. The gnostic component (from the Greek gnosis - knowledge) refers to the sphere of knowledge of the teacher, and it corresponds to the analytical functionality.

2. The prognostic component includes ideas about the promising tasks of training and education and the strategies and ways to achieve them.

3. The communicative component refers to the features of the teacher's communication activity, specifically the specifics of their interaction with students.

4. The organisational component is a system of teacher skills to organise their activities, as well as the activities of students. These components correspond to the prognostic functionality.

5. The research component serves as a basis for the constructive function.

The principles of education are scientific, systematic, connected to life, practical, conscious, learning-oriented, characterised by the unity of concrete and abstract, accessible, knowledge-driven, human-centred, culturally compatible, transparent, and differentiated.

The scientific principle requires that the content of high school education correspond to the achievements of science in the relevant fields of knowledge. The students should learn reliable, scientifically based facts, phenomena, and processes to understand the essence of scientifically based laws, feature development, and the establishment of scientific discoveries, to possess methods of scientific research, to get to know different directions of scientific research, and to get acquainted with the prospects for the development of scientific hypotheses.

[66] UNESCO. UNESCO World Conference on Education for Sustainable Development. 2009. URL: http://unesdoc.unesco.org/images/0018/001887/188799e. pdf

It is essential to foster cognitive interests in students, teach them to master modern research methods and encourage their systematic involvement in various forms of scientific research, thereby stimulating their interest in these activities.

The principle of systematicity follows from the knowledge that the surrounding world is possible only in a certain system. Each science constitutes a system of knowledge united by internal connections. Therefore, this principle means consistency, taking into account the logic of a particular science and the thinking capabilities of students, the deployment of content knowledge, methods of activity in educational programs, textbooks, manuals, etc., as well as compliance with the same order of knowledge acquisition and the formation of abilities and skills. The previous level of knowledge should act as a foundation for efficiently assimilating the next part of knowledge.

- On the one hand, a "systemic" dimension (the fact that a program includes a multiplicity of clearly differentiated and more or less strongly linked components).
- On the other hand, there is a sequential dimension (the fact that teaching each of these components follows a programming and progression plan according to an explicitly planned temporal order).

Teaching builds on the known. It must not reject it – proceed from the known to the unknown. In deep learning, new knowledge builds upon existing knowledge, so teaching should emphasise the interconnectedness of topics.

The principle of connection with life, practice. The study is successful when the individual feels useful and has learned the necessary knowledge. After all, the essential activities of professional educational institutions are reduced to preparing a person for active, productive work in creating spiritual and material values.

The principle of consciousness and learning activity emerges from an essential regularity of a person's cognitive activity. Only mental work guarantees intellectual development, acquired strength, knowledge, and effective learning motives. Therefore, the teacher should consider this regularity and involve students in active educational work at all stages of the educational process. The teacher's attempts to exhaustively explain and oversimplify the educational work of students lead to the deterioration of a person's intellectual development, making the personality incapable of independent, productive professional activity.

The principle of the unity of concrete and abstract means that in education, it is necessary to follow the sequence of the process of knowledge acquisition at each stage of education, find its origin in facts and observations, scientific concepts and theories, after which to determine a natural transition from the perception of a single, specific, subject to general, abstract, or, conversely, from general, abstract, to single, concrete.

The principle of accessibility. Availability depends on the organisation of the educational process, teaching methods, and other factors related to educational conditions. Accessibility is determined by the higher the mental level, the more successful the master's student is. This principle is based on a gradual increase in learning difficulties.

The principle of the strength of knowledge. Fixed regularities of assimilation of the content of education and development of cognitive powers are two interconnected sides of the process of teaching; the strength of students' learning depends not only on objective factors but also on the subjective attitude of the students to studies; the students' memory is selective; the more important and interesting the material is, the better it is assimilated.

The principle of humanisation is the disclosure of the human dimension and human-oriented potential of teachers and graduate students. In short, we should help to create a personal philosophy, a general orientation in life. Humanists believe that individuals can set goals, solve problems, and reach their full potential.

The principle of cultural compatibility establishes an inextricable connection between education and humanity's cultural heritage, particularly in terms of knowledge about the common human wealth in the realms of spiritual and material culture, as well as the peculiarities of national culture development and formation. This principle permeates all spheres of human life, including everyday activities, relationships, and production, as well as various forms of media such as radio, cinema, television, theatre, and books. Moreover, above all, I want to mention the field of education and upbringing. Some people in the education system invest considerable effort in mastering complex concepts to grasp the fundamentals of theoretical knowledge. Moreover, as a result, only a small part of what remains in memory is provided by educational programs. Out of attention, such layers of culture as the visual arts, art, music, the culture of life and behaviour, and applied art remain. These means of education have an effect primarily not so much on the mind as on the sensual sphere. They contribute to the formation and elevation of the spiritual personality culture.

The principle of visual involves learning based on a live perception of specific objects and phenomena, reality, or their images. Visualisation helps students' minds develop, helps reveal the connection between scientific knowledge and everyday practice, facilitates the process of assimilation of knowledge, and stimulates interest in them (develops students' motivational sphere).

The principle of differentiation is the orientation of educational institutions towards students' achievements, considering their interests in education and the development of their interests, inclinations, and abilities.

Differentiation can be embodied in practice by grouping students according to their knowledge and practical experience and creating individual programs tailored to their interests and professional orientation. Differentiation implies polyvariance – creating conditions in the educational system that allow for individual selection and give each person a chance for success. It encourages students to make independent choices and responsible decisions while also promoting the development of alternative and independent thinking.

The teacher's activity is developed in accordance with established pedagogical patterns and principles. However, there is no universal recipe that could solve all problems. In higher education, a student's individuality, knowledge level, and motivation play a crucial role and should be taken into account when planning the

educational process. The primary tasks of this process are not only to transfer knowledge but also to establish a connection between theory and its practical applications and to contribute to the formation of values and the development of creative activity in future specialists.

Higher education is transitioning to andragogy, recognising the unique needs of adult learners. The shift, driven by technology, requires educators to blend their teaching styles to meet the diverse needs of students and the demands of the curriculum. Andragogical principles drive higher education by:

- Fostering collaborative learning environments.
- Implementing contextual analysis and critical dialogue.
- Encouraging connections between theory and real-world applications.
- Leveraging learners' intrinsic motivation tied to career goals.
- Prioritising independent assignments and accessible online environments with engaging tools.
- Providing authentic feedback and fostering a collaborative community through self-assessments and peer evaluations ultimately enhances the learning experience.

1.6 Self-assessment Questions

1. How does the UNESCO definition of "adult education" differ from a simple understanding of learning after formal schooling?

2. List and briefly describe the six principles of Knowles' andragogy theory.

3. What is the core principle of self-directed learning?

4. What is the core aim of Society 5.0? How does it differ from Society 4.0?

5. Explain the concept of a "learning society" and why thinkers like Schön and Hutchins believed it was increasingly important in the modern world. How does the idea of lifelong learning connect to the learning society?

6. What three elements should be congruent in a constructively aligned learning environment?

7. Identify and briefly describe at least three curriculum types (e.g., Knowledge-centred, Learner-centred, Social Reconstruction). What are the primary focuses of these different approaches?

8. What is M. Young's concept of "powerful knowledge"? How does it differ from "common sense" knowledge?

9. What are the three elements of categorical Bildung that Klafki develops? Briefly describe each.

10 What are the five questions in Klafki's "didactical analysis" that teachers should consider when planning a lesson?

1.7 Practice Exercises

1. Reflecting on Philosophical Foundations:

- How might an idealist approach teaching Design courses differently from a realist?
- In what specific ways can pragmatism be seen in modern laboratory activities and science education?

2. Exploring Adult Learning

Self-Analysis:

- Think about your own learning experiences as an adult.
- Which of Knowles' assumptions resonates most with you?
- In what situations might a more pedagogical approach be appropriate, even for adult learners?
- What qualities or characteristics would describe an "ideal" adult learner in the context of lifelong learning and Society 5.0?
- Based on the trends (e.g., Society 5.0, digital transformation), what do you predict will be some key trends and challenges in adult learning over the next decade?

3. Comparing Educational Eras:

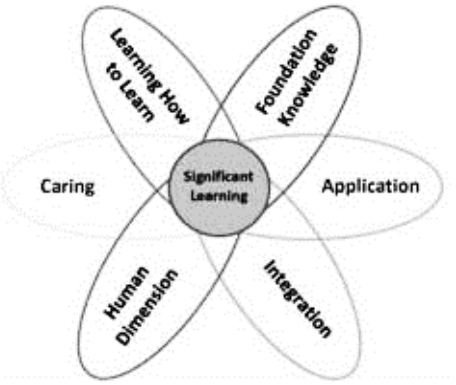
Identify and briefly describe 2-3 key differences between Education 3.0 and Education 4.0, focusing on the aspects of the table, including technologies, the role of the teacher, and the learning approach.

	Education 3.0	Education 4.0

4. Analysing a Learning Environment: Think of a learning environment you know (e.g., a workplace, a university department, or a community group).

- To what extent does this environment exhibit the characteristics of a learning culture? Provide specific examples.
- In your opinion, what are the most important factors in creating a positive learning climate?
- How can these factors be fostered in diverse learning environments?

5. Fink's Taxonomy Keywords:

	For each of Fink's categories, identify one keyword that captures its essence (e.g., Knowing, Doing, Connecting, Self, Feeling, Learning).

6. Reflection Task: The concept of "re-contextualisation" suggests that taught knowledge is a reconstruction, not a direct reflection of expert knowledge.

- How does this idea influence your perception of the content you teach or learn?
- Consider a specific topic you teach or learn about.
- How do you think the university-level knowledge of this topic differs from that of expert practitioners in the field?

7. Analysing a Learning Activity:

- Choose a learning activity you know.
- Analyse it through the lens of constructive alignment.
- Are the learning objectives, activities, and assessment methods aligned? Explain your reasoning.

8. Create a visual metaphor (e.g., a growing plant, a journey) to represent Klafki's concept of "Bildung", labelling key aspects of the metaphor with elements of his theory (material Bildung, formal Bildung, self-determination, etc.).

Chapter 2. A Historical and Theoretical Overview of Pedagogical and Andragogical Approaches

2.1 Philosophical Foundation of Pedagogical Theories

Pedagogical theories are frameworks for understanding effective teaching and learning. They are rooted in both the study of human psychology and philosophical principles. A key philosophical influence is epistemology, the branch of philosophy that examines the acquisition of knowledge. Historically, two major traditions emerged from Ancient Greece: Plato's **nativism**, which posits innate knowledge and influenced cognitive theories, and Aristotle's **empiricism**, which emphasises learning through experience and underpins behavioural approaches. Ancient Greek philosophical traditions echo in contemporary educational thought. While their specific ideas about knowledge and learning originated millennia ago, their influence is evident in the ongoing debates and development of various pedagogical approaches. For instance, Plato's theory of education, with its emphasis on "mental clarity" in an educational climate where the acquisition of information, practical "skills", and "autonomy" are more highly prized, was highly esteemed in past eras like the Renaissance. However, in today's educational landscape, which often prioritises information acquisition, practical skills, and autonomy, Plato's views are more frequently critiqued. Despite this, the continued discussion around his ideas confirms the profound legacy of Platonic philosophy on Western education. Conversely, many of Aristotle's key educational themes remain highly relevant today, including his empiricist model of how we learn, the stress on early habit training in moral education followed by the acquisition of a principled morality, the idea that happiness, virtue and contemplation are all interrelated and are key educational goals, and finally the ideal of liberal education with its stress on the intrinsic values of learning[67].

Beyond these foundational philosophical lineages, numerous influential pedagogical theories have been developed based on empirical observations—for instance, some influential pedagogical theories, such as those by I. Pavlov and B.F. Skinner developed from research on animal behaviour. Others, like the theories of J. Piaget and L. Vygotsky, stemmed from observing how children develop. Newer concepts, such as experiential learning theory and transformative learning theory, integrate diverse perspectives, highlighting holistic adaptation and referencing Jung's concept of psychological types as central to the learning process.

Currently, prominent Western educational philosophies – **Perennialism, Essentialism, Progressivism, and Reconstructionism** (as detailed in Table 2.1) – are applied in educational settings worldwide. Beyond Western thought, Eastern philosophical traditions, notably the educational insights of Confucius found in his "Analects", also play a crucial role in shaping pedagogical theories.

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[67] *Fifty Major Thinkers on Education. From Confucius to Dewey.* Ed. J.A. Palmer. New-York, London, 2001.

The interpretation of Western philosophical approaches to pedagogy is based on Confucianism. For example, the ideas of Herbart, whose theory will be discussed below, proved to be closely related. Herbart's ideas on the convergence of professional education with personal development resonate with the thoughts of Confucius. Vocational education and industrial requirements continued to be subordinate to character education. The idea of student-centred learning is supported because it aligns with the Confucian focus on individual growth and development throughout the learning process.

Table 2.1

Key current educational philosophical approaches

Perennialism	Essentialism	Progressivism	Reconstructionism
A teacher-centred philosophy.	It shares several similarities with perennialism.	A student-centred philosophy.	It shares several similarities with progressivism.
Knowledge is enduring.	Knowledge is not fixed.	Enduring knowledge accumulated through the ages.	Favour multicultural education to construct a larger sense of identity and purpose.
The curriculum is designed to impart knowledge that has stood the test of time.	The curriculum should be socially oriented and focus on procedural subjects rather than content-centred ones.	The curriculum is subject-centred and not in favour of interdisciplinary studies.	The curriculum should encompass global social, economic, and political issues, such as poverty, conflict, famine, and terrorism, and develop the skills to address these problems while being committed to creating a more equitable and just world order.
Education is highly structured and logical.	Education should be a part of life, not just a preparation for life	The students are expected to meet high academic standards and are assessed through various competency tests.	Focuses on enhancing student experience and addressing real-world social issues.

When individuals show interest and enthusiasm in pursuing the teaching profession, it is apparent and comprehensively understood that they need to be well-equipped in terms of pedagogical theories. Educators formulate their teaching methods to effectively deal with students and impart adequate information regarding academic concepts and lesson plans. As one gains experience in teaching jobs, an instructor's style will emerge. In other words, they began to develop interest and motivation towards implementing job duties and generating desired outcomes. To achieve the desired goals and objectives, instructors need to understand pedagogical theories efficiently. The teaching style elements will

remain with the instructors throughout their teaching careers. Therefore, the meaning and significance of pedagogical theories will be understood more clearly when they contribute effectively to teaching styles.

Further Reading: Chen J. (1990). *Confucius as a Teacher: Philosophy of Confucius with Special Reference to its Educational Implications. Beijing, China: Foreign Languages Press.*

"What does this subdivision of Confucian educational philosophy ultimately show? Confucius put a strong emphasis on moral education, including proper conduct in daily life and honouring one's parents. Social harmony is paramount – people have responsibilities to others and are expected to show loyalty toward society, their social class, and family. Others' needs supersede individual needs, and there is an obligation to treat others humanely. Since people are eminently teachable, they should always seek knowledge and study to become better people. They can learn self-control, virtue, and consistently ethical behaviour through personal and communal efforts."[68]

Through acquiring education at all levels, students not only gain knowledge in terms of academic concepts but also develop the skills and abilities necessary to promote better livelihood opportunities. The various types of skills that students develop include communication skills, presentation skills, analytical skills, problem-solving skills, decision-making skills, critical thinking skills, time management skills, personal skills, professional skills, and work ethics. A core goal of higher education is to equip students with a robust understanding of work ethics, skills indispensable in employment and beneficial in all personal and professional endeavours. Consequently, it is paramount that pedagogical methods are crafted to instil these skills, fostering a clear understanding of what work ethics mean and why they matter.

Pedagogical theories stem from learning theories. Learning theories serve as conceptual frameworks for teaching and learning, devoted to the following:

- conditions and processes through which learning occurs;
- ideas about the ways students learn and retain information;
- models to develop instruction sessions that lead to better understanding;
- processes that people engage in as they make sense of information and how they integrate that information into their mental models so that it becomes new knowledge;
- factors that motivate people to learn, and what circumstances enable or hinder learning.

Understanding learning theories helps teachers explain the instructional

[68] Corcoran Ch. (2014). Chinese Learning Styles: Blending Confucian and Western theories. *Journal of Instructional Pedagogies.* 13. URL: https://eric.ed.gov/?id=EJ1060088

choices or the "why" behind what and how to teach, and it helps to improve the teaching philosophy. Theories of learning can provide clarity and direction by offering a set of principles or guidelines to inform your teaching approach.

The more theories of learning you are familiar with, the more strategies you will have to connect with diverse students from different backgrounds, learn at different paces, and face various academic challenges or obstacles.

Learning theories facilitate clear communication between teachers and students (including nonverbal communication like body language, as seen in the Behaviourism section) and parents, families, and school administrators.

As learning outcomes improve, students will also build confidence and self-esteem. There are several theories of learning (Table 2.2).

Table 2.2

Main theories of learning

Orientation	Learning Theorists	Purpose of Education	Teacher's Role	Manifestation in Adult Learning	Key Concepts
Behaviourism	Pavlov, Skinner, Thorndike, Watson	Produce desired behaviour, develop learning skills	Arrange the environment to elicit the desired response	Behavioural objectives	Competency-based education, skill training
Cognitivism	Ausubel, Bruner, Gagne, Lewin, Piaget	Develop capacity and cognitive skills	The structure of the learning activity	Cognitive modelling	Intelligence, learning, memory, and age function
Cognitivist & Socio-cultural	Bandura	Model new behaviour, develop social skills	Models and guide new behaviour	Socialisation, role-playing	Locus of control, mentoring
Constructivism	Dewey, Lave, Vygotsky, Bruner, Gardner	Construct knowledge and identity with the learner	Models, guides, and negotiates learning	Self-directed learning	Reflexive practice
Humanistic	Maslow, Rogers, and Knowles	Become self-actualised, autonomous, self-directed	Facilitates whole-person development	Self-directed learning	Autonomy
Experiential Learning	Kolb, Schön	Ability to adapt to new situations	Catalyst for reflective practice	Active experimentation, social participation	Spiral learning, inductive process
Transformative & Socio-critical	Mezirow, Chomsky	Transform problematic frame of reference	The catalyst for change through dialogue	Transformation of perspectives	Reflexive practice

2.2 Herbartianism: Foundations of Pedagogy and Precursors to Modern Learning Theory

Johann Friedrich Herbart (1776-1841) is regarded as the father of pedagogy, as his works conceptualised the field. A significant aspect of Herbart's metaphysics was his meticulously developed psychology. He was the first to rigorously apply modern infinitesimal calculus to psychological problems, believing that psychology was grounded in experience, metaphysics, and mathematics. Herbart envisioned this new psychology, making discoveries on par with those of Isaac Newton in physics. While his specific empirical approach was not widely adopted in the 19th century, his ideas profoundly impacted Wilhelm Wundt's empirical psychology and Sigmund Freud's psychoanalysis.

Historically, the concepts of "education" and "teaching" were treated as distinct ideas, with separate discussions. Only later were attempts made to link them, exploring how one could support the other. Herbart boldly challenged this separation by incorporating teaching as a component of education within his pedagogical framework. He argued against the primary use of external disciplinary measures, such as punishment, asserting that effective teaching was the surest path to successful education.

According to Herbart, the teacher does not simply impart the principle to the child; instead, his teaching aims to lead the child step by step to recognise the principle as their own and reflect on their direct experience. For Herbart, the teacher promotes reflection by promoting what he calls the child's "interest".

Herbart defined the ideal structure of interest as "versatility". It occurs when an individual thoroughly engages with diverse subjects and connects these in-depth experiences to a comprehensive understanding. An undeveloped interest is crude, while an interest focused on isolated aspects remains "one-sided". Versatile interest, in contrast, integrates these different facets into a balanced and cohesive whole. This unified interest, however, should not vary between individuals; instead, everyone's interests should align, making them receptive to all the distinct modes of human spiritual activity.

Johann Friederich Herbart (1776-1841)

Thus, Herbart's concept of versatile interest is his interpretation of contemporary humanism. Cultivating versatile interests is, in essence, cultivating humanism. Herbart identified six types of humanistic interests: cognitive interests (empirical, speculative, and aesthetic) and relational interests (societal, religious, and individual). His concept of "versatile interest" effectively translated the prevailing idea of "harmonious training of human forces" into his psychological framework.

Interest holds dual importance in educational teaching. Firstly, a versatile interest is a crucial intermediate goal. It provides the inner readiness necessary for

an educated person to act by their sound judgment. Secondly, interest serves as the only permissible driving force in education. Sustained interest enables continuous and effortless expansion of thought, opens up the world, and fosters genuine engagement with others' well-being. Consequently, Herbart considered boredom "the worst sin of teaching."

Equally important, however, is the pupil's constant, active participation in their surroundings, which helps develop an empathetic understanding of their fellow human beings. In all these cases, a teacher must modify the experience and human interaction to maximise the yield of knowledge. The teacher must not be narrowly committed to their scientific expertise but rather demonstrate an interest in the world and humanity.

In his theory, he identified five components of pedagogy, as listed below:

Preparation involves getting ready for the instructional process.

Presentation refers to the actual process of teaching and learning. In honing presentation skills, various factors need to be taken into consideration. These are providing accurate information, speaking clearly and fluently, maintaining eye contact with the audience, using everyday language, answering questions put forward by the audience, having pleasant facial expressions, teaching the principles of morality and ethics, possessing technical skills, and adhering to the time frame.

Associating the process of bringing ideas or events together, e.g., in memory or imagination, can also refer to a mental connection or relation between thoughts, feelings, ideas, and/or sensations.

Generalisation refers to reasoning from detailed facts to general principles and can also be explained as the formulation of general concepts from specific instances.

Applications refer to putting into practice what was learned. Teachers should incorporate the above components into their teaching and learning practices for effective pedagogy.

Herbart also emphasised the connection between an individual's development and their social impact. His works led to Herbartianism, a movement associated with his views. With the rise of early 20th-century progressive education, Herbartianism gradually faded, and Herbart's educational theories seemed destined for obscurity. While Herbart and his followers influenced some early progressive educators, their overall vision for schools sharply contrasted with Herbartian ideas in Germany and internationally. Herbart's original works were no longer widely read; instead, he was portrayed as an advocate for a "book school" where students passively accepted their teacher's words, denying them the opportunity for personal experience. He was accused of attempting to externally mould the mind and impose a curriculum, as exemplified by criticisms from figures like John Dewey in "Democracy and Education". Furthermore, Herbart was often seen as denying inherent human agency.

While Herbart's original theories were primarily focused on children's education, the underlying principles of Herbartianism are highly relevant and valuable in adult learning. Adult learners often prefer self-directed learning. A

Herbartian approach, where the instructor guides adults to recognise principles as their own and reflect on their experience, aligns perfectly with this. Instead of lecturing, an adult educator using Herbartian principles would facilitate discussions, problem-solving, and experiential activities.

For adults, "interest" is often tied to relevance and practicality. An adult learning program rooted in Herbartian ideas would make a strong case for *why* the material matters to the learner's personal or professional life, thereby sparking genuine interest and motivation for deeper engagement.

Herbart's emphasis on reflecting on direct experience is crucial for adult learners, who bring a wealth of prior knowledge and life experience to the classroom. Adult educators can design learning activities that explicitly ask learners to connect new concepts to their past experiences, leading to deeper understanding and retention.

Herbart's idea of modifying experience to maximise knowledge yield fits well with adult learning's focus on problem-centred approaches. Adult education often revolves around solving real-world problems, and a Herbartian framework would support structuring learning around these challenges.

While traditional adult learning often focuses on skill acquisition, Herbartianism reminds us of the importance of developing a broader understanding of the world and empathy for others. In professional development, this translates to fostering collaborative skills, considering ethical implications, and understanding diverse perspectives.

2.3 The Main Learning Theories

2.3.1 Behaviourist Learning Theories

Behaviourist pedagogy (also known as behaviourism) focuses on the observable actions of students and assesses whether they are learning as effectively as possible. The central belief of a behaviourist is that students learn through reinforcement, constant feedback that tells them whether what they are doing is right or wrong. It comes in test scores, homework marks, and more.

Behaviourism was founded in the late 19th century. From this perspective, three assumptions are essential:

- The focus is on observable behaviour rather than on internal cognitive processes.
- The environment is the modifier of behaviour and learning, not individual characteristics.
- Principles of contiguity and reinforcement are central to the learning process.

The theories focus on learning as an aspect of conditioning, emphasising behaviour modification. Ivan Pavlov (1849-1936) proposed the concept of **classical conditioning**. It explains behaviour as a reflex action or response to an antecedent stimulus. In simple terms, two stimuli are connected to produce a newly learned response in a person or animal.

Later, it was proposed that the process of classical conditioning could explain all aspects of human psychology. Everything, from speech to emotional responses, followed patterns of stimulus and response. Pavlov, in his experiment, kept a dog hungry for a few days. Then he tied him to the experimental table, which was equipped with as many specific mechanical devices as possible (Fig. 2.1).

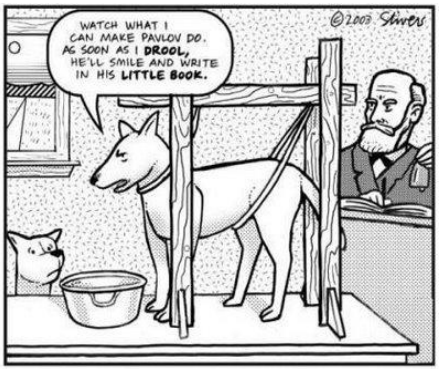

Figure 2.1 Pavlov's conditioning experiment

The observer himself remained hidden from the dog but was able to view the experiment using a set of mirrors. The arrangement was made to give food to the dog through an automatic mechanism. He also arranged for a bell to ring whenever food was presented to the dog. When the food was presented to the dog and the bell was rung, the dog's mouth automatically secreted saliva. The activity of presenting the food, accompanied by the ringing of the bell, was repeated several times, and the amount of saliva secreted was measured.

After several trials, the dog was given no food, but the bell was rung. In this case, the saliva secreted was also recorded and measured. It was found that even in the absence of food (the natural stimulus), the ringing of the bell (an artificial stimulus) caused the dog to secrete saliva (the natural response).

Implications of classical conditioning:

1. In daily life, fear, love, and hatred towards an object, phenomenon, or event are created through conditioning.

2. Most learning is associated with conditioning, i.e., stimulus-response association and substitution.

3. The phenomenon of stimulus generalisation and discrimination occurs throughout our lives.

4. Abnormality in one's behaviour may be greatly the result of conditioning.

5. Our behaviour in the shape of interests, attitudes, habits, sense of application or criticism, mood, and temperaments is fashioned through conditioning.

6. Conditioning helps in learning what is desirable and also unlearning what is undesirable.

Operant conditioning is where a consequence of behaviour follows an antecedent stimulus through reinforcement or punishment.

Burrhus Fredric Skinner (1904-1990), an American psychologist and Behaviourist, first proposed operant conditioning.

This approach considers the causes of an action and its consequences; it is referred to as operant conditioning (Fig. 2.2).

B.F. Skinner

It involves intentional acts that influence the surrounding environment. Skinner concluded that reinforced behaviour tends to be repeated and strengthened, and vice versa.

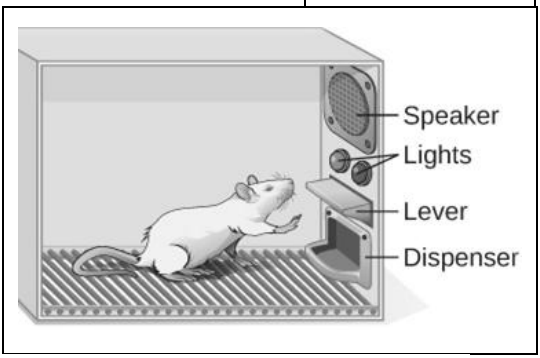

Figure 2.2: Illustration of Skinner's experiments with operant conditioning

In other words, behaviour not supported tends to diminish or die out.

In his works, Skinner concluded that reinforced behaviour tends to be repeated and strengthened, and vice versa; i.e., behaviour not supported tends to diminish or die out. He identified the responses that can follow behaviour. Skinner placed a hungry rat in the box. In this experiment, the rat's pressure on the bar in a certain way could produce a click and a food pellet. The click sound signalled to the rat that if it responded by going to the food cup, it would be rewarded. After the lever-pressing response had been rewarded, the rat repeated it and was again rewarded, which further increased the probability of repeating the response, allowing it to continue. In this way, ultimately, the rat learned to press the lever as desired by the experimenter. The rat quickly learns the association between pressing the lever and receiving food. Because the consequence (food) is positive, the behaviour of pressing the lever is **reinforced**, meaning it becomes more likely to occur again. Over time, the rat will intentionally and consistently push the lever to get food, demonstrating that its behaviour has been "conditioned" by the consequence.

A rat might be placed in a box with a continuous unpleasant stimulus (e.g., a mild electric shock through the floor). If pressing the lever causes the shock to stop, the rat learns to press the lever to remove the unpleasant stimulus, thus increasing the likelihood of that behaviour. If pressing the lever adds an unpleasant stimulus (e.g., an electric shock), the rat will learn to decrease or stop pressing the lever. If a desirable stimulus is removed (e.g., food is withheld when the lever is pressed at certain times), the behaviour of pressing the lever will decrease.

With the help of such experiments, Skinner developed his theory of operant conditioning, which encompasses learning simple responses, such as pressing a lever, as well as the most challenging and complex series of reactions.

> "Operant conditioning shapes behaviour as a sculptor shapes a lump of clay <...> an operant is not something that appears fully grown in the behaviour of the organism. It is a result of a continuous shaping process."[69]

Responses that can follow behaviour:

- Neutral operant: these are responses from the environment that neither increase nor decrease the probability of a behaviour being repeated. ·
- Reinforces: these are responses from the environment that increase the probability of repeated behaviour. Reinforcers can be either positive or negative (Fig. 2.3).
- Positive reinforcement strengthens a behaviour by giving rewarding consequences to an individual. The learner will be more likely to repeat this behaviour in the future, reinforcing the behaviour of scoring more than seventy per cent on in-class assignments.
- Negative reinforcement refers to removing an unpleasant behaviour to strengthen a given behaviour.
- Punisher: these are environmental responses that decrease the likelihood of a behaviour being repeated and weaken (eliminate) a given behaviour. Generally, a punisher acts in the opposite way of reinforcement.

The implications of the theory of operant conditioning:

- The learning or training process and environment must be designed to create minimal frustration and maximum satisfaction for the learner, providing them with the proper reinforcement for the desired learning outcome.
- The theory of operant conditioning does not attribute motivation to internal processes within the organism, and it assumes the consequences of that behaviour.
- Operant conditioning emphasises the importance of a schedule in the behaviour reinforcement process. In trying to impart or teach a particular behaviour, therefore, great care should be taken for the proper planning of the schedule of reinforcement.
- The theory advocated avoiding punishment for unlearning undesirable behaviour and shaping desirable behaviour. Punishment proves ineffective in the long run. Operant conditioning experiments suggested an appropriate alternative to punishment, in the form of rewarding appropriate behaviour and ignoring inappropriate behaviour, for its gradual extinction.

In conventional learning, operant conditioning primarily applies to class and student management issues rather than learning content, and it is highly relevant

[69] Skinner B.F. *Science and Human Behavior*. New York. The Free Press, 1965. P. 91.

to shaping skill performance. A simple way to shape behaviour is to provide feedback on learner performance (compliments, approval, encouragement, and affirmation).

For behaviourists, instruction aims to elicit the desired response from the learner presented with a target stimulus. To accomplish this, the learner must know how and under which conditions to respond appropriately. Instruction is structured around delivering the target stimulus and providing learners with opportunities to practice responding properly. Instruction frequently uses cues (to prompt the initial delivery of the response) and reinforcement (to strengthen correct answers in the presence of the target stimulus) to facilitate the linking of stimulus-response pairs.

Therefore, instruction is structured around delivering the target stimulus and providing learners with opportunities to practice responding properly.

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An example of such reinforcements is shown in Fig. 2.3.

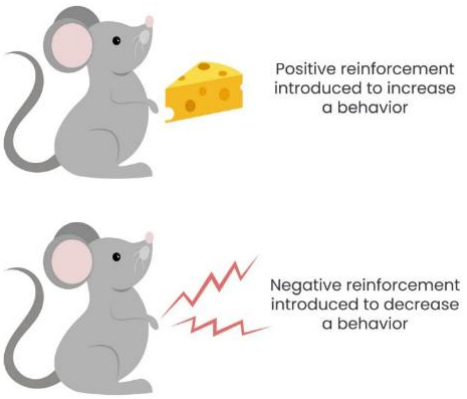


Figure 2.3 Illustrations of positive and negative reinforcement under operant conditioning

The application of this theory in practice looks like this:

- The teacher leads the class through a topic.
- Students listen silently.
- The teacher then sets a task based on the information.
- Students complete the task and await feedback.
- The teacher provides feedback and assigns the next task.

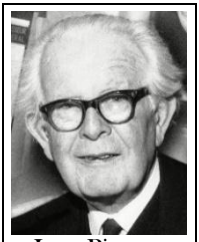
B.F. Skinner and Operant Conditioning

The critics of behaviourism argue that just because a student is engaged and working, it does not mean they are learning, because the learning process is much more internalised.

2.3.2 Cognitivism

Cognitive psychology is the theoretical perspective that focuses on how people perceive, remember, think, speak, and solve problems. These theories differ from behaviourist ones by acknowledging the existence of internal mental states, such as beliefs, desires, and motivations. These theories focus on the complexities of human memory as influencing learning. Thus, instructional strategies should be designed to foster learner retention. The ideas also emphasise the importance of prior knowledge in significantly impacting teaching and learning. Therefore, instruction should be conducted sequentially, incorporating teaching from known to unknown, simple to complex, and/or concrete to abstract concepts.

Cognitive learning is an active style of learning that focuses on helping you learn how to maximise your brain's potential. It makes connecting new information with existing ideas easier, deepening your memory and retention capacity.


Jean Piaget

Jean Piaget (1896–1980) was a Swiss psychologist. He researched children's development and contributed to the development of Jean Piaget's theory of cognitive development. In theory, he describes a child's development as a sequence of learning beyond simple rote learning. He regarded the child as a philosopher who perceives the world only as he has experienced it. Therefore, most of Piaget's inspiration for cognitive and intellectual development stemmed from observations of children.

The theory of cognitive development focuses on mental processes, including perception, memory, belief, and reasoning (Fig. 2.4). Piaget disagreed with the behaviourist theorists, who focused strictly on observable behaviour and concentrated more on what goes on inside the learners' heads rather than how they react.

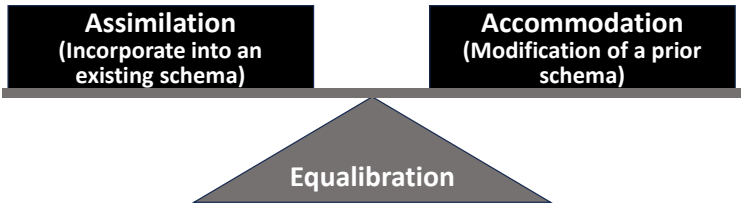


Figure 2.4 Piaget's theory of developmental change via schemas

Reasoning is the essence of intelligence, and reasoning is what Piaget studied to discover – how we come to know. Piaget believed that cognitive development is cumulative; understanding a new experience builds upon previous learning experiences.

Piaget sought to break knowledge into a single, basic unit to make a consistent psychological theory. From there, he could develop a theory of cognitive learning that could apply just as much to a baby's first step as to deep

philosophical concepts they might develop later in life.

Piaget called this basic unit **a schema – a cohesive, repeatable action sequence possessing component actions that are tightly interconnected** and governed by a core meaning.

Piaget outlines a three-step process for forming a schema (Fig. 2.4). These steps are as follows.

1. Assimilation is the cognitive process of associating new information with what is already known.

2. Accommodation – refers to modifying the existing schemas caused by the new information. According to Piaget, a learner constructs knowledge when they encounter input from the environment; the learner's schemes or mental structures incorporate the new experiences (assimilation). If and when newly assimilated information conflicts with previously formed mental structures, the result is called disequilibrium (or 'cognitive conflict'). This state (disequilibrium) motivates the learner to seek equilibrium. Regaining equilibrium or cognitive harmony results in what Piaget called accommodation, a process that involves the development of new mental structures. Furthermore, assimilation and accommodation represent the learner's adaptation to the environmental input.

3. Equilibration is an active and dynamic process of moving between cognitive disequilibrium and equilibrium states. It is as we assimilate new experiences and adapt to new schemes. In the cycle of adaptation and equilibration, a new experience is first assimilated into an existing scheme. If it does not fit properly, cognitive disequilibrium results. Accommodating (adjusting) the scheme brings the child to cognitive equilibrium until a new assimilation rechallenges the scheme.

> "Assimilation theoretically does not result in a change of schemata, but it does affect the growth of schemata and is thus a part of development. One might compare a schema to a balloon and assimilation to adding more air to the balloon. The balloon expands (through assimilation growth) but does not alter its shape. Assimilation is a part of the process by which the individual cognitively adapts to and organises the environment."[70]

> *Learning* can only occur when we find ourselves in a state of *disequilibrium* - a state of "imbalance" and "not knowing."
>
> *Learning* is the process of resolving that *disequilibrium* and achieving equilibrium - a state of "balance" and "knowing."[71]

[70] Aloqaili A.S. (2012). The Relationship between Reading Comprehension and Critical Thinking. *J. King Saud University-Languages & Translation,* 24(1), 35–41.

[71] Ginsburg H.P., Opper S. (1988). *Piaget's theory of intellectual development* (3rd ed.). Prentice-Hall, Inc.

Theories in General and Their Application to Pedagogy: Jean Piaget's Theory Directly Impacts Classroom Instruction and Pedagogical Strategies. As explained below:

- Age consideration: This requires teachers to provide learning activities that are tailored to the learner's developmental level.
- Individual differences, resulting from both nature and nurture, cause children to exhibit variations in their behaviour. Therefore, teachers should occasionally attend to learners individually, avoid making comparisons, and allow learners to progress at a pace that is appropriate for them.
- Appropriate materials should also be provided for learners with special needs.
- Assimilation is the process of fitting new information into the existing way of thinking (mental schemes) in the learners' minds. Teaching should be built on prior knowledge to achieve this goal.
- Learning by doing occurs when learners are engaged in activity-based instruction, leading to productive learning.
- Active receptors of stimulus: learners are active receptors of stimulus. As such, knowledge acquisition and construction should be fully involved. Teachers should employ teaching methods that are applied to learners.

Cognitive theories emphasise making knowledge meaningful and helping learners organise and relate new information to their existing knowledge in memory. Instruction must be based on a student's existing mental structures, or schema, to be effective, and it should organise information so learners can meaningfully connect new information with existing knowledge. Analogies and metaphors are examples of this type of cognitive strategy. Instructional design textbooks, for example, frequently draw an analogy between the familiar profession of architecture and the unfamiliar profession of instructional design.

Piaget's Schema: Accommodation and Assimilation of New Information

It helps the novice learner conceptualise, organise and retain the primary duties and functions of an instructional designer. Other cognitive strategies may include framing, outlining, mnemonics, concept mapping, and advance organisers.

The various benefits of cognitive learning theories have been stated as follows:

Enhances learning. Learning takes place throughout the lives of individuals. They need to learn various concepts and aspects necessary to enrich their lives. Enhancing learning is regarded as one of the fundamental aspects. The individuals have multiple goals and objectives to achieve. They can enrich their lives by enhancing their learning in ways that help them achieve their goals and objectives. Cognitive learning theories render an essential contribution to improving learning. The individuals can build upon previous ideas and apply new concepts to existing knowledge. In particular, when adults come to the classroom, they are sometimes

familiar with the topics. They utilise prior knowledge to gain a comprehensive understanding of the concepts and factors. Therefore, when individuals use prior knowledge to enhance learning, they can benefit to a significant extent.

Boosts confidence. Individuals need to learn to overcome apprehension and vulnerability and boost their confidence. The upgradation of confidence levels enables individuals to concentrate on their tasks and activities, generating the desired outcomes. Hence, individuals need to research to boost their confidence. When learners can understand concepts in a well-organised manner, they feel confident and can provide solutions to various types of problems. One of the important ways to boost confidence in learning is to instil the traits of diligence and resourcefulness. Individuals who cultivate and practice these traits can enhance their learning and achieve the desired outcomes. Therefore, it is well-understood that boosting confidence is a crucial benefit of cognitive learning theories.

Enhances comprehension. Cognitive learning theories effectively enhance learners' comprehension by facilitating the acquisition of new information. When comprehension is enhanced, one of the essential benefits is that the learners will be able to develop a deeper understanding of new materials. Over time, it is of utmost importance to bring about changes, and when these changes are well understood, individuals will be able to grasp the concepts more effectively. In the present existence, modern, scientific, technical, and innovative methods are utilised in the teaching and learning processes. Hence, by enhancing comprehension, individuals can effectively apply these methods and overcome various problems and challenges. Therefore, enhancing comprehension is a benefit that is acknowledged in cognitive learning theories.

Improves problem-solving skills. Problems and challenges arise in the lives of individuals, both personally and professionally. Hence, individuals need to be well-equipped in terms of ways of bringing about improvements in problem-solving skills. Through cognitive learning theories, individuals can acquire an understanding of the meaning and significance of problem-solving skills and learn ways to improve them. The primary benefit of cognitive learning is to provide individuals with knowledge and understanding by employing effective and meaningful methods and approaches to solve problems. When individuals are experiencing setbacks in learning, they need to work diligently and augment their knowledge and understanding. Improving problem-solving skills is a benefit regarded as worthwhile in cognitive learning theories.

It facilitates rapid learning. When concepts are challenging to understand, it is apparent that individuals will need time to grasp them. However, through cognitive learning theories, individuals can learn things rapidly. Through the experience of learning, individuals will be able to recycle and apply the learning methods they have previously utilised. It will contribute efficiently to helping them learn new things at a rapid pace. Students in higher education institutions are aware of the learning methods that would be beneficial and meaningful to them in achieving their academic goals. Students feel content and pleased when they can grasp concepts at a rapid pace. Furthermore, they need to understand how to apply

their learning in both personal and professional contexts. Therefore, the benefit of helping to learn things rapidly is comprehensively acknowledged.

Teachers help with concept formation. Cognitive learning can teach individuals various concepts, enabling them to easily perceive and interpret information that enhances creativity and leads to innovation. When educational institution members utilise modern and innovative methods in teaching and learning, implementing other tasks and activities, and upgrading the overall education system, they can perform their job duties effectively. Still, they can also think logically and rationally. Generating information in terms of concept formation will be a significant contribution to effectively utilising cognitive learning theories. Therefore, it is well understood that teaching concept formation is a vital benefit of cognitive learning theories.

Some students advance quickly, while others require more time to master certain subjects. When educators consider their students' existing knowledge, they can better support each student's learning process. As a learning theory, cognitivism has many applications in the classroom. In each application, the primary principle is to incorporate student experiences, perspectives and knowledge.

For example, a teacher might:

- Ask students about their experience with the lesson.
- Emphasise the connection between past ideas and new ones.
- Incorporate group discussions into the curriculum.
- Invite a variety of opinions about a given subject.

This approach not only helps students learn but also makes them feel respected and listened to. It can make class exciting and encourage a passion for learning that lasts throughout students' lives.

> ***Further Reading:*** Perry T., Lea R., Jørgensen C.R., Cordingley P., Shapiro K. & Youdell D. (2021). *Cognitive Science in the Classroom. London: Education Endowment Foundation. https://educationendowmentfoundation.org.uk/evidence-summaries/evidencereviews/cognitive-science-approaches-in-the-classroom/*

2.3.3 Constructivism

Constructivism is a theory that equates learning with creating meaning from experience. Both constructivism and cognitivism conceive of learning as a mental activity. Constructivism is considered a branch of cognitive science, not a subset of cognitivism. Nevertheless, constructivism distinguishes itself from traditional cognitive theories. Most cognitive psychologists view the mind as a reference tool for the real world; constructivists, on the other hand, believe that the mind filters input from the world to produce its unique reality. Constructivists do not share with cognitivists and behaviourists the belief that knowledge is mind-independent and can be "mapped" onto a learner. Constructivists do not deny the existence of

the real world but contend that what we know of the world stems from our interpretations of our experiences. Learners do not transfer knowledge from the external world into their memories; instead, they build personal interpretations of the world based on their individual experiences and interactions.

From its perspective, these assumptions are essential:

- Behaviour is situationally determined.
- The internal representation of knowledge is constantly open to change; there is no objective reality that learners strive to know.
- Knowledge emerges in contexts within which it is relevant. Therefore, the experience must be examined to understand the learning that has taken place within an individual.
- The situations actually co-produce knowledge (along with cognition) through activity. Every action is "an interpretation of the current situation based on an entire history of previous interactions."
- The focus of instruction shifts from teaching to learning, from the passive transfer of facts and routines to the active application of ideas to problems.

A major contributor to the field of constructivism is Lev Vygotsky (1896–1934), best known for his work on psychological development in children and for creating the framework known as cultural-historical activity theory. Following his early death, his books and research were banned in the Soviet Union until the death of Joseph Stalin in 1953, when the first collection of primary texts was published in 1956.

Lev Vygotsky

"This difference between twelve and eight, or between nine and eight, is what we call the zone of proximal development. It is the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers <...> The zone of proximal development furnishes psychologists and educators with a tool through which the internal course of development can be understood. By using this method, we can account for not only the cycles and maturation processes that have already been completed but also those that are currently in a state of formation, just beginning to mature and develop. Thus, the zone of proximal development permits us to delineate the child's immediate future and his dynamic developmental state, allowing not only for what has already been achieved developmentally but also for what is in the course of maturing."[72]

[72] Vygotsky L.S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cole, M. and others, eds. Cambridge, Mass.: MIT Press. P. 86–87.

According to Vygotsky's social constructivism theory, cognitive abilities are gained through social guidance and construction. He defined the "zone of proximal learning" (Fig. 2.5), according to which students solve problems beyond their actual developmental level (but within their level of potential development) under adult guidance or in collaboration with more capable peers.

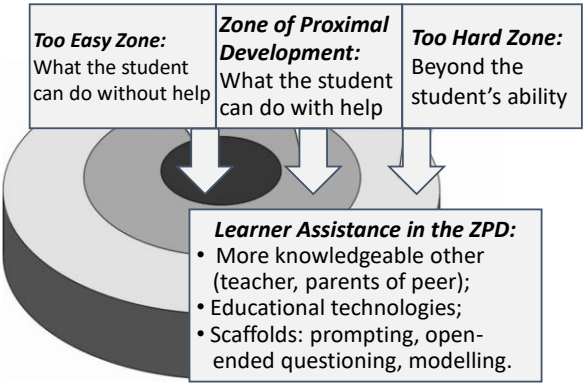


Figure 2.5 Vygotsky's zone of proximal

Vygotsky described human mental abilities in the following way.

- "lower mental functions" (vision, hearing, taste), which are controlled by external objects and events,
- "higher mental functions" (logical and abstract thinking and language) that operate internally and are used to control lower mental functions,

The main ideas of Vygotsky are:

- Adults in society play a crucial role in fostering children's cognitive development by engaging them in challenging and meaningful activities. Adults convey to children the way their culture interprets and responds to the world,
- The interactions with others significantly increase not only the quantity of information and the number of skills a child develops, but also affect the development of higher-order mental functions such as formal reasoning.
- Higher mental abilities could only develop through interaction with more advanced others,
- Children are born with basic mental skills, such as memory and perception; higher mental functions develop through social interactions.

The true direction of the development of thinking is not from the individual to the social. Indeed, it is from the social to the individual. Vygotsky introduced the concept of internalisation to emphasise the sociocultural nature of human development (Fig. 2.6).

According to Vygotsky, the mental function does not simply move from the 'social' plane into the individual's head. It transforms through the individual's growing familiarity with other people's roles in the distributed action (e.g., by

Vygotsky, internal private speech by the child is an abbreviation of external speech directed to others).

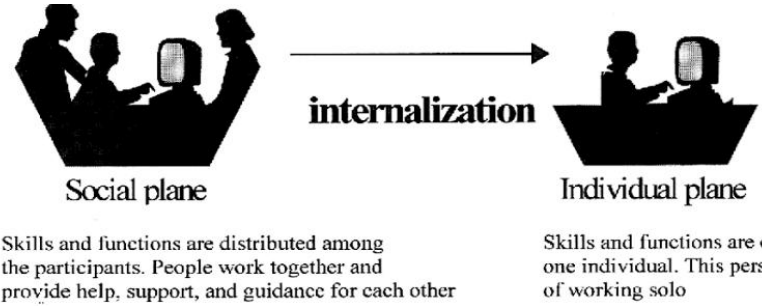


Figure 2.6 Vygotsky's concept of internalisation

"<...> The process of internalisation consists of a series of transformations: An operation that initially represents an external activity is reconstructed and begins to occur internally. Of particular importance to the development of higher mental processes is the transformation of sign-using activity, the history and characteristics of which are illustrated by the development of practical intelligence <...> An interpersonal process is transformed into an intrapersonal one. Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological) <...> All the higher functions originate as actual relations between human individuals <...> The internalisation of socially rooted and historically developed activities is the distinctive feature of human psychology <...> As yet, the barest outline of this process is known."[73]

It also transforms through a change in mediation (e.g., initially stretching out the hand-mediated command to another to give a remote object, then stretching out the hand-mediated command to the child to pay attention to a remote object or event).

Vygotsky agreed with Piaget that cognitive development occurs in stages, and he broadly concurred with Piaget's description of these stages; however, he viewed cognitive development as a social process in which children learn from experienced adults. Key differences between Vygotsky's and Piaget's theories are illustrated in Table 2.3.

While Piaget was interested in describing what was universal in children's cognitive development, Vygotsky was interested in the differences that arise from the social, cultural, and historical context in which children grow. Like Piaget, Vygotsky believes that young children are curious and actively involved in learning,

[73] Vygotsky L.S. *Mind in Society: The Development of Higher Psychological Processes.*1978. Cole M. and others, eds. Cambridge, Mass.: MIT Press. P. 57.

discovering, and developing new understandings and schemas. However, Vygotsky emphasised the social contributions to the development process, whereas Piaget emphasised self-initiated discovery.

Table 2.3

Vygotsky vs. Piaget

	Piaget	Vygotsky
Sociocultural context	Little emphasis	Strong emphasis
Constructivism	Cognitive constructivist	Social constructivist
Stages	Strong emphasis on stages of development	No general stages of development are proposed
Key processes in development learning	Equilibration; schema; adaptation; assimilation; accommodation	Zone of proximal development; scaffolding; language/dialogue; tools of the culture.
Role of language	Minimal – Language provides labels for children's experiences (egocentric speech)	Major – Language plays a powerful role in shaping thought.
Teaching implications	Support children to explore their world and discover knowledge	Establish opportunities for children to learn with the teacher and more skilled peers.

Further Reading: Matusov E. (1998). *When Solo Activity Is Not Privileged: Participation and Internalization Models of Development. Human Development, 41(5-6), 326–349.*

There is a strong emphasis on social interaction and culture. However, many other aspects of development are often neglected, such as the importance of emotional factors, e.g., the joys of success and the disappointments and frustrations of failure; these factors act as a powerful motivator for learning.

Due to the nature of constructivism,

- The instructor should adopt a more hands-on approach rather than the traditional lecture style.
- The classroom environment should be supportive of each learner's thinking and encourage a constant challenge.
- The learning occurs in small groups,
- and knowledge is shared between students and the instructor.

Currently, however, constructivism is considered the dominant educational theory, having been widely adopted by nearly every educational reform initiative over the last two decades. Most teaching methods developed in recent years are based on various constructivist theories, such as *social constructivism, situated*

learning, and connectivism. For example, they are problem-based learning, authentic instruction, and computer-supported collaborative learning.

2.3.4 Social Learning Theory

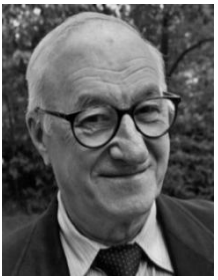
Social learning theory explains behaviours through the continuous reciprocal interaction between cognitive, behavioural, and environmental influences. In this theory, two aspects must be emphasised: the mediating processes between stimuli and responses and learning behaviour from the environment through observational learning. The individuals who are observed are called models. The children observe and learn from the behaviours of the individuals around them. The term "identification" has been used in social learning theory.

There are three core concepts of social learning theory.

- The idea is that people can learn through observation.
- The notion is that internal mental states are essential to this process.
- This theory recognises that just because something has been learned does not mean it will result in behavioural change.

Albert Bandura (1925–2021) introduced the concept of reciprocal determinism, a brilliant idea. He describes how a person's behaviour is influenced by and influences their factors and the environment.

In his writings, Bandura challenges early behaviouristic thinking, which took a simplistic view of the human mind and experience. According to this view, humans are thought to function like input-output systems, where external stimuli exert their effects, resulting in a specific, unvarying response (akin to a machine that lights up whenever a particular button is pressed).



Albert Bandura (1925–2021)

Bandura's theory states that the environment and, in turn, a person's behaviour influence each other. In simpler terms, it means that the environment tends to change the individual's behaviour, and in return, the individual's behaviour is also responsible for environmental changes.

It means that not only does the environment influence a person's thinking, but the person's subsequent behaviour also influences the environment. Thus, three main factors are addressed in this theory, known as triadic reciprocal causation (Fig. 2.7). Determinism is the theory that posits that a person's actions, behaviour, or decisions are merely an outcome of past events. It means that our actions are just reactions to what has already happened.

The social learning of A. Bandura emphasises the importance of learning and modelling the behaviours, attitudes, and emotional reactions of others. Social learning theory explains behaviours through the continuous reciprocal interaction between cognitive, behavioural, and environmental influences. In this theory, two aspects must be emphasised: the mediating processes between stimuli and responses and learning behaviour from the environment through observational learning. The individuals who are observed are called models. The children

observe and learn from the behaviours of the individuals around them. The term "identification" has been used in social learning theory.

The way we behave today is just a reaction to past events. He agreed with the theory of determinism, which posits that past events cause our behaviour and actions. Still, he was also of the opinion that the environment is also caused or affected by our behaviour. Children observe the people around them behaving in various ways.

The famous Bobo Doll experiment illustrates that children can learn through observation and later imitate the same behaviours, facilitated by a combination of environmental and cognitive processes.

Bobo Doll experiment

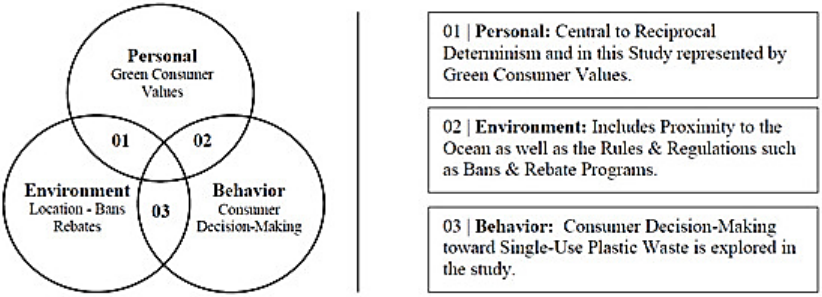


Figure 2.7 Bandura model of reciprocal determinism(adapted from [74])

Bandura explains the following steps that are usually involved in learning.

1. Attending and perceiving: Observation of a role model catches a child's attention.

2. Remembering the behaviour: the child remembers the actions and styles.

3. Converting the memory into action: the child imitates the role model. A behaviour observed and remembered by the learner is analysed in terms of its acceptability. It is transformed into action only afterwards; thus, the learner imitates the observed, relevant and accepted aspect of the model's behaviour.

4. Reinforcement of the imitated behaviour: the child tries to change himself into the role of a model. The model's behaviour imitated by the learner is reinforced to facilitate proper adoption and continued use.

Reinforcement can be external or internal and can be positive or negative. If a child wants approval from parents or peers, this approval serves as external reinforcement; however, feeling happy about being approved is an internal reinforcement. A child will behave in a way that it believes will earn approval because it desires approval.

[74] Fischbach S., & Yauney B. (2023). Social Cognitive Theory and Reciprocal Relationship: A Guide to Single-Use Plastic Education for Policymakers, Business Leaders and Consumers. *Sustainability*, *15*(5), 3946. https://doi.org/10.3390/su15053946

Positive (or negative) reinforcement will have little impact if the external reinforcement does not match an individual's needs. Reinforcement can be positive or negative, but the critical factor is that it will usually change a person's behaviour.

The child will also consider what happens to other people when deciding whether or not to copy someone's actions. A person learns by observing the consequences of another person's (i.e., models) behaviour, e.g., a younger sister observing an older sister being rewarded for a particular behaviour is more likely to repeat such behaviour herself. It is known as vicarious reinforcement.

It relates to an attachment to specific models that possess qualities seen as rewarding. Children will have several models with whom they identify. These may be people in their immediate world, such as parents or older siblings, or they could be fantasy characters or people in the media. The motivation to identify with a particular model is that it possesses a quality the individual would like to have.

> "In dealing with their environment, models usually exhibit coping strategies both by their actions and by voicing their self-guiding thoughts. Observers can thus acquire, from informative modelling, strategies for managing challenging or threatening situations. This contribution is significant when personal inefficacy reflects skill deficits rather than misappraisals of the skills one already possesses. In addition, modelling displays convey information about the nature of environmental tasks and the difficulties they present. Modelled transactions may reveal that tasks are more or less difficult and potential threats are more or less manageable than observers originally believed. Adoption of serviceable strategies and altered perceptions of task difficulty will change observers' judgments of their efficacy."[75]

The concept of self-efficacy is central to Albert Bandura's social cognitive theory. Self-efficacy refers to a person's belief in their ability to complete a task or achieve a specific goal. It encompasses a person's confidence in themselves to control their behaviour, influence their environment, and stay motivated to pursue their goal. People can have self-efficacy in various situations and domains, including school, work, relationships, and other significant areas.

According to Bandura, self-efficacy is part of the self-system, which comprises a person's attitudes, abilities, and cognitive skills. This system plays a significant role in perceiving and responding to different situations. Self-efficacy is a crucial component of this self-system. Bandura also identified vicarious experiences obtained through peer modelling as another essential means of establishing and strengthening self-efficacy. Seeing others put in effort and succeed can, in turn, increase your belief in your ability to succeed.

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[75] Bandura A. Social Cognitive Theory of Social Referencing. In S. Feinman (Ed.), *Social referencing and the social construction of reality in infancy*. Plenum Press, 1992, P. 194.

"Cognitive self-arousal depends on the level of cognitive development. Cognitive functioning involves knowledge and cognitive skills for operating on it. The issue of theoretical interest is whether the cognitive prerequisites for vicarious arousal are best analysed as global cognitive stages or as specialised cognitive competencies. Social cognitive theory explains the mechanisms of vicarious arousal in terms of specialised ideational, attentional, self-referential, and self-regulatory subskills. As already noted, the degree of social correlation of personal outcomes also figures prominently in the social cognitive theory of vicarious arousal."[76]

Bandura identified four primary sources of self-efficacy. The four ways that self-efficacy is achieved are mastery experiences, social modelling, social persuasion, and psychological responses:

1) Mastery Experiences. 2) Social Modelling.

3) Social Persuasion. 4) Psychological Responses.

Further Reading: Bandura A. (1992). *Social Cognitive Theory of Social Referencing. Social Referencing and the Social Construction of Reality in Infancy, pp. 194 – 202.*

The following steps are involved in the observational learning and modelling process:

- **Attention:** To learn, you need to pay attention. Anything that distracts your attention will hinder observational learning. If the model is attractive or there is a novel aspect of the situation, you are far more likely to dedicate your full attention to learning.
- **Retention:** The ability to store information is also a crucial aspect of the learning process. Several factors can affect retention, but the ability to pull up information later and act on it is vital to observational learning.
- **Reproduction:** Once you have noticed the model and retained the information, it is time to perform your observed behaviour. Further practice of the learned behaviour leads to improvement and skill advancement.
- **Motivation:** For observational learning to be successful, you have to be motivated to imitate the behaviour that has been modelled. Reinforcement and punishment play an important role in motivation.

While experiencing these motivators can be highly effective, so can observing others experiencing some reinforcement or punishment. For example, if you see another student rewarded with extra credit for attending class on time, you might show up a few minutes early each day. Thanks to Bandura's work, psychologists

[76] Bandura A. Social Cognitive Theory of Social Referencing. In S. Feinman (Ed.), *Social referencing and the social construction of reality in infancy*. Plenum Press, 1992, P. 184.

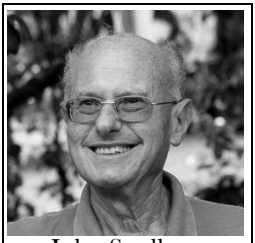
now recognise that humans are the agents of their self-development, who can adapt and self-regulate to achieve their desired future.

2.4 Cognitive Load Theory

Knowledge of both philosophical principles and applied pedagogical theories is necessary for a teacher who seeks to consciously and effectively shape the educational environment. The fundamental theoretical approaches considered in the previous sections, such as behaviourism, cognitivism, constructivism and social theories of learning, form the philosophical basis of educational practice. With the development of neuropsychology, information technology and instructional design, applied, practically oriented theories of learning have emerged. One of them is the Cognitive Load Theory (CLT) of John Sweller, which is based on the idea that working memory resources are limited and that presenting educational material in a logical manner is crucial. The provisions of CLT are so universal that they should be taken into account in all formats of educational activity, from the creation of individual materials to the organisation of interactions between participants in the educational process. That is why, although CLT shares an everyday theoretical basis with cognitivism, it should be considered separately as an independent modern theory focused on the effective design of the educational process, particularly in the context of digital, electronic, and blended education.[77]

2.4.1 The Essence of Cognitive Load Theory

Cognitive load theory was developed in the late 1980s through research by John Sweller (born in 1946) and his colleagues. It explains how people typically learn and retain new information, as well as which learning strategies are most effective in facilitating this process.


John Sweller

The theory is based on the concept of interaction between working and long-term memory, as well as the principles of human cognitive architecture. The human cognitive architecture is viewed as a natural information-processing system that determines our thinking, learning, and problem-solving abilities. It forms mechanisms aimed at reducing the excessive load on working memory and facilitating the assimilation of knowledge that accumulates in long-term memory.

To date, discussions continue regarding the understanding of what cognitive load entails, how to interpret the most effective measures of cognitive load, and how to formulate hypotheses that incorporate the relationships between load components, total load, and learning outcomes.

[77] Rodrigo Duran R., Zavgorodniaia A. and Sorva J. (2022). Cognitive Load Theory in Computing Education Research: A Review. *ACM Trans. Comput. Educ.* 22(4), Article 40, 27 pages. https://doi.org/10.1145/3483843

The theory has evolved over several decades, addressing shortcomings in earlier versions. It has been partially revised since 2010, so the so-called Old and New CLT variants can be found in the literature.[78]

Cognitive load is most commonly characterised as the amount of "mental energy" required to process data. It is referred to as "working memory," which provides a temporary storage space for data used in study and reasoning.[79] The existence of internal and external cognitive load, as well as the additive nature of the total load, is unanimously recognised by theorists.

To understand the processes of knowledge acquisition, they are divided into two main categories: biologically primary and biologically secondary. Primary are those that a person acquires automatically, without special training, in the process of evolution. They include skills necessary for survival and social interaction, such as speech, face recognition and basic thinking. Such knowledge is easily acquired and does not cause a significant cognitive load. Biologically, secondary knowledge requires purposeful learning since it is not formed naturally. These include academic subjects such as reading, writing, mathematics and history. Their acquisition requires mental effort and is accompanied by a noticeable cognitive load since this knowledge is not part of the evolutionarily programmed experience. According to J. Sweller, general cognitive skills are formed based on biologically primary knowledge and are acquired unconsciously. In contrast, subject-specific (secondary) skills require focused instruction, as without it, students are forced to rely on trial-and-error strategies, which creates excessive cognitive load.

Figure 2.8 schematically depicts the processes that occur in human memory during learning activities.

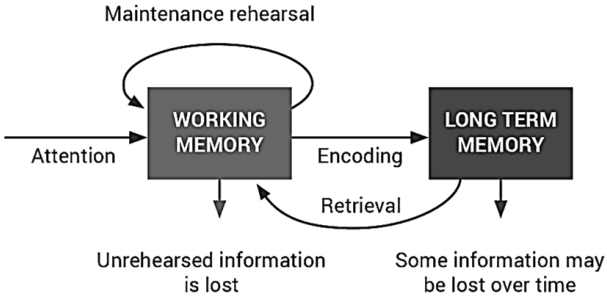


Figure 2.8 Human memory scheme as relevant to education. It is taken from[80]

[78] Kalyuga S. (2011). Cognitive load theory: How many types of load does it really need? *Educational Psychology*. Review, 23, 1–19. https://doi.org/10.1007/s10648-010-9150-7

[79] Sweller J. (2024). Cognitive load theory and individual differences. *Learning and Individual Differences*, 110, 102423 DOI https://doi.org/10.1016/j.lindif.2024.102423

[80] An introduction to cognitive load theory. (March 3, 2021). The Education Hub. https://theeducationhub.org.nz/an-introduction-to-cognitive-load-theory/

Memory is not a single system but consists of two components that are closely related to each other. Working memory is the conscious component in which new information is temporarily stored and actively processed for reasoning, learning, and understanding. For learning to occur, information must be organised and made sense of in working memory, and then transferred to long-term memory.

Long-term memory is the unconscious system where knowledge is stored in the form of schemas. When learners encounter familiar information, the schemas are automatically activated and returned to working memory for conscious processing. It is a biologically primary skill that requires no effort. An experienced learner can quickly transfer complex schemas to working memory, effectively completing complex tasks. Working memory is limited: it can hold only 5–9 pieces of information, of which only 2–4 can be actively processed at a time, and only for about 20 seconds without repetition. These limitations cause cognitive load when working with new material.

In contrast, long-term memory has no known restrictions. When familiar information is activated and returned to working memory, its volume limits do not apply. Thus, working memory is limited only when processing new information, and learning occurs when the content of consciousness changes due to the storage of material in long-term memory.

2.4.2 Components of Cognitive Load

Researchers distinguish several types of cognitive load and correlate them with the types of memory they affect. Most often, intrinsic and extrinsic cognitive load are distinguished. The latter, in turn, are divided into extraneous and germane (also known as relevant).

Regarding the educational process, intrinsic cognitive load is primarily determined by the complexity of the material being studied. It is associated with the number of elements that are integrated into the content scheme and must be processed simultaneously. It is believed that an increase in the number of such elements leads to an increase in intrinsic cognitive load. It also depends on the individual's prior knowledge (or training).

Extraneous cognitive load is precisely what is created due to the ineffective presentation of the material, rather than the complexity of the content itself. It is mainly associated with the design and presentation of educational material. Extraneous or irrelevant load is part of the external environment that does not contribute to learning but instead interferes with it. It is caused by external conditions related to the material's content and the student. For example, it can be caused by poorly developed instructions, unsuccessful design, or a combination of educational materials that overload perception channels, etc. It is associated with factors that require additional effort from the individual due to an inappropriate data format. For example, when text and a picture are displayed simultaneously on the screen, the visual channel of human perception becomes overloaded. It is well known that the text is initially perceived as a picture. Only then does its recognition and understanding begin. In a situation where a person sees both text

and a picture, their visual perception is divided between the two images - the picture and the text. This kind of extraneous load is eliminated by replacing the image of the text with an audio commentary.

Another example: If a diagram is presented on the screen with explanatory text, such text is difficult to ignore, even if it is not necessary for understanding the content of the diagram. The learner is required to assimilate multiple data elements, which places an additional load on working memory.

It is believed that extraneous load should be reduced as much as possible.

Relevant load (germane cognitive load) is a term often used to refer to the effort aimed at building schemas in memory. In the old version, researchers considered it a separate type of cognitive load, and this is still a subject of debate.[81]

Germane load goes beyond simply overcoming internal load. It is required for constructing schemas and learning, and characterises the degree of effort needed to process, internally organise, integrate, and construct cognitive schemas of data. This type of load is beneficial because it directly contributes to learning and is often associated with increased motivation to learn. Individuals do not automatically utilise all of their cognitive abilities. Those who study a subject more deeply are more likely to work with a high load compared to those who study superficially. Some scholars emphasise that relevant load is not just any useful load but rather arises from those additional, labour-intensive aspects of learning that extend beyond the scope of task performance, such as conscious reflection and self-explanation.[82] Therefore, such a load is considered an aspect of self-regulation and is associated with motivation and interest. It is believed that it is necessary to take care of its maximum increase during learning.

Table 2.4 compares the old and new versions of cognitive load theory.

In the new version, the concept of "relevant cognitive load" is no longer considered a separate type. It is included in the inherent (internal, intrinsic) cognitive load, that is, that which naturally arises during the understanding and assimilation of content and depends on the level of complexity of the material and the student's efforts to process it.

The total cognitive load is characterised by additivity, meaning it is equal to the sum of all types of load. Understanding this property provides a basis for predicting the effectiveness of working with any educational resources and preventing excessive increases in cognitive load. It is essential to recognise that if the total load exceeds the student's working memory capacity, learning will either not occur or occur inefficiently.

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[81] Orru G., Longo L. (2019). The Evolution of Cognitive Load Theory and the Measurement of Its Intrinsic, Extraneous and Germane Loads: A Review. In: L. Longo, M. Leva (eds) *Human Mental Workload: Models and Applications. H-WORKLOAD 2018. Communications in Computer and Information Science*, vol 1012. Springer, Cham. https://doi.org/10.1007/978-3-030-14273-5_3

[82] Kalyuga S. (2011). Cognitive load theory: How many types of load does it really need? *Educational Psychology Review*, 23, 1–19. https://doi.org/10.1007/s10648-010-9150-7

Table 2.4

Comparison of the New and Old Versions of CLT

Criterion	Old CLT (traditional)	New CLT (extended)
Types of cognitive load	Three types: – Intrinsic – Extraneous – Germane	Two main types: – Intrinsic – Extraneous (relevant included in intrinsic)
Relevant load (germane)	Considered as a separate proper type of load related to the construction of schemes	Included in intrinsic load; not considered a separate type
Focus	Optimising the ratio between the three types of load	Focus on reducing extrinsic factors and managing relevant information according to the knowledge level
Level of knowledge of students	Not always taken into account in the development of the material	Key factor — the level of preparation determines the effectiveness of different learning strategies
Approach to instructions	Universal instructions for all	Differentiated instructions for novice and experienced learners (effect of feedback or expertise)
Application in practice	Mainly related to the design of educational material	Considers both the design and adaptation of the learning strategy to the learner
Attitude towards individual differences	Limited attention	Significant attention to individual cognitive characteristics

Figure 2.9 schematically illustrates the relationship between the load a person experiences during learning and the volume of working memory involved.

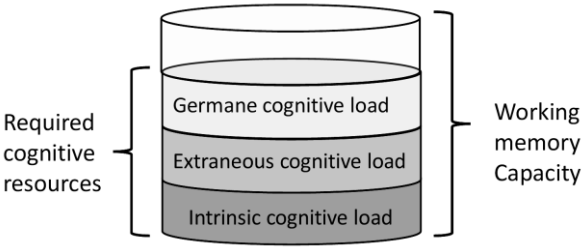

Figure 2.9 Schematic representation of the relationship between the load experienced by a person during learning and the amount of working memory involved in this process

When the internal load is low, an increase in the relevant load is possible, even if the external load is high. That is why the design of educational materials is not essential for mastering simple material. However, if the subject of study is complex, an additional external load can exceed the student's working memory capabilities and prevent them from performing relevant operations. If the internal

and/or external load is too high, then there is no “room” for the germane load, and learning will not occur.

Cognitive load in the learning process must be purposefully managed, with the load reduced or increased depending on the overall level of cognitive demand and the available memory resources. As J. Sweller notes, one of the most common causes of ineffective learning is poorly formulated instructions: those that are too complex, unclear, or misleading. In such cases, the student's attention shifts from processing the content to overcoming the difficulties of understanding the task.

Effectively designed educational materials optimise cognitive load by reducing extraneous and increasing relevant (useful) load. Instructional design should provide a level of overall load that does not exceed the capacity of working memory, thereby contributing to the effective assimilation of knowledge.

In cases where intrinsic load is high (for example, due to the complexity of the content or limited prior knowledge of the student), extraneous load should be minimised. At the same time, under conditions where overload does not pose a threat, it is quite permissible to consciously increase the overall load, in particular by adding secondary but motivationally significant elements.

The basic assumption within the cognitive load theory is the immutability of internal load. However, recent studies suggest the potential for regulating cognitive activity by structuring it according to the principle of gradual complication ("from simple to complex") and developing learning strategies that consider students' varying knowledge levels.[83] In this context, the main object of optimisation will be the external load, which developers of learning materials can purposefully modify.

2.4.3 Elimination of Cognitive Overload

Cognitive load theory is crucial for educators because it can help reduce the excessive workload on students’ working memory, thereby promoting effective learning. Cognitive overload occurs when the amount of information that needs to be processed in working memory to complete a task exceeds its available resources. In such cases, understanding the material becomes more difficult, the learning process slows down or becomes ineffective, and the transfer of knowledge to long-term memory becomes significantly more difficult.

Students may experience cognitive overload in the following situations:

—when working with complex educational material without proper guidance from teachers or textbooks;

—when it is necessary to divide attention between several interconnected sources of information;

— when there is redundant information that is integrated with essential educational material;

—with an inadequate level of educational guidance that does not take into account students’ prior experience and knowledge;

[83] Sweller J., van Merriënboer J. J. G., Paas F. *Cognitive Load Theory*. Cambridge: Cambridge University Press, 2019.

—when performing tasks with significant variability, if the student does not have sufficient expertise to process them effectively.

Each of the listed situations that cause cognitive overload is typical and has a corresponding name, reflecting a specific effect of cognitive overload. These effects are well-researched in various scientific fields. Today, learning methods have been developed that can be applied to various educational environments to optimise cognitive load and build effective learning strategies. They are based on proven empirical data from numerous studies.

The split-attention effect. This effect occurs when a student is forced to simultaneously process information from multiple sources that are not integrated into a single, understandable message. For example, when a learning material contains a chart on one page and a related table on another, the student must switch between them to compare values and structures. To complete the task, the student must first read the table, store the data in working memory, and then find the corresponding elements in the chart. This activity creates unnecessary cognitive load due to the need to integrate disjointed information mentally. As a result, working memory resources are spent not on mastering the content but on the technical operations of searching and combining.

It can be avoided by combining information in a single representation - for example, by directly mapping key numerical data from the table onto the corresponding elements of the chart. When related sources of information are presented in an integrated form that is easy to perceive, the load on working memory is reduced, which contributes to better learning. The divided attention effect is observed not only in cases involving charts and tables but also when using any interdependent sources, such as text and formulas, or text and images.

The redundancy effect. In an attempt to make learning easier, teachers sometimes present students with additional information, not realising that it only overloads the cognitive system. The redundancy effect is that redundant information—especially information that duplicates what has already been presented or is not critically important—can interfere with learning. The student is forced to process more information than necessary, spending working memory resources on integrating multiple forms of the same content.

A classic example is when a teacher reads aloud text that is verbatim on a presentation slide. It forces the listener to switch between oral and written channels, which makes it difficult to perceive, especially when the reading speed does not match the rhythm of speech. Studies show that removing some duplicate text on a slide while maintaining the oral presentation allows for better focus on the content and increases learning efficiency.

It is also worth avoiding additional, uninformative elements, such as background music effects, animations, or entertaining inserts that do not convey educational content. Despite their attractiveness, they often only distract attention without contributing to assimilation. To avoid unnecessary load, it is worth focusing on concise, meaningful and necessary information.

Another example of redundancy is the addition of unnecessary explanations

to already clear diagrams or schemes. If the image is transparent in itself, duplicating its meaning with text not only does not help but also creates additional load. Such a case differs from situations where explanations are necessary for understanding. Redundancy appears precisely when information is duplicated unnecessarily. This effect is similar to another effect - prior knowledge. Sometimes, it is referred to as the expertise reversal effect (also known as the prior knowledge effect).

The expertise reversal effect (prior knowledge effect). This effect is observed in situations where the student's level of preparation exceeds that expected by the developers of educational material, which contains numerous auxiliary elements (hints, comments, etc.) relevant mainly to the initial level of assimilation. Teaching methods that are effective for beginners may not only be ineffective but also harmful for experienced students, as they cause excessive cognitive load.

An example is a situation where a student who is well-versed in software performs a complex task but is constantly distracted by prompts from an automatic assistant. Despite the benefits of such prompts for beginners, for an experienced user, they only interfere, forcing them to spend working memory resources on processing information that they do not need.

Therefore, educational strategies should correspond to the level of preparation of the student: beginners need explicit instructions, and experienced students better assimilate the material through independent problem-solving.

The worked example effect. This effect suggests that it is ineffective for beginners to solve problems on their own without instruction, as they generate solutions at random due to a lack of knowledge, which overloads working memory and slows down learning. On the other hand, providing worked examples reduces cognitive load and promotes more effective learning of the material.

In technical fields (mathematics, engineering, programming), a worked example is a clearly formulated problem with a step-by-step solution. The most effective way is to alternate examples with similar problems (so-called almost transfer problems), which allows you to quickly form rules for applying knowledge.

In non-technical fields (for example, literature), an example can be an essay question and a sample answer, which helps you create your answer by analogy. This approach promotes more active learning through modelling thinking.

An example for the design industry. An entry-level student is learning how to create a mock-up of a mobile app in Figma. If they are immediately given the task: "Create an authorisation screen for an app," without any instructions or examples, they start experimenting with the tools without understanding the structure, usability, and design principles. It results in a high cognitive load and slows down the learning process. In this case, the most effective approach to learning would be to demonstrate a previously solved example. It could be a ready-made screen with an explanation of each element (fields, buttons, colours, fonts, etc.). After that, the student can be offered to create a similar screen for another app. It will allow them to focus on the sample rather than building everything "from scratch."

The variability effect. Studying several examples with the same structure but

different features helps students recognise common steps in solving problems. Such variability contributes to the generalisation of knowledge, the formation of mental schemes and the development of the ability to transfer skills to new tasks.

At the initial stage, it is advisable to use examples with low variability to avoid cognitive overload. As the level of knowledge increases, it is worthwhile to move on to examples with high variability for deeper assimilation of the material and better transfer of knowledge. Practising the same procedure with different variants of the task promotes generalisation, which, in turn, facilitates the further development of existing schemes. Thanks to this, students can recognise similar tasks in the future, even if they have different surface characteristics.

Research confirms the importance of adapting learning procedures to the existing schematic knowledge base in the student's long-term memory. Therefore, it is worth using tasks with low variability initially and, for more experienced students, tasks with high variability. Examples of tasks with varying degrees of complexity for the pharmaceutical and design industries are shown in Table 2.5.

Table 2.5

Examples of low and high variability tasks for different fields of knowledge

Stage of learning	Type of variability	Characteristics of tasks	Educational effect
Pharmacy			
Initial	Low	Analysis of the composition and preparation of a specific ointment (for example, zinc). Standardised recipe and technology.	Mastering the basic steps of preparation - Forming a precise sequence of actions.
Advanced learning	High	Analysis of recipes for different forms of ointments (hydrophilic, hydrophobic, combined). Variations in active ingredient, base and administration methods.	Generalisation of technological approaches - Formation of flexible thinking - Preparation for real pharmacy conditions.
Design			
Initial	Low	Working with multiple posters of the same style (e.g. minimalism). One colour palette, one theme.	Mastering Basic Compositional Solutions - Formation of Primary Templates in Memory.
Advanced learning	High	Analysis of posters with the same compositional structure but different styles (retro, modern, futurism) and themes.	Generalisation of compositional principles. Formation of design flexibility and creative thinking.

2.4.4 Methods for Measuring Cognitive Load

To measure cognitive load, both subjective and objective assessment methods are employed, which can be either indirect or direct. A general classification of methods is presented in Table 2.6.

Table 2.6

Classification of methods for measuring cognitive load

Method types	Indirect	Direct
Subjective	Self-analysis of the mental effort made. Questionnaires.	Expert assessment of the complexity of the material.
Objective	Analysis of work results and evaluation. Analysis of examples of behaviour. Measuring the level of student development.	Methods that measure brain activity (neuromethods) and/or physiological characteristics during the performance of an educational task. Secondary task method.

Subjective methods for determining cognitive load are based on the use of rating scales and questionnaires. People can reliably assess mental load if they are given a scale with one or more aspects fixed by extreme descriptors. Such scaling is quite sensitive to small changes in load. Respondents conduct a self-analysis of their cognitive processes and estimate the amount of effort required to understand a particular educational material.

The most common subjective methods for determining the level of cognitive load are the Subjective Scale of Intensity (SSI) and the NASA-TLX (Task Load Index). Both methods are based on the self-assessment of respondents but differ in the depth of analysis and sensitivity to individual differences.

The SSI method involves a simple survey using a single semantic scale (usually 7–9 points), allowing you to obtain a general idea of the level of load. The method's advantages include reliability, sensitivity, and ease of use. However, it can only measure the total load, and it is impossible to analyse the cause to establish what combination of internal, external and relevant loads caused it.

NASA-TLX is a multidimensional instrument that includes six scales: mental, physical, and temporal demands, as well as assessments of productivity, effort, and frustration. The evaluation is carried out in two stages: first, respondents provide ratings for each aspect, and then they conduct a pairwise comparison of the aspects' importance, which enables the calculation of the weighted value of the total load. This approach enables more accurate differentiation of load sources, but it is significantly more challenging to apply.

The NASA-TLX method is considered more sensitive than the SSI since it allows for comparing multiple combinations of external and internal loads. However, due to its ease of implementation, the SSI method is the most widespread.

The advantages of subjective methods include simplicity, accessibility and reliability. The disadvantages include:

–the integral nature of the assessment;

– the uncertainty of the boundaries between different levels of mental processes that are activated when the load increases;

– the lack of psychophysiological indicators, which makes automated diagnostics impossible;

–limited consideration of the dynamics of the load over time (instantaneous, peak, average, total, cumulative).

It has been established that the effectiveness of subjective assessments increases under conditions of high load, while minor changes may go unnoticed.

Therefore, subjective methods are suitable for general monitoring of the load, especially in educational environments. However, for an accurate analysis, it is advisable to combine them with objective indicators, which provide a comprehensive picture of cognitive activity.

Since the theory of cognitive load primarily considers situations of potential overload, it is often necessary to record instantaneous load. Physiological rather than subjective methods are more suitable for this.

Direct methods enable you to control the change in the speed of respondents' reactions or compare the values of their physiological characteristics before and during the educational work. They can be measured using various sensors, including heart rate variability, breathing, visual scanning, and changes in pupil diameter, as well as cardiovascular characteristics (ECG, pneumogram, electroencephalogram, etc.), which change in response to mental effort during the cognitive process.

Example of using the pupillometry method

Various methods of observation and timing of executive actions and results are used. An example would be usability testing of an educational electronic resource, namely, testing the interface of the Moodle system or the university's educational platform. Students are encouraged to complete typical educational tasks (for example, finding a schedule, downloading an assignment, and taking a test). The execution time, number of errors, and returns to previous stages are recorded, along with the path of clicks. Physiological measurements are carried out, including eye movements (eye tracking), pupil dilation (pupilometry), and skin conductance, all of which are measured in parallel.[84]

According to the results of one such study, it was found that when navigating between Moodle tabs with a large amount of information, students demonstrate increased cognitive load (an increase in pupil diameter, long fixation time on headings). In the version with an adapted design (less information on the screen and a convenient menu structure), the load is significantly reduced.

Direct methods can be considered more accurate, but measuring the above parameters is challenging in an educational institution. In addition, they also have disadvantages. For example, there may be a so-called "empty fixation" of the gaze,

[84] Maslov I. and Nikou S. (2020). Usability and UX of Learning Management Systems: An Eye-Tracking Approach. *2020 IEEE Int. Conf. on Engineering, Technology and Innovation*, Cardiff, UK, pp. 1-9, doi: 10.1109/ICE/ITMC49519.2020.9198333

where students can stare at the screen for an extended period without processing the information. The external gaze does not reflect internal thinking, as the object of fixation does not necessarily guarantee the object of attention. There may also be an immersion effect, where a student becomes so engrossed in studying complex material that they can "disconnect" from their surroundings.

Therefore, to analyse student activity, researchers tend to employ a combination of methods in various ways. It raises the problem of comparing the results obtained since the methods reveal different aspects of activity. Currently, it can be stated that there are no universal, automated methods for assessing cognitive load in the arsenal of researchers in human-computer interaction.

From the perspective of educational applications, the secondary task method can be considered the most optimal. In combination with monitoring the success and quality of acquired knowledge, it allows you to obtain an objective quantitative assessment of the resulting load and investigate its dynamics with sufficient accuracy. Its essence lies in the fact that students simultaneously perform two tasks: one educational (referred to as the main task), and the second allows for recording changes, for example, the speed of the student's reaction to a signal (visual or auditory). For example, when studying the load while working with a specific educational e-resource, this may involve the speed of pressing a button (object, trigger), the highlighting of a particular area on the screen, the change in colour of another object, or the appearance or disappearance of a sound, among other factors. An increase in cognitive load when performing the main task results in a corresponding increase in the time required to perform the second task.

The success of the main task can be assessed, for example, by testing. A secondary task is added to the learning process, unrelated to the outcome of the educational activity. The success of its implementation cannot be assessed by itself. However, certain characteristics can be measured, for example, the time interval between the signal change on the screen and the student pressing the button. Table 2.7 formulates the requirements for the secondary task.

Table 2.7

Secondary task requirements

Requirements	Example in research
The secondary task must require the same cognitive resources as the primary task. Otherwise, the performance of the secondary task will not be influenced by the primary task's performance.	The secondary task is integrated into the main task.
The performance quality criterion for the secondary task must be reliable and acceptable.	Execution time is used as a proven criterion of performance for secondary tasks.
The secondary task must be simple enough not to hinder concurrent learning processes.	Participants only have to press a keyboard key when they notice a change in the secondary task signal.

Here are a few options for tasks that can be used as a secondary task. Simpler tasks involve responding to changes in the colour of the screen background, an acoustic signal, or the appearance or disappearance of any object on the screen. More complex ones are used, for example, in the social sciences, when participants are asked to memorise numbers (8-digit numbers displayed for 30 seconds) or track numbers that appear on the screen at varying speeds.

2.5 Fundamentals of Multimedia Learning

Multimedia technologies offer numerous opportunities for presenting educational material in various forms. At the same time, finding the optimal combination of these forms to enhance learning effectiveness is a challenging task. Multimedia in this context is understood as a combination of words (oral or written) and images (static graphics, diagrams, dynamic animation, video, interactive objects).

Multimedia learning tools are a set of hardware and software solutions that enable users to interact with content using text, images, sound, video, and interactive elements. Multimedia learning technologies allow the integration, processing, and simultaneous reproduction of various types of information.

The basis of modern ideas about multimedia learning is the following theories: dual coding by A. Paivio, working memory by A. Baddeley, multimodal by J. Engelkamp, cognitive load by J. Sweller, the cognitive theory of multimedia learning by R. Mayer, and the animation approach by M. Nathan.

These theories describe how a person perceives, processes and remembers information. In this context, the term "cognitive architecture" is often used, referring to the general scheme of memory, methods of data encoding, and mental operations. The main criteria for assessing the effectiveness of educational materials are facilitating memorisation, reducing information overload, minimising confusion between data, and enhancing understanding of the material.

2.5.1 Theories Underlying Multimedia Learning

Dual coding theory, as proposed by A. Paivio (1969).[85]

This theory provides a crucial foundation for understanding cognitive architectures, as it clarifies the distinctions between verbal and visual encoding of information. The researcher argued that there are two independent ways of learning material: through words (verbal associations) and images (visual representations). Each channel has its mechanisms for processing and storing information, and their combination provides a more reliable form of memorisation. According to the theory, concrete words are easier to remember than abstract ones, and images are more effective than words because they are encoded as a separate type of information in memory. The most effective way is to use both codes simultaneously, which creates a double trace in memory.

[85] Paivio A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology*, 45(3), 255–287. https://doi.org/10.1037/h0084295

An example of the practical application of this theory is the keyword method for learning foreign vocabulary: a new word is associated with a familiar word in the native language, creating a corresponding image. It enables you to activate both verbal and visual channels, thereby improving memorisation.

Dual coding theory is widely used to develop effective multimedia learning materials that combine text, sound, images, and video.

Working memory theory, as proposed by A. Baddeley and J. Hitch (1974).[86]

The working memory model explains the mechanisms by which information is stored and processed in the short term. Within the framework of this theory, two principal codes are distinguished: phonological (verbal) and visual-spatial, which function under the control of the third component, the central executor.

The main components of the model:

- The phonological loop provides temporary storage and processing of speech and auditory data.
- A visuospatial sketchpad operates with visual images and spatial information.
- The central executor manages attention, selects processing strategies and integrates information from both subsystems.

The visuospatial sketchpad is the conventional name for the subsystem that stores and processes ideas about shapes, colours, sizes, and the location of objects, among other things. The term "sketchpad" is metaphorical: just as in a real notebook, you can make a sketch or record, so this system allows you to "hold" visual images in your mind (for example, imagine a route or the placement of objects in space). In simple terms, it can be described as a “mental screen” or “workbook” where visual and spatial representations are temporarily stored and processed.

In 2000, the model was supplemented with a fourth component, the episodic buffer, which ensures the integration of information from different sources and forms holistic cognitive representations.

Practical studies of the model have demonstrated that when reproducing complex visual tasks (for example, memorising the location of pieces on a chessboard), the visuospatial sketchpad and the central executive play a crucial role. At the same time, verbal information has a minimal impact. These results indicate the independence of the codes, but, at the same time, emphasise the limitations of the model in explaining the integration of different types of information. The latter was only taken into account with the advent of the concept of the episodic buffer. The architectures considered above were based on the interaction between words and pictures, but did not consider actions.

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[86] Baddeley A. (2012). Working memory: theories, models, and controversies. *Annual Review of Psychology*, 63, 1–29. https://doi.org/10.1146/annurev-psych-120710-100422

Baddeley A. D., & Hitch G.J. (1974). Working Memory. In G.A. Bower (ed.), *Recent Advances in Learning and Motivation*, vol. 8, pp. 47–89. New York: Academic Press. http://dx.doi.org/10.1016/s0079-7421(08)60452-1

J. Engelkamp studied the role that actions play in educational constructs, a topic that continues to arouse great interest among psychologists and educators.

J. Engelkamp's multimodal theory (1998).[87]

This theory explains the mechanisms of information storage and processing during the execution of actions. It has become the theoretical basis for interpreting numerous experimental results in the field of action memory.

According to this model, the information processing system has:

- Two modality-specific "inputs" - the visual system (images of objects, events, situations) and the verbal system (oral or written language).
- Two modality-specific "outputs" - activities based on the processing of visual information and activities related to verbal information.

The main principle of the theory is the importance of the conceptual system, which performs semantic processing of information regardless of the channel through which it is received (visual or verbal). The author believes that to understand a phrase, it is not enough just to listen to or read it - you need to "prepare" for the action, that is, activate the understanding of the command's content even before its execution.

Thus, the model emphasises the need for semantic processing through an action that integrates the received information into a holistic representation. After receiving a message (auditory or visual), the information passes through a conceptual system that "translates" it into a possible action.

An example of the theory's implementation is an experiment with simple movements (for example, moving the index finger "towards" or "away" depending on the meaning of the phrase). The results showed that the correspondence of the movement to the content of the phrase helps to speed up the reaction, while the discrepancy slows it down.

Together with the theories of A. Paivio's (dual coding) and A. Baddeley's (working memory) theories, along with Engelkamp's multimodal theory, influenced the formation of the concept of cognitive load (J. Sweller, 1988, 1994, 2003). According to this concept, working memory has a limited capacity, and a large amount of information or the need to coordinate its different types can reduce the effectiveness of learning.

There are two possible ways to overcome these limitations:

- Automating processing—reducing the need for active control through skill acquisition.
- Creating knowledge schemas—organised structures that increase the amount of information that can be processed simultaneously.

Experiments have shown that presenting material in a multimodal format promotes faster and deeper learning than monotonous or isolated learning methods.

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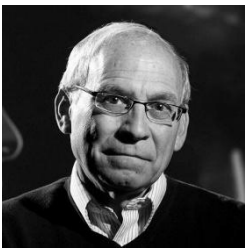
[87] Engelkamp J. (1998). *Memory for Actions. Essays in Cognitive Psychology.* Hove, UK: Psychology Press.

Unlike A. Paivio, A. Baddeley, and J. Sweller, R. Mayer developed a theory specifically for multimedia learning. The theories discussed earlier formed the basis of its learning.

2.5.2 Mayer's Cognitive Theory of Multimedia Learning

R. Mayer (born in 1947) substantiated the most fundamental theoretical foundations of using multimedia tools.[88]


Richard E. Mayer

He applied A. Paivio's assumption about double data coding; from A. Baddeley, he adopted the idea of a limited working memory capacity, which the performer can control.

The researcher also adapted the differences between external and internal cognitive loads, as described by J. Sweller, aiming to find ways to reduce external cognitive load in multimedia learning forms.

The main provisions of the theory developed by R. Mayer are as follows.

- Dual coding: information is perceived through two separate channels—visual (graphics, video, animation) and verbal (text, speech).
- Limited working memory resources: Each channel has a limited bandwidth, so an excess of information can reduce the effectiveness of learning.
- Active information processing: for effective assimilation of knowledge, the active transformation of information is necessary - the selection of essential elements, organisation of them into logical structures, and integration with existing knowledge in long-term memory.

The Cognitive Theory of Multimedia Learning (CTML), proposed by Richard Mayer and developed from 2001 to 2021, is based on the idea that successful learning involves the active construction of knowledge by the learner through the integration of verbal (text or audio) and visual (static or dynamic) information within the limited capacity of working memory.

Mayer's early work (2001, 2005, 2009) emphasised the combination of words (written or spoken) with images or animations, where the main activity of the learner was the mental integration of these materials.

From 2010 to 2021, the theory in its original form underwent significant development in the context of:

1. The widespread introduction of dynamic visualisations. The model was expanded by studying the role of:

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[88] Mayer R. E. (2024). The Past, Present, and Future of the Cognitive Theory of Multimedia Learning. *Educational Psychology Review*, 36, 8. https://doi.org/10.1007/s10648-023-09842-1

Mayer R.E. (2021). Multimedia Learning (3rd ed.). Cambridge University Press. https://doi.org/10.1017/9781108785253

- Animations (moving graphics), unlike static images, better reflect temporal and procedural changes.
- Videos — both real and simulated — are used to present procedures and mechanisms.
- Augmented and virtual reality allow for the manipulation of educational objects.

These changes have sparked debate about whether dynamic images are always helpful. Meta-analyses[89] have shown that dynamics are only beneficial when there is controlled navigation (pause, rewind), an explanatory voice-over or text, and the animation is simple and appropriate to the learner's cognitive abilities.

2. Recognition of the role of action ("embodied interaction"). New in CTML is the inclusion of physical actions in learning scenarios (Mayer, 2021):

- Learning through gesture - supporting mental models with gestures and movements;
- Interactive simulations - the student does not just observe but performs actions that form an idea of the content;
- Dragging elements, manipulating objects - active involvement of motor skills improves the construction of mental models.

Studies have confirmed that embodied learning contributes to a deeper assimilation of abstract concepts (for example, physical or mathematical processes) due to the involvement of bodily experience.

Insights on Revised Bloom's Taxonomy & Cognitive Theory of Multimedia Learning

In addition to the classic 12 principles, R. Mayer introduced new ones. Namely:

- Interactivity principle - Active actions with the material (such as clicking, selecting, or dragging) contribute to deeper processing.
- The embodiment principle – multimedia agents or robots with gestures and poses enhance learning.
- The personalisation principle – a "first-person" style, addressing the student, makes the material more approachable.

Thus, in the modern version of the theory, 15 principles of multimedia learning are formulated. They are listed in Table 2.8. Most of these principles align with reducing external cognitive load, such as eliminating extraneous and redundant information.

[89] Castro-Alonso J.C., Ayres P., & Paas F. (2021). Dynamic visualisations and motor activity in multimedia learning: An integrated perspective. *Educational Psychology Review*, 33, 1–23. https://doi.org/10.1007/s10648-020-09537-8

Höffler T.N., & Leutner D. (2007). Instructional animation versus static pictures: A meta-analysis. *Learning and Instruction*, 17(6), 722–738. https://doi.org/10.1016/j.learninstruc.2007.09.013

Table 2.8

Principles of Multimedia Learning by R. Mayer

Principle	What does it mean?	Example of use
Multimedia	People learn better from words + images than from words alone.	Words illustrated by a diagram.
Coherence	Remove clutter (background music).	No music or animations that do not explain the topic.
Signalling	Emphasise key elements to direct attention.	Arrows or highlighting of the main parts of the diagram.
Redundancy	Avoid duplication: use visual illustrations, voiceovers, and subtitles simultaneously to enhance the overall experience.	Voicing without duplicate text on the screen.
Spatial contiguity	Place text and images side by side.	Explanation directly under the diagram, no gap in space.
Temporal contiguity	Present text, voiceover, and visualisations synchronously.	What is said immediately appears on the diagram; there is no gap in time.
Segmenting	Break down the material into learner-controlled parts.	Video is divided into short content blocks, allowing for display control.
Pre-training	Prepare the basic terms and concepts before teaching to ensure a clear understanding of the material.	List of preliminary definitions before the main lecture.
Modality	Use sound with graphics, not text with graphics.	Animation with audio commentary instead of text on the screen.
Personalisation	Use a conversational style (e.g., "you" and "we") instead of a dry, formal one.	"Let us look at an example..." instead of "In this example..."
Voice	Use a friendly human voice, not a mechanical one.	Recording with the teacher's voice, not a synthesiser.
Image	Showing the teacher's face is not necessarily required; it does not necessarily improve understanding.	Animation without a teacher's video.
Embodiment	A virtual agent with human behaviour is more effective.	An avatar that "gestures".
Generative activity	Active content creation by the learner.	Task: to create a diagram yourself.
Feedback	Feedback improves learning.	Test with the answer explanation.

2.5.3 Design Principles for Interactive Multimodal Environment

According to modern terminology, a multimodal learning environment is defined as an environment that uses different methods (verbal and non-verbal) of

presenting content. An interactive multimodal learning environment is one in which everything that happens depends on the individual's actions and responses. The term "interactivity" still lacks a definitive interpretation. However, all characteristics of interactivity are sensitive to the student's actions during the learning process. In a non-interactive multimodal learning environment, the multimedia message is presented regardless of the person being taught (for example, animation with audio accompaniment, manuals containing text and illustrations, etc.). In an interactive, multimodal learning environment, the words and images that appear depend on the student's actions. Navigation alone, if it only provides movement through the educational environment and does not lead to the construction of knowledge, is not enough to consider the environment interactive. Several types of interactivity are presented in Table 2.9.

Table 2.9

Types of interactivity

Interactivity Type	Description of student actions	Example
Dialogue	Receives a question, answer, or feedback after input.	Phrases: “Ask the on-screen agent for help”; “Click the hyperlink for more information.”
Control	Controls the pace and/or order of presentation and repetition.	Recommendations: “Use the pause/play or forward/back buttons while watching the narrated animation.”
Manipulation	Sets parameters for simulated action execution, changes scale and moves objects on the screen.	Imitating actions in a way that is easy to observe.
Search	Finds new content material, enters a query, and retrieves and selects options.	Task: “Search for information on the Internet.”
Navigation	Moves to different content areas and selects sources of learning material.	“Open the menu to move from one section to another.”

Dialogue, control and manipulation are considered the main features of a multimodal learning environment. Search and navigation are more typical of hypermedia and search engine programs.

A potential problem with learning in interactive multimodal environments is that the requirements for processing the material can exceed the cognitive system's capabilities, resulting in cognitive overload. Therefore, it is necessary to carefully study the relationship between the cognitive requirements imposed by the learning environment and the required results of learning activities.

Five empirical principles for designing an interactive multimodal learning environment have been formulated to optimise learning. There are many similarities with R. Mayer's theory because they are based on the same patterns of knowledge acquisition. It emphasises the universality and correctness of his

approach, which remains relevant despite the emergence of new technologies.

Guided activity. Students learn better when they are allowed to interact with a pedagogical agent that helps guide cognitive processing. The theoretical explanation for the "guided activity" principle is that encouraging students to actively participate in the selection, organisation, and integration of information reinforces substantive processing, leading to greater understanding than passive processing of identical instructional materials.

Reflection. Students learn better when they are asked to reflect on (or question) correct answers in the process of knowledge creation. Reflection promotes substantive processing by supporting more active organisation and integration of new information.

Feedback. Students learn better when they receive explanatory feedback compared to when they receive only corrective feedback. Explanatory feedback reduces extraneous load by providing students with appropriate schemas to correct misperceptions.

Pacing. Students learn better when they are allowed to control the pace of the presentation. Pacing reduces the amount of knowledge that needs to be learned by allowing students to process smaller blocks of data in working memory.

Prior learning. Students learn better when they receive focused or specific prior learning that activates relevant prior knowledge. Prior learning helps students perform relevant processing by showing them which parts of prior knowledge need to be integrated with current information. Prior learning can be applied in any learning technology, including non-interactive multimodal environments. In interactive multimodal environments, it is a form of dialogic activity where students can ask to learn about the components of a system, or a pedagogical agent can offer explanations about the system's knowledge components.

Consider an example. In an interactive learning environment, a novice student is presented with an animation with audio accompaniment (narration) that explains why and how a scientific phenomenon occurs. During learning, the story is processed by the student in both the acoustic channel and the visual channel. Presenting the material in a mixed modality is most effective because it uses independent perceptual channels and increases the capabilities of working memory. However, if the animation is complex—for example, it illustrates many interactions between different objects—and the pace of the presentation is fast, students do not have enough time to organise the words and images into a mental model and cannot integrate them with prior knowledge. The solution to the problem is to manage the work with the material in such a way that it allows students to divide the animation and explanation into smaller segments. Pace control is an essential principle in the development of interactive environments. The easiest way to implement it is to have display controls on the monitor.

2.5.4 Experiential Learning Theory

A generalisation of scientific literature data related to learning with electronic resources enables us to formulate the provisions that must be followed when

creating and using dynamic visualisations, including semantic accents principles, coding colour and the integration of various representations (Table 2.10)

Table 2.10

Techniques used to reduce the cognitive load caused by dynamic visualisations

Technique	Purpose	Examples/comment
Dynamic contrast	Attracting attention.	Slowing down, changing the direction of the display.
Scaling elements	Attracting attention.	Enlargement of the image (magnifying glass) or the pointing arrow.
Simultaneous manipulation of spatial and temporal aspects	Attracting attention, drawing it to a specific location of learning elements.	Slowing down the animation when relevant messages are brought to the fore.
Varying playback speed	Emphasis on the level of the organisational hierarchy of concepts.	Demonstration of a macro-event comprising micro-events at varying speeds.
Colour coding	Identification of interrelated elements.	Identification of elements that form a unity by colour in different images.
Positioning related objects next to each other	Facilitating understanding of relationships between learning elements.	Placing labels, instructions, and explanations next to appropriate objects.
Activity control	Supporting internal processing encourages students to participate in the selection, organisation and integration of new data.	Interaction with a pedagogical agent that helps to guide cognitive processing.
Pacing control	Controlling the presentation pace. Reducing the amount of knowledge to be learned by providing the opportunity to process smaller blocks.	Controls to provide the ability to change the playback speed. It can be organised as an interaction with a pedagogical agent.
Interactive step-by-step learning	Students' management of the learning environment. Improving learning occurs by increasing the germane load and motivational factors to learn.	Controls to provide the ability to return, stop and repeat the display. It can be organised as an interaction with a pedagogical agent.
Explanatory feedback	Reducing extraneous load. Providing students with schemes for correcting incorrect ideas.	Receive a comment explaining the error after an incorrect answer.
Pre-learning	Controlling students' information processing by showing which aspects of prior knowledge are integrated with current data.	Implementation of specific prior learning that activates relevant knowledge and skills.

In pedagogical activity, the formulated principles should be implemented not as immutable prescriptions that are applied in all situations, but as guidelines for

the development and testing of technologies. Their understanding enables teachers to consciously and effectively utilise the capabilities of information technologies and adapt electronic resources to different groups of students, taking into account pedagogical, physiological and psychological factors.

2.6 Adult-related Learning Theories

2.6.1 Experiential Learning Theory

Experiential learning is a constructivist learning theory defined as 'learning by doing.' The learner actively participates in the educational process, and learning is achieved through a continuous cycle of inquiry, reflection, analysis, and synthesis. Experiential learning shifts the learning design from a teacher-centred approach to a semi-structured one. In the first case, the teaching is mainly transmissive, and the students may remain unmotivated and disengaged. A semi-structured approach requires students to cooperate and learn from one another through direct experiences tied to real-world problems.

> "Learning is the process whereby knowledge is created through the transformation of experience. This definition highlights several key aspects of learning from an experiential perspective. First is the emphasis on the process of adaptation and learning as opposed to content or outcomes. Second, knowledge is a transformation process, being continuously created and recreated rather than an independent entity to be acquired or transmitted. Third, learning transforms experience in both objective and subjective forms. Finally, to understand learning, we must understand the nature of knowledge, and vice versa."[90]

Y.A. Kolb and A.D. Kolb are the authoritative developers of this theory. The thorough work "The Experiential Educator: Principles and Practices of Experiential Learning" (2017) comprehensively considers the origins, principles, perspectives, and differences between experiential learning and traditional approaches in education, emphasising the learning process instead of the behavioural outcomes.

The theory of experiential learning rests on a different philosophical base. Experiential learning is actually a philosophy of education based on what Dewey (1938) called a 'theory of experience.' He argued that while traditional education had little need for theory, as the practice was primarily determined by tradition, the new experiential approach to education required a sound theory of experience to guide its conduct. Since their emergence in the early 1970s, the principles and practices of experiential learning have been used to create curricula and conduct educational courses and programs. Many nontraditional educational innovations

[90] Kolb D.A. *Experiential Learning: Experience as the Source of Learning and Development.* Englewood Cliffs, NJ Prentice Hall 1984. P. 38.

that have emerged during this period, such as college programs for adult learners and prior learning assessments, have utilised experiential learning as their educational foundation. Experiential, learner-centred education has gained widespread acceptance in the twenty-first century.

The concept of experiential education draws together the work of several notable 20th-century scholars who were valued for their theories of human learning and development. The Association for Experiential Education has summarised the key findings into a set of key experiential learning principles:

- Experiential learning occurs when carefully chosen experiences are supported by reflection, critical analysis, and synthesis.
- Experiences are structured to require students to take the initiative, make decisions, and be accountable for the results.
- Throughout the experiential learning process, the student is actively posing questions, investigating, experimenting, curious, solving problems, assuming responsibility, being creative, and constructing meaning.
- Students are engaged intellectually, emotionally, socially, soulfully, and/or physically. This involvement produces a perception that the learning task is authentic.
- The learning results are personal and form the basis for future experiences and learning. Relationships are developed and nurtured among students, with themselves, others, and the world at large.
- The instructor and student may experience success, failure, adventure, risk-taking, and uncertainty because the outcomes of the experience cannot be predicted.
- Opportunities are nurtured for students and instructors to explore and examine their values.
- The teacher's primary roles include setting suitable experiences, posing thought-provoking problems, establishing clear boundaries, providing support to students, ensuring physical and emotional safety, and facilitating learning.
- The teacher recognises and encourages spontaneous learning opportunities.
- Teachers strive to be aware of their biases, judgments and preconceptions and how these influence their interactions with students.
- The learning experience design allows learning from natural consequences, mistakes, and successes.

***Further Reading**: Deakin Crick R., Goldspink C., Foster M. Telling Identities: Learning as Script or Design? Learning Emergency Discussion Paper (June, 2013). URL: http://learningemergence.net/events/lasi-dla-wkshp*

Experiential education has gained recent momentum in the higher education sector. Driving this shift is the recognition by universities that the purpose of 21st-century education has evolved to include the generation of student competence in

self-directed learning, citizenship, eco-sustainability, and employability, in addition to traditional knowledge, skills, and attitudes within particular disciplines.

One of the main concepts of this theory is the experiential learning cycle, a four-step learning process applied multiple times in every interaction and experience: experience, reflect, think, and act. This learning process is initiated by a concrete experience, which demands reflection, review, and perspective-taking about the experience. It involves abstract thinking to reach conclusions and conceptualise the meaning of the experience, leading to a decision to act, engage in active experimentation, or apply what has been learned.

Experiential Learning Theory

The model of the experiential learning cycle illustrates the process and sequence of experiential learning, encompassing its key concepts (experiencing, reflecting, thinking, and acting upon an experience) and constructs. After having a "real" experience, learners can reflect on it and then move to the next stage, considering possible ways to apply the experience. After having the chance to reflect and think, learners can transfer their thoughts into actions that result in constructing learning and/or creating new experiences, leading them to go through the process again and propose new ideas. Any experience may be transformed into a reliable source of knowledge. To make an experience a more meaningful and reliable source of knowledge, learners should go through the four-stage process (i.e., experiencing, reflecting, thinking, and acting) (Fig. 2.8).

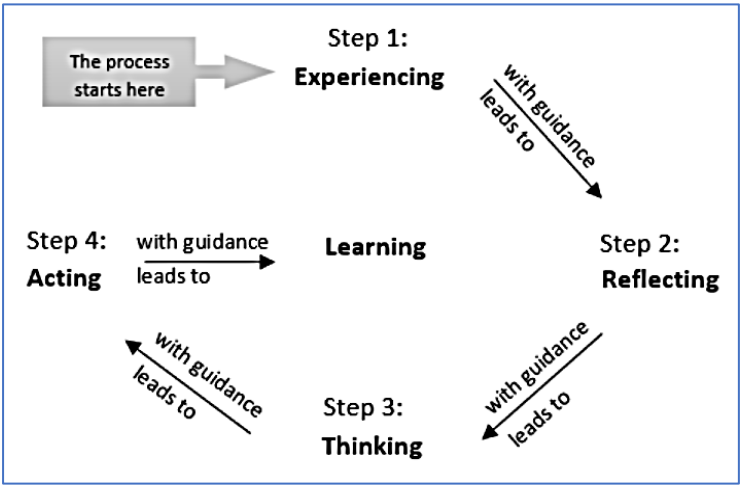


Figure 2.8 Model of Experiential Learning Theory

"The primal parental educator role, with its emphasis on learning through shared direct experience, has particular relevance for the experiential educator. For educators, the magic of experiential learning lies in the unique relationship that is formed between the teacher, the learner, and the subject matter under study. Traditional approaches to education have relied on an information-transmission model of learning, where knowledge about the subject is communicated, often through lectures, via the teacher's discourse about the subject. The experiential approach places the subject to be learned in the centre, to be experienced by both the educator and learner. It has a levelling effect on their relationship to the extent that both can directly experience the subject. Everyone has a perspective on the subject."[91]

Experiential learning opportunities require students to take an active role in their learning through personal participation.

1. Students will be involved in problems that are practical, social, and personal.

2. Students will be allowed freedom in the classroom as long as they make headway in the learning process.

3. Students often find themselves involved in complex and challenging situations while learning.

4. Students will self-evaluate their progression or success in the learning process, which becomes the primary means of assessment.

5. Students will learn from the learning process and become open to change. This change includes less reliance on the instructor and more on fellow peers, developing skills to investigate (research) and learn from an authentic experience, and objectively self-evaluate one's performance.

Further Reading: Bartle E. (2015). *Experiential Learning: an Overview.* Australia: The University of Queensland, Institute for Teaching and Learning Innovation, March, 2015. https://itali.uq.edu.au/files/1264/Discussion-paper-Experiential_learning_an_overview.pdf

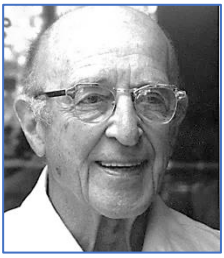
2.6.2 Humanist Theory of Adult Learning

Rooted in a romantic perspective of humanity, this tradition champions an inherently positive human nature brimming with boundless potential. It posits intellect as the defining characteristic that elevates humans above other creatures, asserting an innate goodness within each individual. According to this philosophy, learning thrives on personal growth and self-guided exploration. This philosophy caters to the privileged sections of society and facilitates the self-actualisation of the naturally intellectually gifted learner. Its central tenets are experiential learning,

[91] Kolb Y.A., Kolb A.D. *The Experiential Educator Principles and Practices of Experiential Learning. Experience Based Learning Systems.* 2017. p. XXV.

freedom, individuality, self-direction, openness and cooperation. The teacher serves as a facilitator, nurturing the learning process rather than dictating it.

In stark contrast to the traditional educational model, where the teacher functions as a knowledge expert who directly dictates learning outcomes through a top-down, one-way flow of information, the humanist theory of learning emerged in the 1960s and 1970s. Developed by therapists and educators Abraham Maslow (known for his "hierarchy of needs") and Carl Rogers (renowned for his emphasis on the facilitator-learner relationship), humanism centres on the idea that experience shapes perception and underscores the freedom and responsibility individuals have to reach their full potential. These principles significantly influenced adult learning theory, emphasising the value of self-direction and prior experience.



American psychologists
Abraham Maslow (1908-1970) & Carl Rogers (1902-1987)

A. Maslow, the founder of humanistic psychology, posited that human motivation is structured as a hierarchy of needs, culminating in self-esteem and self-actualisation. He viewed learning as a pathway to fulfilling one's potential, a form of self-actualisation. Self-actualisation is not just about personal growth; it cultivates a natural, deeply rooted, and potentially universal value system based on acceptance, connection, and a healthy relationship with reality. While self-actualised individuals share a foundational layer of values rooted in acceptance, the pinnacle of their value system is unique and deeply personal. It expresses their character structure and who they are as distinct individuals.

The author emphasises that this must be the case because self-actualisation, by its very definition, is the process of realising one's unique self. To illustrate this, the author uses examples of renowned artists and thinkers such as Renoir, Brahms, and Spinoza. Each was a master with a distinct style and perspective that could never be replicated. Similarly, while the self-actualised individuals studied may share many common traits (as previously observed), they are also profoundly individualised. They are more distinctly themselves and less likely to be mistaken for others than an average group.

It leads to a seemingly paradoxical observation: self-actualised individuals are simultaneously very much alike and yet very much unlike each other. They share

core human qualities and a foundation of acceptance, deeply connecting them to humanity ("more completely socialised, more identified with humanity"). However, they also exhibit individuality and uniqueness. In this context, when discussing the learning climate, Maslow emphasises:

"To take the teacher/student relationship as a specific paradigm, our teacher subjects behaved in a very unneurotic way simply by interpreting the whole situation differently, e.g., as a pleasant collaboration rather than as a clash of wills, of authority, of dignity, etc.; the replacement of artificial dignity-that is easily and inevitably threatened-with the natural simplicity that is not easily threatened; the giving up of the attempt to be omniscient and omnipotent; the absence of student-threatening authoritarianism; the refusal to regard the students as competing with each other or with the teacher; the refusal to assume the professor stereotype and the insistence on remaining as realistically human as, say, a plumber or a carpenter; all of these create a classroom atmosphere in which suspicion, wariness, defensiveness, hostility, and anxiety tend to disappear. So also do similar threat responses tend to disappear in marriages, in families and in other interpersonal situations when threat itself is reduced"[92].

Similarly, from an educational perspective, the fundamental question is not how to teach but how to build a relationship that learners can use for personal growth to actualise themselves. Humanism fundamentally believes in individuals' capacity to control their own lives, their inherent goodness, and their desire for a better world, as well as freedom of choice and boundless growth potential.

Rogers abstracted ten principles from his experience in education settings and his clinical work:

1) Human beings have a natural potential for learning.

2) Significant learning occurs when the student perceives the subject matter as relevant to his overt purposes.

3) Learning, which involves a change in self-organisation – in the perception of oneself – is threatening and tends to be resisted.

4) Those learnings that threaten the self are more easily perceived and assimilated when external threats are minimal.

5) When the threat to the self is low, experience can be perceived differently, and learning can proceed.

6) Much significant learning is acquired through doing.

7) Learning is facilitated when students participate responsibly in the learning process.

8) Self-initiated learning involving the whole person of the learner – feelings and intellect – is the most lasting and pervasive.

9) Independence, creativity, and self-reliance are all facilitated when self-criticism and self-evaluation are basic and evaluation by others is of secondary importance.

[92] Maslow A. *Motivation and Personality*. Harper & Row, Publishers, 1954

10) The most socially beneficial learning in the modern world is the learning of the process of learning, a continuing openness to experience and incorporation into oneself of the process of change.

Rogers listed five defining elements of significant or experiential learning:

1 It has a quality of personal involvement – Significant learning has a quality of personal involvement in which "the whole person in both his feeling and cognitive aspects [is] *in* the learning event".

2. It is self-initiated – "Even when the impetus or stimulus comes from the outside, the sense of discovery, of reaching out, of grasping and comprehending, comes from within".

3. It is pervasive – Significant learning "makes a difference in the behaviour, the attitudes, perhaps even the learner's personality".

4. The learner evaluates it – The learner knows "whether it is meeting his need, whether it leads toward what he *wants* to know, whether it illuminates the dark area of ignorance he is experiencing".

5. Its essence is meaning – "When such learning takes place, the element of meaning to the learner is built into the whole experience."[93]

Humanists analyse and interpret learning processes within a broader frame of reference, taking into account both the affective and cognitive aspects of learning, considering the whole person, their feelings, and intellect. Among the many dimensions influencing learning processes, humanists underline the roles of anxiety, the subconscious, repression, defence mechanisms, inner drive (libido), and 'coup manqué' (Freud). While putting forward a Freudian (psycho) analysis, they refuse to accept a deterministic vision of the subconscious. They have an optimistic view of people's inner capacity for growth, personal development, and change. For them, it is essential to help individuals discover and valorise their capacity to grow and change. Learning, understood in this way, is always ambivalent: searching for one's identity, questioning one's beliefs, meanings, or experiences, venturing into the unknown, and changing one's self-organisation may be frightening and threatening to the self.

A learning experience is significant when it holds subjective meaning for the individual, i.e., when the individual can relate this learning event to their prior experiences and present context and needs. It is progressive when the individual can see that they are gaining something from it, enhancing their knowledge or capacity for action, thus continuing to construct themselves. The learning experience is stimulating when the knowledge imparted and received addresses a personal question or answers some curiosity (personally meaningful learning). It is inner-directed when the individual feels that they have achieved something entirely on their own, that they have increased their inner capacity for action or expression, thus reinforcing their autonomy.

C. Houle, in *The Inquiring Mind* (1960), identified three categories of adult learners: (1) the goal-oriented adult;

[93] Rogers C. *Freedom to Learn*. Columbus, OH: Charles E. Merrill, 1969.

(2) the activity-oriented adult;
(3) the learning-oriented adult; and
(4) The undereducated adult was also discovered by W. Roger in Axford, as noted *in Adult Education: The Open Door* (1969).

The adult learner has a real life that includes all the daily hassles of life. This busy person participates in learning activities that are relevant to their life and pertain to seeking answers to questions. The information generated through the answers is then directly applied to solve problems. So, adults attend learning activities to solve problems. To successfully solve these problems, teachers must be sensitive, self-actualised, and collaborative and understand that these students bring a wealth of practical experience to the teaching-learning process.[94]

Humanistic theories emphasise the development of individuals and empower learners. Their overarching goal is to develop individuals with the capacity for self-actualisation, who are autonomous in their learning and intrinsically motivated. Knowles advanced this perspective through his work on "andragogy," which explains the drivers of adult learning. However, a significant drawback is its exclusion of the learning environment and the social dynamics through which meaning and knowledge are built.

Why Maslow's Hierarchy Of Needs Matters

Self-directed learning proposes that adults can take full responsibility for their learning, from planning to evaluation. Often seen as the ideal outcome of adult education, it stresses learner autonomy and freedom. While a fundamental concept in adult learning, the feasibility of purely self-directed learning, as opposed to guided self-learning, has been a subject of debate. A notable weakness of this approach is its lack of consideration for the social aspects of learning and its implicit downplaying of the value of other methods, such as collaborative learning[95].

Carl Rogers's Theory of Personality: Key Concepts

2.6.3 Transformative Theory

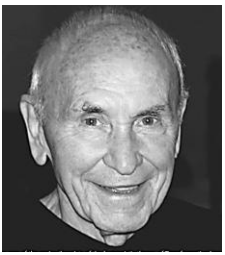
According to Jack Mezirow (1923-2014), transformative learning involves a significant change in a learner's "frame of reference," which encompasses their

[94] Cooks A., Hackney D., Jackson S., Stevens C., Zumwalt D. (2002). A Humanistic Approach to Adult Education: Learning from the Inside Out. *2002 Conference (Dekalb, IL: Northern Illinois University).* URL: https://scholarworks.indianapolis.iu.edu/items/cfcd88a3-72ae-4ce6-ba1e-1c788ec47bd8/full

[95] Taylor D., Hamdy H. (2013). Adult Learning Theories: Implications for Learning and Teaching in Medical Education. *AMEE Guide. No*83, Medical Teacher.

established habits of mind and individual perspectives. Mezirow explains that frames of reference are the assumption structures that underpin our understanding of experiences, selectively shaping and restricting our expectations, perceptions, cognition, and feelings, thereby setting "our line of action".

These frames are comprised of two key components: habits of mind, which are broad, ingrained ways of thinking and perspectives. Prior learning and cultural contexts shape habits of mind, whereas points of view encompass personal beliefs and attitudes. Mezirow described four pathways of learning: expanding existing viewpoints, developing new viewpoints, altering previous opinions and modifying habits of mind. When students first encounter new material or assessments, they tend to favour information that aligns with their existing beliefs.



Jack Mezirow (1923-2014)

However, the educational journey encourages them to consider alternative perspectives. These new perspectives can then integrate with or replace existing ones, forming new viewpoints. It evolves into a transformed habit of mind when learners develop the ability to view things from different angles, including recognising potential biases in both old and new ideas[96].

> "Transformative learning is a constructivist orientation which holds that the way learners interpret and reinterpret their sense experience is central to making meaning and hence learning."[97]

Drawing on Ju. Habermas (born in 1929), J. Mezirow posits that transformative learning fundamentally changes the "lifeworld". He defines "lifeworld" as our extensive collection of unquestioned assumptions and shared cultural beliefs encompassing codes, norms, roles, social practices, interpersonal psychological patterns, and individual skills. Like frames of reference, the lifeworld is perpetuated through cultural reproduction, social integration, and socialisation.

Transformative learning theory

This ongoing process in higher education necessitates that both faculty and students are willing to transform and critically examine their perspectives, potentially leading to a transformation in habits of mind for both. The result is a

[96] Mezirow J. (1997). Transformative Learning: Theory to Practice. *New Directions for Adult and Continuing Education*, No74, 5–12.

[97] Mezirow J. (1991). *Transformative Dimensions of Adult Learning. San Francisco. Jossey-Bass, 1991*

deeper level of learning that is retained in the long term. However, achieving this requires a mutual commitment to facilitating transformative learning, which may involve changes in teaching and learning practices and expectations. While transformative assessment might be more time-consuming for faculty to grade and more demanding for students to complete, the profound and lasting learning outcomes make transformative education a highly valuable approach in the higher education context.

To translate transformative learning elements into the classroom, instructors can foster critical self-reflection by using P. Cranton's (2016) approach, based on Mezirow's content, process, and premise questions. Engaging activities, such as co-constructed role-playing with debriefing and simulations (e.g., sensory or reading challenges), are also valuable. The six key elements that promote transformative learning are individual experience, critical reflection, dialogue, a holistic perspective, sociocultural and personal factors, and authenticity. Teachers can utilise reflective questions, role-playing, simulations, arts-based activities, critical incident techniques, and learner support groups to cultivate this type of learning.

In 1978, Mezirow identified 10 steps required for transformative learning to occur (Fig. 2.9).

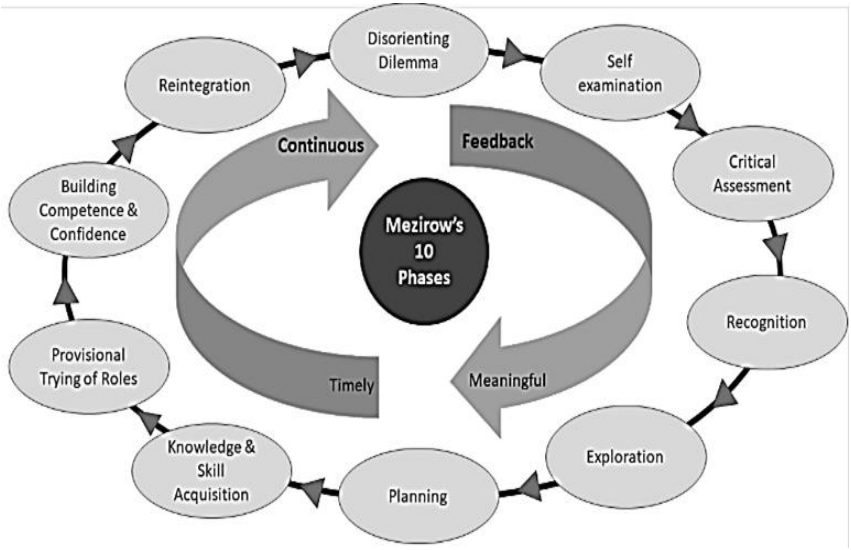


Figure 2.9 Ten steps for transformative learning by Mezirow[98]

These 10 steps are:

a) a disorienting dilemma,

b) self-examination,

c) discontentment; realising others are also discontent and have changed,

[98] Mezirow J. (1978). Perspective Transformation. *Adult Education*, *28*(2), 100-110. https://doi.org/10.1177/074171367802800202

d) evaluation of potential options,
e) critical assessment of personal assumptions,
f) experimenting with new roles,
g) planning a course of action,
h) attaining knowledge and skills to realise an action plan,
i) attainment of competence in a new role,
j) reintegration of a new perspective.

Reframing can be objective (analysing others' assumptions) or subjective (analysing one's own). This learning is a regular part of adult development. Mezirow believed that typical adult challenges are best overcome by critically understanding how our ingrained perceptions, thoughts, and actions have distorted our understanding of problems and ourselves.

For transformative learning and teaching changes in higher education, the researchers recommend that instructors balance challenge and support, promote the critical application of new methods, and encourage multi-dimensional thinking (theory, technique, experience). Creating a secure yet flexible environment is vital due to the potentially unsettling nature of transformative learning, requiring a balance of structure and free expression. Choosing effective learning goals and using structured dialogue with open questions are also key to fostering deep understanding.

Table 2.4

Transformational vs traditional learning

Feature	Transformational Learning	Traditional Learning
Nature of Change	Revolutionary, fast, sudden	Evolutionary, slow, gradual
Goal of Change	Rapid transition, adjustment to unexpected events	Institute unwelcome change by building consensus over time
Pace of Change	Quick, abrupt	Slow, incremental
Focus	Provoking "aha moments", new perspectives, and sudden insights	Gradual adaptation, building consensus
Learner Experience	Unexpected discovery, seeing problems in new ways	Time to adapt to changes
Relevance	Preparing for volatile, uncertain, complex, and ambiguous environments	Suitable for stable environments where gradual change is acceptable
Underlying Philosophy	Creating conditions for paradigm shifts in understanding	Building knowledge and skills incrementally

The empowerment of learners for self-reflection, autonomy, and self-determination, along with a focus on collective consciousness-raising and action, is central when learning is understood within a social context. This emancipation of learners is fundamental not only to design "learner-centred" approaches and methods but also to make learning fundamentally about the learners themselves and their scope and capacity for action.

Deborah Oniah, adult learner, speaking at the EAEA Annual Conference:

"What a teacher needs to provide is a safe space and an understanding that when you attend a class, you should focus on the strengths that people bring with them, as well as their diverse experiences and skills. A good teacher reminds learners of the strengths that they have in themselves."[99]

2.6.4 Multiliteracies Approach in Transformative Context

The new London group (1996) refers to an international consortium of academics researching literacy pedagogies. The ten authors of this group met in 1994 to discuss the state of literacy pedagogy, the tension between immersion and explicit teaching models, and the challenge of cultural and linguistic diversity. They published the manifesto "A Pedagogy of Multiliteracies: Designing Social Futures." Multiliteracy is a term that refers to the connections between the changing social environment facing students and teachers and the demands for a new approach to teaching. Their research identified four significant pedagogy components (Table 2.5): 1) Situated practice, 2) Overt instruction, 3) Critical framing, and 4) Transformed practice.

Table 2.5

Four major components of pedagogy

Situated Practice:	Immersion in experience and the utilisation of available discourses, including those from the students' lifeworld and the simulation of relationships found in workplaces and public spaces.
Overt Instruction:	Systematic, analytic and conscious understanding. In the case of multiliteracies, this requires the introduction of explicit metalanguages, which describe and interpret the Design elements of different modes of meaning.
Critical Framing:	Interpreting the social and cultural context of particular Designs of meaning. It involves the students' standing back from what they are studying and viewing it critically in relation to its content.
Transformed Practice:	Transfer in meaning-making practice refers to the application of transformed meaning in other contexts or cultural sites.

Didactic teaching methods convey results, products, or facts of inquiry to learners without engaging them in the processes through which they were achieved or even the impact they will have on their lives. The researchers observe that

[99] *Transformative Learning and Values.* Background paper on EAEA's annual theme 2022. European Association for the Education of Adults (EAEA) 2022.

situation practice calls for modelling in classrooms of the contexts in which 'real-life' learning is achieved.

Situation practice takes learners through the processes that yield the desired knowledge. Basically, it involves activities, such as projects, and practical and social contexts of learning (learner interactions).

Overt instruction involves constructing knowledge from what learners already know and identifying learners' specific needs for further attention.

Critical framing. It is an aspect of pedagogy where learners step back from what they have learned and view it critically in its context. Learners are guided through critically analysing and questioning the ideologies and their relevance. In critical framing, emphasis is placed on critique.

Transformed practice is an authentic learning experience where students are both products and transmitters of learning, including student-teacher role reversals. Transformed practices enable learners to apply the knowledge they have learned in new situations. It helps them develop the ability to act based on their understanding and apply the knowledge they have acquired to solve problems. With transformed practice, learners are provided opportunities to apply the knowledge they have learned beyond the classroom setting. Generally, the four pedagogical aspects are neither hierarchical nor sequential but rather interdependent.

> ***Further Reading:*** Cazden C., Cope B., Fairclough N., Gee J. (1996). A Pedagogy of Multiliteracies: Designing Social Futures. *Harvard Educ. Rev. 66, 1.*

D.R. Collier and J. Rowsell[100] analyse the theory after 20 years, examining how it has developed and whether it has influenced pedagogical thought. They state that many models of Multiliteracies teaching certainly exist. Two major themes emerged from their well-cited article:

1) the centrality of multimedia and popular culture;

2) the importance of online relationships to young people.

The New London Group recognised that modern educational shifts demand a pluralistic understanding of literacy. Thus, educators must move beyond conventional teaching to link classroom learning with students' real-world experiences, especially given the impact of new digital technologies. Higher education instructors need a profound understanding of language and literacy, the ability to critically assess information, and an understanding of how these relate to their students' daily lives. Traditional literacy views often prioritise skills while neglecting "will" – the motivation and engagement that are crucial for learning. Literacy development must integrate social interaction, intrinsic motivation,

[100] Collier D.R., Rowsell J. (2014). A Room with a View: Revisiting the Multiliteracies Manifesto, Twenty Years On. *Fremdsprachen Lehren und Lernen.* 43(2), 12–28.

effective strategies, and a broad knowledge base to empower and genuinely engage students.

In this context, the Multiliteracies approach offers a powerful solution for university lecturers preparing students for today's globalised workplaces. This framework promotes engaging and creative activities that enhance learning outcomes by incorporating various forms of knowledge, including video and digital media.

For undergraduate students to thrive in their learning environments, teachers must understand the potential and challenges of multimodal literacy and multimedia technologies, which are constantly generating new text forms. Thus, the New London Group developed the term "Multiliteracies" to account for the increasing complexity of texts driven by new communication technologies.

The Multiliteracies framework emphasises how literacy practices evolve in tandem with new technologies and a rapidly changing global landscape. When technology is used to create texts, visuals become integral to literacy, enabling new interactive forms such as websites, PowerPoint presentations, and hypertext stories that combine linguistic, audio, and visual elements.

Transformative Learning Theory often begins with a "disorienting dilemma" – an experience that challenges an individual's established beliefs, assumptions, or perspectives. Multiliteracies directly create such dilemmas. Exposing students to diverse forms of communication (visuals, digital media, multimodal texts) and requiring them to analyse texts critically (within a critical framework, considering power, social justice, and oppression) naturally confronts them with information and perspectives that may contradict or complicate their existing understandings.

Multiliteracies provide the pedagogical tools and framework (including multimodal texts and digital media) to navigate a new reality. In contrast, transformative learning provides the why, the profound, personal shift in perspective necessary for individuals to contribute effectively in such a dynamic environment. Therefore, Multiliteracies is not just a method for teaching diverse texts but a powerful catalyst for students' genuine intellectual, social, and personal transformation in an increasingly complex and interconnected world.

2.7 Self-assessment Questions

In what ways are Constructivism and Social Learning Theory similar? In what ways do they differ significantly in their approach to learning?

Define the Zone of Proximal Development (ZPD) in your own words, using the provided text as a reference.

What are the core beliefs of humanistic learning theory regarding human nature, intellect, and the learning process?

How does Maslow's concept of self-actualisation relate to learning within the humanist framework?

According to Kolb, how is knowledge created in experiential learning? What is the role of experience in this process?

What is a "frame of reference" in Mezirow's transformative learning theory, and how does it influence our understanding of experiences?

2.8 Practice Exercises

1. Explain the constructivist idea that "what we know of the world stems from our interpretations of our experiences". Provide a concrete example of how two individuals might interpret the same event differently based on their prior experiences.

2. Explain the constructivist idea that "what we know of the world stems from our interpretations of our experiences". Provide a concrete example of how two individuals might interpret the same event differently based on their prior experiences.

3. Select a specific higher education academic program or an adult learning initiative (e.g., professional development, community education). Analyse its current design and propose how it could be enhanced or re-designed by explicitly integrating principles from *two* discussed theories (e.g., Experiential and Transformative or Humanist and Experiential). Provide concrete examples of pedagogical methods, assessment strategies, and instructor roles reflecting these integrated theories.

Write a 2000-word report or a 15-minute presentation with a detailed proposal.

4. Analyse how the three theories address the role of emotions, personal involvement, risk-taking, and uncertainty in the learning process. How do they suggest creating an environment that supports these aspects while ensuring psychological safety? Refer to specific principles (e.g., Rogers' minimal external threats, experiential learning's acceptance of success/failure/risk, transformative learning's unsettling nature).

5. Scenario A

Liam, an art student, struggles with perspective drawing. His art teacher, Ms. Chen, initially lectured the class on the rules of perspective and demonstrated techniques on the board. Liam found this confusing and felt he was not "getting it". Ms. Chen then decided to change her approach. She provided various real-world objects for students to draw, encouraged them to experiment with different vanishing points, and had them work in small groups to give feedback to one another. She also paired Liam with Sarah, a more experienced art student, who showed him how she breaks down complex objects into simpler shapes and guided

him through drawing a challenging street scene. Liam started to show significant improvement.

1. Constructivist Lens: How did Ms. Chen's initial approach align with or diverge from constructivist principles? How did her revised approach better reflect the principles of constructivist learning?

2. Vygotsky's ZPD: How did Sarah's interaction with Liam exemplify the Zone of Proximal Development concept? What role did Sarah play as a "more capable peer"?

3. Internalisation: How might Liam's initial struggles and subsequent improvement demonstrate Vygotsky's concept of internalisation?

6. Scenario B

Maria is a new student in a computer science class. She is shy and initially feels intimidated by the coding assignments. During one group project, she observes another student, David, confidently debugging a complex code. David explains his thought process aloud, showing how he systematically checks for errors. Maria also noticed that the teacher praised David's approach to problem-solving. Later, when Maria encounters a similar coding bug, she tries to mimic David's systematic debugging process. When her code finally works, she feels a sense of accomplishment and increases her confidence in her coding abilities.

1. Observational Learning: Analyse Maria's learning experience using Bandura's four steps of observational learning (attention, retention, reproduction, motivation).

2. Self-Efficacy: How did Maria's experience impact her "self-efficacy" in computer science? Which of Bandura's sources of self-efficacy are evident in this scenario?

3. Reciprocal Determinism: How does this scenario illustrate Bandura's concept of reciprocal determinism? Consider the interaction between Maria's personal factors, her behaviour, and the environment.

Chapter 3. Pedagogical Professionalism

3.1 Defining Adult Teaching

The origin of the word “teach” lies in the Old English “tæcan” meaning “show, present, point out”, which is of Germanic origin and related to “token”, from an Indo-European root shared by Greek deiknunai “show”, “deigma”, sample. Other words with associated meanings include educator, instructor, trainer, lecturer, coach, and facilitator. While traditional pedagogy often casts the teacher in a role of direct instruction and knowledge transmission, fostering a degree of learner dependency, andragogy, as explained in the following paragraph, significantly shifts this dynamic.

Given that andragogy emphasises learner autonomy, experience, relevance, and self-direction, the essence of teaching adults lies in facilitating learning rather than dictating it, moving away from the learner dependency seen in traditional pedagogy. The teacher for adults connects learning to the adult learner's needs and everyday life, rather than solely focusing on content and supports the learner's internal drive to learn rather than relying on external rewards. The adult educator acts more as a guide, facilitator or resource person who empowers self-directed learning than a traditional authority transmitting knowledge to a dependent student.

Teachers should be concerned for their students, but students should also be involved with their teachers. Many books and papers have demonstrated the significance of the moral relationship in teaching. The teachers should go to help students achieve fulfilment through teaching and learning. It is the vocation of teaching:

- Teaching is the imparting of knowledge or skills. - Teaching as success.
- Teaching as an intentional activity - Teaching as normative behaviour, and
- Teaching as the promotion of learning.

A descriptive definition of teaching is "imparting knowledge or skill.” Traditionally, the teacher's role has been that of a purveyor of information; the teacher was the fountainhead of all knowledge. The traditional method of imparting education involves establishing educational institutions wherein students attend classes and a single teacher teaches one or more individual courses. This education system is almost universally followed and remains an efficient method for imparting education. The system facilitates peer interaction between students and fosters competition among them. Students also have the opportunity to contact the teacher immediately for clarification of their doubts, and feedback and responses are received immediately. The sessions are interactive, the students are attentive, and subject comprehension is high. The teacher knows each student individually, their potential, and their limitations, especially if the class size is small.

However, the traditional system, as outlined above, has several disadvantages. One major drawback is that a single teacher is expected to impart knowledge to a large number of students. As a result, the amount of attention given to each student decreases with an increase in the number of students.

The stochastic process is a fundamental characteristic of adult learning. The educator must first understand the learners' experiences and provide feedback to help them analyse and classify those experiences. This process allows learners to find meaning and avoid cognitive chaos. The adult educator is obliged to work towards bringing about a possible change. He can achieve this a) by determining his goals and expectations from those of his students and b) by encouraging discussion and the participation of the trainees, avoiding dogmatism. The educator helps learners re-examine and challenge dysfunctional perceptions, enabling them to develop a more experiential and authentic worldview.

> "Differentiating between 'telling' and 'teaching' needs to be clear if the following principles of pedagogy are to have meaning. For me, teaching is based on understanding oneself and others <...>; hence, the heart and soul of teaching begin with relationships. Teaching is a relationship, and without building relationships, the purpose of teaching is diminished. Other principles of pedagogy are enhanced through relationships; therefore, not surprisingly, although I do not view my list of principles of pedagogy as a checklist to be considered in rank order, the first principle (relationships) is foremost."[101]

Adults are generally independent and responsible for their decisions. However, when placed in a traditional educational setting (like a classroom), they might unconsciously slip back into a passive student, expecting the instructor to "teach them". The physical environment, particularly a "classroom-style" setup, can trigger this conditioned response. The familiar arrangement of desks and a teacher at the front reinforces the idea of passive learning. Thus, it manifests as a "teach me" attitude, where adults relinquish their active role in learning and expect to be spoon-fed information. To address the "dependency" problem, educators have developed strategies to help adults transition from dependent to self-directed learners. Instructors guide learners in connecting the learning material to their personal and professional lives, making the content more meaningful and engaging. Activities are used to gather information about what participants want to achieve, ensuring alignment between the instructor's and learners' objectives. The goal reinforces the idea that learners are responsible for their learning.

The ultimate educator is a blend of a teacher and a trainer. By employing a combination of academic approaches and training skill-building strategies, the ultimate educator creates a rich learning environment. These skills are universal and transcend all learning boundaries and content areas.

The modern teacher is a facilitator who helps students learn for themselves. Instead of sitting in rows, students will likely be in groups doing something different. Some perform practical tasks, while others write and work remotely,

[101] Loughran J. (2003). Teaching about Teaching: Principles and Practice. *Teaching about Teaching: Purpose, Passion and Pedagogy in Teacher Education.* Edited by John Loughran and Tom Russell. London, Washington, D.C The Falmer Press, pp. 57–71.

utilising specialist equipment or consulting the library. All students may be at various stages in their learning; the teaching is individualised to suit their requirements and abilities.

> The ultimate educator remains alert to the first principle of adult learning: adults enter the learning environment with a deep need to be self-directed and take a leadership role in their learning.[102]

This change from the traditional model is the result of several factors. First, it is recognised that adults, unlike small children, possess a wealth of experience and can plan their learning efficiently. Second, not all individuals learn in the same way, so if a teacher talks to students, some might benefit, while others might not. Third, everyone learns at their own pace, not necessarily at the rate set by the teacher. Hence, the individualising of learning has defined advantages.

The concept of "teaching as success" implies that teaching always leads to learning, as evidenced by the expression teaching-learning process. From this viewpoint, teaching is an activity in which the teacher learns what the student is teaching. As Siegfried "Zig" Engelmann (1931-2019) said, "If the student has not learned, the teacher has not taught – that is not a slogan; it is an operating principle."[103] Lastly, teaching is an intentional activity, distinct from instruction (Table 3.1).

Table 3.1

Teaching vs. instruction

Teaching	Instruction
The scope is broad.	Its scope is narrow and limited.
It is both formal and informal.	
Teaching is a continuum for modifying behaviour.	Instruction is always formal.
Teaching means the development of an individual's potential.	Instruction is a part of teaching.
The range of methods used in teaching is extensive.	Instruction means to impart knowledge of specific subjects.
Teaching is imparted in schools, libraries, and political groups, among other settings.	Instruction is generally confined to the classroom.

Teaching is seen as a normative behaviour, making it possible to distinguish educative teaching from training and conditioning (Tables 3.2 and 3.3). Of the approaches mentioned above, the view of teaching as an intentional activity is considered fruitful. An intentional teacher focuses on how to engage students in

[102] Edmunds C., Lowe K., Murray M., Seymour A. (1999). *The Ultimate Educator.* National Victim Assistance Academy (Advanced). Washington, DC.

[103] Heward L., Kimball J.W., Heckaman K.A. et al. (2021). In His Own Words: Siegfried "Zig" Engelmann Talks about What's Wrong with Education and How to Fix It. Behav. *Analysis Practice,* 14, 766–774. URL: https://doi.org/10.1007/s40617-021-00636-*x*

active learning. He/she tracks how students meet the benchmarks of the established student development milestones.

Table 3.2

Teaching vs. conditioning

Teaching	Conditioning
Teaching aims at the development of potential and intellect.	It aims to modify behaviour and learning habits.
It has a broader scope.	The scope of conditioning is relatively narrow.
Reinforcement is not necessary for teaching.	Reinforcement plays a vital role here.
In teaching, repetition of the subject matter being taught is not necessary.	Conditioning is achieved through the repetition of a behaviour to be acquired.
In teaching, there is a very comprehensive curriculum.	In conditioning, the curriculum is fixed.
In teaching, qualitative and quantitative techniques are used for evaluation.	Evaluation in conditioning is done based on the acquisition of a behaviour or a habit.
Teaching is a broader process with various levels.	Conditioning is considered the lowest level of the entire teaching process.

Many scholars of education define teaching as "the promotion of learning". In their teaching work, teachers must provide suitable conditions that facilitate learning. Some others define teaching as helping others learn. Teaching is the art of imparting knowledge, and it involves knowing what to teach learners and the most effective ways to impart that knowledge. M.S. Knowles best summarises the primary differences between teaching and training (Table 3.3).

Frank O'Meara (1996) provides ten rules for novice trainers to help them get off to a good start in their training careers. His rules also remind veteran trainers to keep their attention focused where it belongs – on the learners.

1. Change your shoes. Imagine yourself as a member of your audience; see the subject from your learners' point of view.

2. Get your act together. Know your stuff.

3. Loosen up. Hang loose and smile.

4. Un-complicate it. Express your ideas in the simplest possible language.

5. Put it on ice. Motivate your participants to make them feel it is their program.

6. Vary your pitch. Be comfortable with several teaching techniques to maintain and renew interest and participation during the day.

7. Let George do it. Until they demonstrate, show, and do it themselves, they have not acquired the knowledge or mastered the skill you want them to learn.

8. Play it again, Sam. Repetition is the mother of learning.

9. Accentuate the positive. Be patient and positive in ensuring that each individual understands and is proficient in the material.

10. Get a receipt. The purpose of your training session is to ensure that participants possess the necessary knowledge and skills required for effective performance.

Table 3.3

The difference between teaching and training, according to M.S. Knowles

	Teaching	Training
Underlying Philosophy	Knowledge is passed from the teacher to the learner. Organisations are improved through technical advances. Teacher-oriented	Knowledge is discovered through mutual investigation of problems and issues. Organisations are improved by developing the resources and self-directed capabilities of learners. Learner-oriented
Learning Objectives	It looks only at observable, measurable behaviour. Usually, they insist on measurable and precise behavioural objectives. Emphasise acquiring information.	It looks at attitude as well as behaviour. Tailor the degree of precision in objectives to the task or skill being learned. Emphasise interpersonal and self-directing competencies.
Content	Often used for technical knowledge and skills, psychomotor skills, languages, mathematics, and science.	Appropriate interpersonal and technical skills, requiring some degree of analysis and judgment, as well as managerial skills, the arts, and humanities.
Learning Methods	Tend to be subject-oriented in structuring the content and mechanical in devising instructional methods. Use programmed learning, lectures, and audiovisual materials.	Tend to orient the structure of the content to the learner, the problem, and the situation at hand. Use discovery learning methods.

Cognitive science has shed light on the nature of learning and the conditions that foster its growth. Educators should, from now on, derive their teaching rules from the nature and conditions of learning.

The complex nature of adult education places significant responsibility on its educators. Teachers are the cornerstone of student success, particularly in adult learning. Educators empower learners to contribute to society, foster critical thinking, and develop lifelong learning skills, making them the "backbone" of the system. Therefore, ongoing professional development is essential for enhancing their skills and professional status. Nevertheless, few opportunities exist for adult educators to acquire a comprehensive body of knowledge on adult learning theory and its application before entering their profession, and even fewer are available to them once they are in practice. Without specialised programmes and regulated procedures that safeguard quality, many adult educators assume this responsibility. Consequently, teaching effectiveness often hinges on individual attributes, such as sensitivity and commitment, rather than structured professional development.

Adult educators' continuing education is part of the discussions on improving the quality of adult education, and European policies have argued for an increased professionalisation of adult educators. Adult teaching staff have been identified as a key factor in the success of effective adult learning policies at all levels.

3.2 Coaching in Adult Education

The word "coach" has a rich history, dating back to its origins in Kocs (Hungary), where horse-drawn carriages were manufactured. It transitioned to Oxford University slang in the 1830s, describing tutors who guided students through exams. This meaning broadened to encompass athletic training in the 19th century. In the 20th century, workplace coaching emerged as a method for training recruits. It involved experienced employees demonstrating tasks, observing performance, and providing feedback, ultimately leading to collaborative planning for improvement. While sharing similarities with instruction, coaching empowers the students to move from externally observed performance to self-directed experimentation and reflection. Coaching is frequently defined as a method to help individuals achieve their full potential. These definitions struggle to differentiate them from similar practices (mentoring, counselling, consulting).

Efforts to distinguish coaching by purpose, clientele, or process have yielded limited success. Defining coaching through a unique process also presents challenges, as many described characteristics are common to other fields or too specific to be universally applied. Coaching is a facilitative approach that empowers individuals (coaches) to take ownership of changing their behaviour or thinking for improved outcomes. Unlike teaching, coaching offers educators a non-directive method for fostering independent learning. The relationship between coaching and mentoring is also frequently examined (Table 3.4).

According to Mezirow, transformative learning centres on the learner's experience, particularly a "disorientating dilemma", as the foundation for critical reflection, prompting a recognition of perspective limitations. This principle is echoed in coaching, which invariably starts with the coachee's personal experiences, often initiated by a catalyst similar to Mezirow's dilemma. The coaching approach involves setting goals, encouraging experiences, facilitating learning and employing tools such as homework and reflective dialogue. It is often triggered by critical inquiry and follow-up on assigned tasks during coaching.

Adult learners are uniquely capable of transformative learning through critical reflection, which involves questioning deeply held assumptions rooted in their experiences. When adults undergo a disorienting event, they are more likely to revise their underlying assumptions, adopt a new paradigm, and actively apply it to create new knowledge. Conflicting thoughts, feelings and actions often accompany this and can lead to a transformation of perspective. Reflection can occur at three levels: content (what), process (how), and premise (why). Reflective writing strengthens this process by making thoughts concrete. Coaching similarly employs tools like assessments and inquiries to facilitate learning and transformation[104].

Transformative learning relies on rational discourse through dialogue[105].

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[104] Sammut K. (2014). Transformative Learning Theory and Coaching: Application in Practice. *Int. J. Evidence Based Coaching and Mentoring.* Special Issue No.8, 39–52.

[105] Taylor E.W. (2007). An Update of Transformative Learning Theory: A Critical Review of the Empirical Research (1999-2005). *Int. J. Lifelong Education*, 26, 173–191.

Exposure to alternative viewpoints encourages individuals to question their beliefs and values, leading to transformative learning when their self-perception and worldview shift. This study found that coaches refer to this transformative dialogue as a standard conversation. Inquiry and reflection during these conversations allow coaches to introduce new ideas that develop subtly over time. Homework and tasks extend this process by providing opportunities for coaches to interact with others. Participants reported that coaches often expressed fears of failure, the unknown, change, pressure, and overall vulnerability. Through ongoing dialogue built on trust and rapport with their coach, limiting beliefs and fears were identified, and new perspectives emerged.

Table 3.4

Coaching vs. Mentoring in Education[106]

Feature	Coaching in Education	Mentoring in Education
Definition	A one-to-one conversation focused on enhancing learning and development by increasing self-awareness and personal responsibility.	A series of one-to-one conversations where a more experienced person asks questions, provides guidance, shares knowledge, and advises to support a learner's performance and success.
Primary Focus	Facilitating the coachee's self-directed learning.	Supporting a learner to improve their performance and achieve success.
Coach's Role	Facilitates through questioning, active listening, and appropriate challenge in a supportive and encouraging climate. It aims to help the coachee find their solutions.	Asks questions, provides guidance, shares knowledge, and gives advice. Offers expertise and experience.
Key Elements	Increasing self-awareness and a sense of personal responsibility. Emphasis on the coachee's insights and actions.	Knowledge transfer, sharing of experience, and providing advice from a more experienced individual. Focus on the mentor's expertise.
Relationship Dynamic	It is a facilitative partnership that empowers the coachee to drive their learning.	It is more of a guidance-oriented relationship, with the mentor offering direction based on their experience and expertise.
Experience Level (of Coach/Mentor)	While helpful, the coach does not necessarily need to be an expert in the coachee's specific area. The focus is on the process of self-discovery and learning.	The mentor is typically more experienced in the learner's area of interest. Their experience and knowledge are key to the relationship.
Goal	Enhancement of learning and development through the coachee's insights and actions.	Performance improvement and achievement of success through the guidance and support of the mentor.

[106] van Nieuwerburgh C., Barr M. (2016). Coaching in Education, in: *The SAGE Handbook of Coaching.* (Eds.) T. Bachkirova, G. Spence, D. Drake. Sage. URL: https://au.sagepub.com/en-gb/oce/the-sage-handbook-of-coaching/book245418

Traditional transformative learning has been critiqued for overemphasising rational thought. K. Brown suggests that change occurs more through "see-feel-change" than "analyse-think-change." Mezirow states that educators must create a "whole person learning" environment to engage expressive knowing, which helps learners understand their feelings and how they relate to making sense of things.

Coaching's learner-centred approach allows for individual learning preferences, generally creating a holistic environment; however, the coach's style also plays a significant role. To avoid coercion, coaches emphasise non-influence and employ various methods to create an authentic environment. Some coaches avoid co-dependency, and others question their motivations for desired progress. In peer coaching, colleagues of equal status form a collaborative and supportive relationship to focus on the coachee's professional development (Table 3.5).

Table 3.5

Core practices of coaching[107]

Core practices	Contributions from the wider literature
Individual and prior experience, including what is experienced within the learning event.	The primary medium of transformational learning. The individual experience encompasses thoughts, feelings and emotions.
Engaging in a dialogue with oneself and others.	The coach supports becoming aware of hidden assumptions, encourages critical reflection and explores options and actions to facilitate informed decision-making. Alternative view: awareness of what is happening in someone's inner world is sufficient, and no critical reflection is needed. The coach can challenge clients by asking incisive questions, confronting inconsistencies and/or using tools. Attitude coach: expresses a belief in the client, has a future-oriented outlook, promotes hope and possibilities, and supports the client when they experience discomfort. Recognise readiness to change.
Holistic orientation includes other ways of knowing (affective and relational).	Cognitive/ rational: reflecting on experience using, e.g. dialogue, journal, life history exercises, concept maps. Extrarational: reflecting on emotions and feelings experienced currently, e.g. journal, drawing, writing, performance. An integrated approach requires both reflective and non-reflective activities.
Awareness of context helps appreciate how personal or social factors influence learning.	The Influence of Environment on Uncritically Assimilated Assumptions. Social acceptance, acknowledgement and possible peer appreciation can support or block transformation.
Importance of establishing an authentic relationship.	Established by non-evaluative feedback, acceptance, presence, no hierarchy, voluntary participation, shared goals, and authenticity.

[107] Moons J. (2015). *Shift in the Room – Myth or Magic? How do coaches create a transformational shift in the room?* Dissertation submitted to Oxford Brookes University.

Driven by the coachee's identified need for learning or change, the coach and coachee work together to achieve specific goals. Involvement in peer coaching is generally voluntary and tailored to the coachee's unique learning requirements.

3.3 Characteristics of a Profession. Professionalisation of Adult Teacher

The terms "profession" and "professor" have their etymological roots in the Latin word "profess." To be a professional or a professor was to profess oneself as an expert in a specific skill or knowledge field. The word profession meant 'a sense of religious dedication' during the 13th century. It refers to the set of activities performed based on some knowledge and skill to serve the public and earn money while adhering to the rules established by society. Professions are occupations with remarkable power and prestige. The discrete components of professional ethics include honesty, transparency, integrity, loyalty and confidentiality. A group of individuals who adhere to ethical standards and possess the required special knowledge and skills in their field, and who encourage others to continue seeking their services, are termed "professionals." In other words, a member of a profession is a professional. Codes of ethics govern them and profess a commitment to the competence, morality, and well-being of the public, upholding laws, ethics, and principles as a way of practice. Dedication to duty is the core concept of a profession.

Professionalisation can be described as the societal process in which a trade or occupation develops into a recognised profession characterised by standards of integrity and expertise. This transformation usually entails the establishment of formal qualifications, with professional bodies proposing codes of practice, regulating the behaviour of practitioners, and differentiating certified members from untrained or casual participants through professional licensing. A central feature of this transition is the creation of what is often called "occupational closure," meaning that entry is restricted to those who satisfy set requirements, excluding outsiders, amateurs, and the unqualified.

Such regulation produces a structured division between those with recognised authority and those in subordinate or deferential positions. Restricting entry, frequently labelled as "closure," has historical roots in the medieval guild system, where artisans sought exclusive rights to exercise their craft, employ apprentices, and preserve special privileges. Over time, this emphasis on exclusivity became linked to credentials, so that permission to practise increasingly depended on rigorous qualifications or certificates. Professionalisation has therefore also been associated with reliance on formal attestations, primarily academic degrees, when making decisions about employment or promotion. Overall, professionalisation may be viewed as the social mechanism through which individuals are permitted to practise an activity as paid work or as a livelihood once they have met the standards imposed by a relevant institution or authority. The specific entry requirements, however, differ across disciplines and professional domains.

Table 3.6

Nature of learning and rules for teaching (based on Teaching and Learning by Harpaz Yoram)[108]

	Nature of learning	Rules for teaching
Undermining	People learn well when their confidence is undermined and the world disrupts their schemes (concepts and expectations). People who are undermined are driven to learn to restore their lost cognitive equilibrium.	Teaching should challenge students' beliefs, undermine those they take for granted, and help restore their cognitive equilibrium through the learning process.
Multiple Intelligences	People learn effectively when the subject matter aligns with their intelligence profile.	Teaching should direct its contents to the dominant intelligence of the student (and strengthen their weaker intelligence after they have gained enough self-confidence).
Learning and Thinking Styles	People learn effectively when the teaching and assessment methods align with their thinking and learning styles.	Teaching and assessment should be tailored to the student's thinking and learning styles.
Motivation	People learn well when they are driven by internal motivation.	The teaching method and its content should stimulate students' curiosity and foster learning for its own sake.
Zone of proximal development	People learn well when the subject matter is at a level they can reach with the help of another person, aligning with their developmental stage.	Teaching should help students identify their zone of potential and guide them towards it.
Attribution Theories	People learn well when they have productive (implicit) theories of learning, intelligence, and development.	Teaching should empower learners to develop productive theories in various ways.
Distributed Intelligence:	People learn effectively when their intelligence is distributed, supported by others, computers, and books.	Teaching should be conducted in an environment that fosters collaborative thinking, utilising both computers and books.
Feedback	People learn well when they are supplied with ongoing, formative and informative feedback.	Teaching should provide students with constructive feedback.

[108] Yoram H. *Teaching and Learning: Analysis of the Relationships,* URL: https://yoramharpaz.com/teaching-and-learning-analysis-of-the-relationships/

Several corollaries distinguish a profession from other occupations, namely: 1) the concept of restrictions regarding entry requirements and operations of the profession, 2) the professional focus on the performance of the members of that profession, and 3) professions exist to advance themselves.

Professions impose restrictions on entry, resulting in a limited number of people joining the profession. This position implies that controlling the number of people entering the profession helps maintain professional standards as overcrowding is kept at bay. The profession usually regulates its members' conduct in several aspects. Characteristics of a profession:

- Knowledge acquired after a period of specialised intellectual study and training is essential for the practice of an occupation.
- Controlled entry into the occupation.
- A code of conduct to guide the behaviour of the profession's members.
- A solid professional organisation that guides the interests of its members as well as codifies the entire professional framework.

Occupation and profession are different in terms of "moral values." Teachers are the employers of the wider community, serving the interests of people, society, culture, and religion.

Teaching is called a profession due to the following:

- It is a social obligation.
- Social prestige.
- Community demand.
- Social service.
- Transformation of values and traditions.

What is Professionalism? Professionalism involves decision-making and judgment-based practice. Professionalism encompasses more than rules; it is a fluid concept that varies depending on the context. Professionalism should be viewed as a responsibility to make informed judgments and decisions within the context of practice. A clear professional identity must underpin contemporary professionalism.

A professional identity involves becoming aware of what matters most in practice and the values and interests that shape one's decision-making. Professional identity is closely linked to professionalism, which is taking responsibility for one's actions. So, thinking and acting as a professional are underpinned by professionalism and a sense of professional identity. A teacher's professional identity refers to a teacher's optimistic attitude and a solid commitment to the profession, which is reflected in the teacher's desire to maintain their profession and the degree of enthusiasm they feel for it. Professional identity forms within the teacher education program but is also influenced by prior experiences and beliefs.

Professionalism is a measure of an occupational group's social strength and authority. The teaching profession embodies the notion of regulated autonomy because it acts on behalf of the state in the best interest of its citizens. Teacher professionalism is what teachers practice. These practices involve:

- transfer of knowledge,
- presentation of content,
- facilitating learning,
- developing skills in monitoring and enhancing learning,
- ability to exert educational judgment.

> Professional identity stands at the core of the teaching profession. It provides a framework for teachers to construct their ideas of 'how to be,' 'how to act,' and 'how to understand' their work and their place in society. Importantly, teacher identity is neither fixed nor imposed; instead, it is negotiated through experience and the sense that is made of that experience.[109]

The first schools began many years ago, around 3000 B.C.E. In ancient Egypt, priests taught boys to read and write, and they tutored them in the humanities and math. Around the same time, Mesopotamian priests taught reading, writing, astrology, and medicine. Often, their pupils became scribes or librarians. Did these priests see themselves as teachers?

Earlier, priests and prophets taught noble and wealthy children the skills to excel in business and politics. Priests were treated well due to their extensive knowledge and expertise. The first private teacher was Confucius in the fifth century B.C.E. In Ancient Greece, knowledge was considered sacred, and this ideology persisted through the time of Christianity. Education was not very popular among the lower classes until after the Middle Ages. The Roman Catholic Church took responsibility and established centres of learning, which eventually evolved into the great universities of Europe, including Cambridge.

Specific teacher training originated in France in 1685 with St. John Baptist de la Salle. The training spread through Europe via the monitorial system, which is the education method where there are several students at a bench, a monitor (older student) who the teacher instructs and then instructs the younger students, and then the teacher.

In European countries, one of the first concerns of the 18th-century educational reformers involved establishing uniform procedures for selecting and nominating teachers. In fact, teaching was one of the first professions to adopt meritocratic selection methods based on the formal recognition of individual merit, as demonstrated by diplomas and specific tests. Teaching licenses or permits have been obligatory since the end of the 18th century. These documents have been issued by a State authority or an agency granted authority by the State. They were issued after an individual had passed an examination or competition open to anyone with a certain number of attributes necessary for admission (literary prowess, age, good moral character, etc). This decision represents an

[109] Sachs J. (2001). Teacher Professional Identity: Competing Discourses, Competing Outcomes. *Journal of Education Policy*, 16(2), 149–161.

important step in the process of professionalisation. It creates the conditions necessary for developing a canon of technical competencies based on educational criteria, which serves as a basis for recruiting teachers and, consequently, as a blueprint for a teaching career.

> The development of education in Ukraine dates back several centuries to Kyivan Rus. Schools were established in Kyiv at the end of the 10th century and continued to grow in number during the 11th and 12th centuries. The fraternal schools (XVI-XVII centuries) paid great attention to the problem of developing the teacher's professional status. Schools operated based on the charter, which outlined the duties of students, teachers, and the training regimen. The relationship between the teacher and the parents has evolved: according to the statute, they have concluded a contract between themselves in the presence of two witnesses, which defines the school's obligations and the parents' rights, intended to contribute to the student's educational success. Pedagogical education in Ukraine was initiated by the Lviv Fraternal School, which trained teachers in primary and secondary education. However, fraternal schools were liquidated or turned into Catholic schools. In the fragmented Ukraine of the 18th and 19th centuries, teaching and teacher professionalisation deteriorated.[110]

The creation of teacher training institutions, a pivotal step in the process of professionalisation, is the result of joint action by both teachers and the State: the former viewed it as a means of enhancing their status. At the same time, the latter saw it as a powerful instrument of control. On the one hand, the institutionalisation of training procedures through the creation of regular schools has permitted the development of teaching as a profession and the social improvement of its members. On the other hand, it establishes stricter State control of the teaching profession. The project for creating teacher training institutions is old, but it was not realised until the 19th century in most European countries.

In the 19th century, two axes of reflection developed: on the one hand, the axis of pedagogy, closer to the normal schools and the practices of teacher training, and on the other hand, the axis of the science of education, often in the space of the university, and a theoretical dimension. There is a disconnection between the science of education as an academic discipline and pedagogy as practical knowledge for teachers. This bias produced a cleavage between theory and practice (between theoreticians and practitioners). This fact highlights the appropriateness of analysing the professionalisation of teachers based on the knowledge and powers in place in a given period.

[110] Vasylieva S.O. (2015). *On the history and problems of teacher professionalisation in Ukraine (Rozvytok profesiinoho statusu vchytelia: teoriia ta istoriia).* Kharkiv: Planeta-Prynt, (in Ukrainian).

According to António Nóvoa, the first cycle in the professionalisation of teachers lasted until the 1920s and 1930s. This cycle began with State-sponsored schooling at the beginning of the 20th century. Despite tensions and conflicts, it was a relatively coherent period in the lives of teachers, a time when they developed as a professional body. However, teachers were confronted with several contradictory processes during and after the Second World War, caused by the post-war dynamics of educational expansion. Elements of professional affirmation were mixed with the logic of devalorisation and authoritarian control over the profession, which some authors have named de-professionalisation.

Creating teacher training institutions has constituted a crucial step in the professionalisation of teaching. In the 20th century, the progressive universalisation of training structures represented an essential aspect of teachers' social and scientific affirmation.

The formal study of adult education emerged in the 20th century, facilitating the growth of andragogy as a vital academic foundation. Establishing adult education as a recognised profession is still underway. The historical view of adult learning as merely a response to deficits is no longer relevant today, where knowledge and adult education are central to economic, cultural, and social progress, with their demand increasing as societies advance. Understanding various viewpoints is fundamental for effective future planning. Key areas for adult education include anticipating the future of learning (through futurology) and strengthening the guidance professionals provide to improve access to educational opportunities and empower learners to realise their potential, meeting their interests and community needs. Adult education is not yet a fully established profession. The research highlights that its professionalisation is inconsistent, with a focus mainly on academic and professional development through university programs, research activities, expert training, and the expansion of professional bodies.

Because there is no singular definition or identity regarding what or who an "adult educator" is, the professionalisation of adult educators is complex and ambiguous. In the professionalisation of adult educators in a Canadian learning society, Sh. McIntosh (2008) questions the compatibility and the desirability of the professionalisation of adult educators with the goals of a learning society. Noting that international standards and agreements emphasising lifelong learning and professionalisation have increased interest in adult education, McIntosh considers arguments for the increased professionalisation of adult educators:

- to enhance credibility, recognition, and formation of a coherent identity;
- to increase earning potential and improve quality of life;
- to provide tools for conducting self-assessments and discernment of personal and professional development needs;
- to establish a common set of concepts and vocabulary to enhance communication with other professional groups;
- to facilitate access to professional preparation programs;
- to provide an opportunity for a common core of knowledge and skills to

be demonstrated by the adult educator;

- to distinguish between those who are qualified and those who are not;
- to provide a basis for defining an emerging field of study;
- to provide a means of protecting adult educators and learners from misconduct and incompetence through the development of competencies and adherence to ethical standards;
- to provide a means of ensuring autonomy and protection from government intervention[111]

***Further Reading**: António Nóvoa The teaching Profession in Europe: Historical and Sociological Analysis. URL: https://core.ac.uk/download/pdf/12424649.pdf*

3.3.1 Professionalism of Knowledge

Professional development should be focused on acquiring new knowledge. Master teachers have four types of knowledge.

Knowledge of content. The expert teacher has a body of knowledge related to the content or subject matter to be taught. The math teacher knows a lot about math; the social studies teacher knows a lot about social studies, etc. This body of knowledge guides the expert teacher in deciding what is taught and in what order. What about the elementary teacher or the special education teacher?

Pedagogical knowledge. Pedagogy is the art and science of teaching and learning. Expert teachers possess a range of skills, strategies, techniques, and methods to impart knowledge and enhance learning. Effective teachers have a toolbox filled with multiple pedagogical skills they can use with students in different situations.

Pedagogical content knowledge. Pedagogical content knowledge is an understanding of teaching specific content or skills. For example, you know the best strategies for teaching reading, science, math, or writing. Also, you understand how to convert your knowledge into information that students can understand. You can break things into manageable parts, use kid language to clarify things, and design activities that help students understand.

Knowledge of learners and learning. You understand the learning process, know how students best learn and recognise the link between what you do and student learning. Here, you understand human development and learning theories, which explain how humans learn.

Literature highlights many features that characterise expert teachers, including extensive pedagogical content knowledge, effective problem-solving strategies, adaptation for diverse learners, informed decision-making and perception of classroom events, greater sensitivity to context, and respect for

[111] Eidoo S. (2002). The Professionalization and Training of Adult Educators in Global Citizenship Education for Youth and Adults. *Addressing Global Citizenship Education in Adult Learning and Education: Summary Report*. Hamburg. https://www.uil.unesco.org/sites/default/files/medias/fichiers/2022/03/professionalizationgced.pdf?hub=156

students. Several studies emphasise the importance of teachers' knowledge, highlighting that, in addition to assimilating academic knowledge, student teachers must also incorporate knowledge derived from experiential and practical classroom experiences. Research also shows that variations in 'opportunities to learn' in teacher preparation are related to differences in student achievement.

While teacher knowledge is undoubtedly a component of teacher professionalism, professional competence involves more than just knowledge. Skills, attitudes, and motivational variables also play a significant role in the mastery of teaching and learning.

Blömeke and Delaney[112] proposed a model that identifies cognitive abilities and affective-motivational characteristics. They are the two main components of teachers' professional competence, as shown in Fig. 3.1.

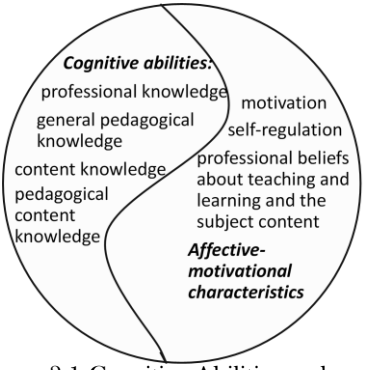

Figure 3.1 Cognitive Abilities and affective-motivational Characteristics as Components of professional competence

***Further Reading**: Guerriero S. Teachers' Pedagogical Knowledge and the Teaching Profession Background Report & Project Objectives. http://www.oecd.org/education/ceri/Background_document_to_Symposium_ITEL-FINAL.pdf*

Teachers' pedagogical 'knowledge base' encompasses all the necessary cognitive knowledge required to create effective teaching and learning environments (Fig. 3.2).

Research suggests this knowledge can be studied. However, identifying the content of this knowledge base is a complex issue. Most studies use the distinction between declarative ('knowing that') and procedural knowledge ('knowing how') from cognitive psychology as a theoretical basis. This approach is relevant as it focuses on understanding how knowledge is related to behaviour, or in other words, the quality of teaching performance.

Some models of general pedagogical knowledge combine pedagogical and psychological aspects (Table 3.7). Psychological components play a crucial role in learning that occurs in a social context, and learning success depends on the individual students' general cognitive and affective characteristics.

In the twenty-first century, teachers must see themselves as co-learners and collaborators within the learning environment. In their role as learners, teachers learn a great deal about – and often from – their students. They learn from each other, too. Moreover, as a collaborative group, they learn together. The

[112] Blömeke S., Delaney S. (2012). Assessment of Teacher Knowledge Across Countries: A Review of the Stat of Research. *ZDM Mathematics Education*, 44, 223–247.

researchers identify several 'knowledge era' skills for effective teaching. These include: a) Collaboration, b) Negotiation to arrive at shared expectations, c) Engagement management (managing learning, not classrooms), d) Creating and managing knowledge, e) Developing individual learning programs, f) Self-awareness and self-evaluation, g) Self-management and self-directed learning.

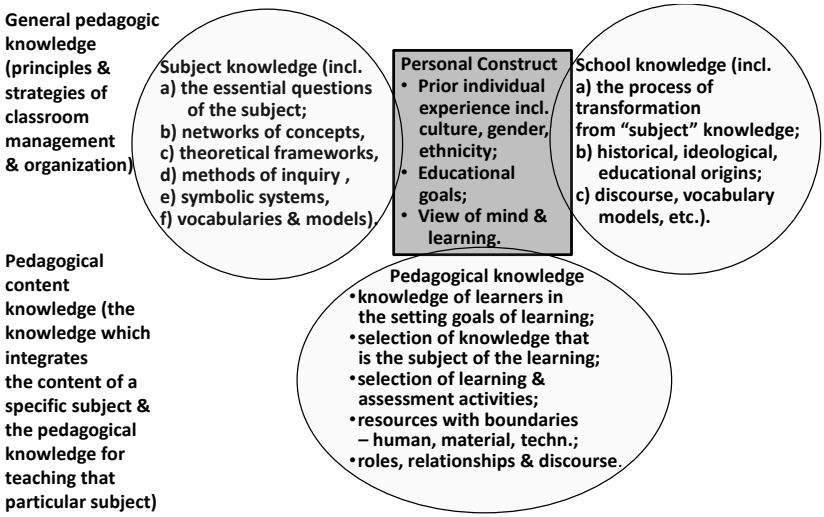

Figure 3.2 The model of teacher knowledge of L.S. Shulman [113]

Table 3.7

Pedagogical knowledge is a combination of pedagogical and psychological aspects

Pedagogical components	Psychological components
Knowledge of classroom management: maximising instructional time, handling classroom events, teaching steadily, and maintaining clear lesson direction. Knowledge of teaching methods: having a command of various teaching methods and knowing when and how to apply each technique. Knowledge of classroom assessment: understanding the various forms and purposes of formative and summative assessments, as well as the impact of different frames of reference (e.g., social, individual, criterion-based) on students' motivation. Structure: structuring learning objectives and the lesson process, lesson planning, and evaluation. Adaptivity: dealing with heterogeneous learning groups in the classroom.	Knowledge of learning processes: supporting and fostering individual learning progress by knowing various cognitive and motivational learning processes (e.g., learning strategies, the impact of prior knowledge, effects, and quality characteristics of praise, etc.). Knowledge of individual student characteristics: knowing the sources of student cognitive, motivational, and emotional heterogeneity.

[113] Shulman L.S. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review, 57(1), 1–22.*

3.3.2 Developing Teachers' Knowledge

Teacher knowledge, as mentioned above, is heterogeneous and open to change. Accordingly, their development requires special preparation. Recent studies focus attention on practical experience, cooperative work, and learning. One of the primary principles of teacher training is forming a professional identity through the development of self-development skills.

A teacher education program derived from a behaviour model will prioritise what teachers need to know and can apply in the school situation. The apprenticeship model would emphasise the school experience, with teachers being socialised to fit into the existing contexts. The development model would build teachers' confidence in their learning and understanding of experiences. In the latter model, teacher educators must be viewed as learners, monitoring their own experiences, supporting teacher research efforts, and valuing the knowledge and expertise of teachers.

Teacher professional development begins with training at the faculty level, when future teachers start to create their professional identity. It occurs through defining and recognising the roles they will take on as teachers in the classroom.

As Robert V. Bullough states, the core principles in teacher education are:

1. Teacher identity—what beginning teachers believe about teaching and learning and self-as-teacher—is vital to teacher education; it is the basis for meaning-making and decision-making. Teacher education must begin, then, by exploring the teaching self.

2. Because selves are formed in context, the exploration of teacher identity necessitates the study of schooling and the broader social context and how those contexts both enable and limit meaning, privilege and suppress knowledge.

3. Identifying ways contexts enable and limit meaning requires understanding social philosophy and the aims of education in a democracy.

4. Reflecting on a lifetime investment, self-conceptions are deeply resistant to change, as my determined flight from the problems of teacher education illustrates. However, self-study can be risky and fraught with danger. Teacher education must be powerful enough to challenge beliefs that could potentially be miseducational in their effects. In contrast, the immediate context of teacher education must be supportive and respectful of the individual as an adult learner fully capable of making reasonable judgments about their learning and the direction of that learning.

5. Part of building a trusting and respectful learning environment is openly articulating the reasons behind program decisions.

6. All education is ultimately indirect. Teachers can create the conditions for learning, while learning is the responsibility of those who embrace or reject the opportunity.

7. Educational outcomes are inevitably unpredictable and are aimed at being flexible. While there may be a minimum acceptable level of student performance

in teacher education, the essential learning outcomes will be personal, idiosyncratic, and likely unmeasurable. No one's best teaching style, personality, or model can serve as a standard for evaluation. Competency models inevitably oversimplify teaching and impoverish both teacher education and the teaching profession.

8. Each person makes teacher education meaningful in his/her own way.

9. Program continuity is not just a matter of sensibly sequencing courses and content but of creating means that enable students to forge their sense of continuity through attending, systematically and over time, to their experience of teacher education and development as teachers.

10. Coming to feel part of a profession requires learning the language of teaching and applying it with others similarly invested in professional education and situations with real educational consequences.

11. To teach is to testify and care about, converse, and connect with others whose experiences differ from ours. To teach is to enable boundary crossing while seeking to build a sense of belonging to a broader and ethically grounded community.

Teaching is inextricably linked to learning; teaching is a two-way process. Teaching about teaching should broaden the perspectives of both teachers and students on the teaching and learning process. This extension relies on reflection on both the teaching and learning that occur; it follows that reconsidering one's actions, refraining from problematic situations, mulling over the flow of suggestions, and reasoning through the implications of alternative views and testing hypotheses are the cornerstones of reflection. Again, suppose reflection is to be better understood by student-teachers. In that case, it needs to be explicitly modelled to encourage them to consider approaching their teaching in ways that might be based on a similar basis or foundation.

The teacher is an active learner, constructing ideas based on personal experience. This learning must occur in at least the following areas:

1. Ideas about the teaching and learning process.
2. Ideas in relevant knowledge discipline areas.
3. Understanding of self.
4. The social structures within the profession and in school communities.

It is a comprehensive agenda for teacher education. Still, each component needs to be addressed in the context of learning about teaching.

Further Reading: *Teaching about Teaching: Purpose, Passion and Pedagogy in Teacher Education.* Eds. J. Loughran & T. Russell. London, Washington, D.C The Falmer Press, 2003.

In 2010, the European Commission's study on "Key competencies for adult learning professionals: contribution to developing a reference framework of key competencies for adult learning professionals" was released. The study identified various ways stakeholders can use the set of key competencies. It is up to stakeholders to determine how to use the key competencies and for what purpose.

3.4 Professional Role and Behaviour

We define a 'professional role' as a personal interpretation of a position based on expectations from the environment and on a systematically organised and transferable knowledge base.

The 'professional role' concept should not be confused with the 'professional identity' concept, which has recently become more popular in literature. The researchers describe professional identity as relatively stable views, reflection patterns on professional behaviour, and the accompanying self-image. The concept of 'professional identity' primarily focuses on personal opinions and self-image, whereas the idea of 'professional role' mainly focuses on position and expectations from the environment.

The role of the teacher is never uniquely defined, and many factors influence its definition. Cultural and social events, as well as the environment, characterise it. Both factors influence the differences in conceptions of teachers' roles within various cultures and societies, including different geographic territories. Three roles for the teacher can be identified: the teacher as a subject matter expert, pedagogical expert, and didactical expert. They influence the development of the teacher's role and determine behaviour in the classroom.

Educators perceive their roles as fluid and multifaceted rather than fixed. The facilitator role, emphasising guidance over direction, emerged as the most prominent. One teacher described their role as helping learners "look at themselves and their discoveries," aiding them in identifying areas for personal growth. Another, identifying with roles like co-learner, facilitator, and "diagnostician," emphasised creating a collaborative and supportive learning environment, viewing it as a classroom manager, not of learning, but rather prioritising student discovery and mutual learning.

Adult educators often struggle to separate their teaching and counselling responsibilities. While Mezirow advocates for educators to possess psychological knowledge to support learners, most lack the necessary training. Nonetheless, teachers expressed caution about overstepping their professional boundaries. They recognised the trauma experienced by many literacy learners and emphasised the importance of referring them to qualified counsellors. They also highlighted the substantial resources and training required if educators were expected to integrate therapeutic practices into literacy programs.

While educators demonstrated a commitment to collaborative and transformative principles in creating supportive learning environments and understanding learner needs, their evaluation and curriculum design practices revealed a different picture. They often adopted more traditional roles, managing, planning, and evaluating student learning. Despite attempts to share power, they acknowledged the practical constraints imposed by evaluation requirements, leading to power differentials.

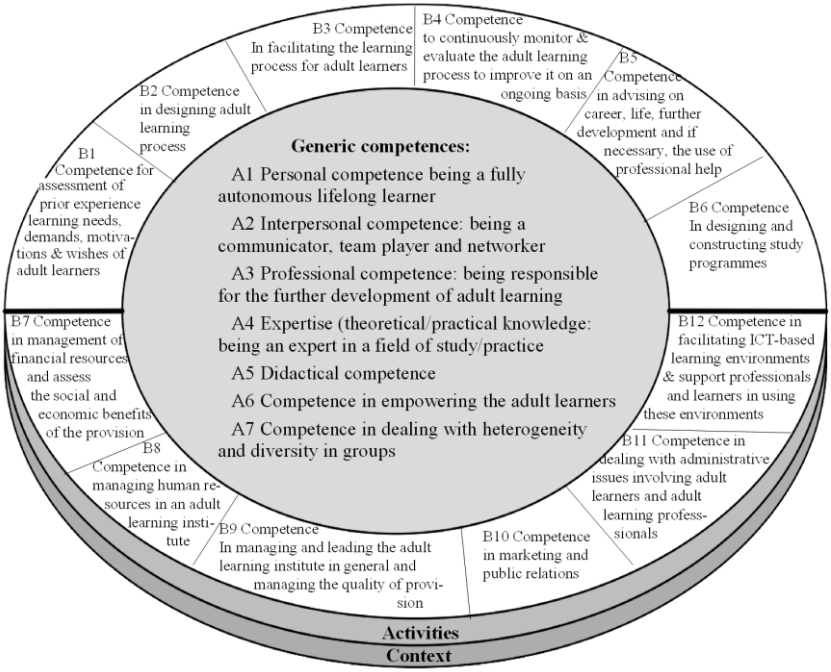

Figure 3.3 Graphic of the set of key competencies of adult learning professionals[114]

They also recognised the impact of socioeconomic and cultural differences on teacher-student dynamics, factors often overlooked in pedagogical discussions[115]. The concept of professional identity within adult education encompasses two distinct forms. The first is how you conceive of your professional identity as an adult educator—the individual identification with an adaptation to the field and culture of adult education. Due to the multiplicity of specialisations within adult education, practitioners may more readily identify with a specific role, such as literacy instructor, health education specialist, human rights advocate in education, human resource development professional, or instructional designer, rather than with the broader designation of adult educator. The other form of professional identity is how the field creates, maintains, and changes its professional identity. In other words, it has a public face with a relatively agreed-

[114] Adapted from: Buiskool B.J., Broek S.D., van Lakerveld J.A., Zarifis G.K., Osborne M. (2010). Key Competences for Adult Learning Professionals. *Contribution to the Development of a Reference Framework of Key Competences for Adult Learning Professionals*. Zoetermeer: Research voor Beleid.

[115] Margo K.M. (2002). Exploring Teaching Roles and Responsibilities in Adult Literacy Education: Do Teachers See Themselves as Transformative Educators? *Adult Education Research Conference*. URL: https://newprairiepress.org/aerc/2002/papers/41

upon discourse, research, and practice.

There is a significant gap in our understanding of professional development for adult educators. Unlike other professions, there is no well-established, unified theoretical framework that explains how adult educators develop their competencies. This lack of a clear theory is partly due to the incredibly diverse roles of adult educators. They might be teachers, managers, curriculum designers, assessors, and more, making it challenging to create a single model for their development. Despite the lack of an overarching theory, the literature agrees that adult educators need specific skills, knowledge, and attitudes to effectively perform their various professional tasks (teaching, management, program design, assessment, etc.). Research indicates that there is no widely accepted set of core competencies or skills considered essential for working in adult learning. The diversity of the field is a significant contributing factor to this lack of consensus.

The factors that influence the role of the teacher are internal and external. Internal factors influence a teacher's perception of their role. External factors include the views and expectations of the teacher's role, which are shaped by other stakeholders, such as pupils, parents, colleagues, school leaders, and the general public. Both factors are also an essential part of a teacher's professional identity. The teachers create internal factors that influence their understanding of their role. They can be classified into two categories: the teacher's beliefs about the essential role and the teacher's expectations for their role. Most interpretations of teachers' roles refer to their tasks, social position, status, image, and expectations of others. The core personal qualities that are essential for a teacher and necessary for a successful one include creativity, trust, care, courage, sensitivity, decisiveness, spontaneity, commitment, and flexibility.

What is the role of the teacher in transformative education?

- The teacher must serve as a role model and demonstrate a willingness to learn and change by expanding and deepening their understanding of both subject matter and teaching perspectives.
- The teaching should create a community of individuals united in a shared experience of trying to make meaning of their life experiences.
- The teacher should establish an environment that fosters trust and facilitates the development of sensitive relationships among all members.
- The role of the teacher should be de-emphasised, and the role of the students should be heightened.

Students must be prepared to participate in transformative learning actively.[116]

We define 'professional behaviour' as behaviour based on systematically organised and transferable knowledge expressing the values and norms of the professional community. What can be detected as misbehaviour? All teacher misbehaviour can be placed into two categories based on legality. The misbehaviour either does or does not break the existing law(s) of the land where it

[116] Santalucia S., Johnson C.R. (2010). Transformative Learning: Facilitating Growth and Change Through Fieldwork. *OT Practice*, 15(19), CE1-CE7.

occurs, and it is a relatively straightforward categorisation. Illegal teacher misbehaviour usually relates to physical misconduct, abuse, harassment, theft, or financial lawbreaking.

'Didactogeny' is even defined as a faulty education that physically, psychologically, and educationally harms students. The most commonly reported misbehaviours that result in students becoming fearful or resentful of their teachers and disengaged from the subjects taught by them are excessive negative criticism, embarrassment, humiliation and yelling in anger.

Teacher behaviour is closely related to a code of ethics, which is reflected in clearly established norms, as in the example below.

Personal and professional conduct

A teacher is expected to demonstrate consistently high personal and professional conduct standards. The following statements define the behaviour and attitudes that set the required conduct standards throughout a teacher's career.

♣ Teachers uphold public trust in the profession and maintain high standards of ethics and behaviour, within and outside school, by:

- treating pupils with dignity, building relationships rooted in mutual respect, and at all times observing proper boundaries appropriate to a teacher's professional position
- having regard for the need to safeguard pupils' well-being by statutory provisions
- showing tolerance of and respect for the rights of others
- not undermining fundamental British values, including democracy, the rule of law, individual liberty and mutual respect, and tolerance of those with different faiths and beliefs
- ensuring that personal beliefs are not expressed in ways that exploit pupils' vulnerability or might lead them to break the law.

♣ Teachers must have proper and professional regard for the ethos, policies, and practices of the school in which they teach and maintain high standards in their attendance and punctuality.

♣ Teachers must understand and always act within the statutory frameworks which set out their professional duties and responsibilities.[117]

High teacher self-efficacy beliefs mediate the proficient translation of professional knowledge (action theories) into professional practice (behaviours). In teacher education, the development of highly efficacious teachers ensures high levels of student achievement, efficacy beliefs in the students they teach, student motivation, pedagogical risk-taking to meet students' needs, diversity in instructional pedagogical choices; planning, persistence with struggling students;

[117] *The Teachers' Standards on the GOV.UK*

acceptance of student errors; job satisfaction; commitment and lower absenteeism, and proactive classroom management strategies, sense of control, and democratic decision-making.[118]

3.5 Professional Ethics

Ethics are the fundamental ways of human behaviour or basic social and personal life principles. It studies the values of all men and women, including human and natural rights, as well as concern for health and safety in the natural environment.

Ethical principles guide how individuals live their lives according to defined criteria. Many thinkers discussed the virtues of a moral life. The role of ethics or ethical behaviour in professional life has been a great debate. The demand for ethics is an essential part of life, most notably in performing duties in a professional setting. In every field of life, the demand for ethics becomes increasingly crucial day by day. Doctors, lawyers, accountants, scientists, and many other professionals follow rules and regulations, and they are all bound by ethics for the benefit of their stakeholders.

Professional ethics encompasses personal and community standards of conduct expected of professionals within an institution or organisation. The term "professionalism" originally referred to the undertaking of a religious order. By the end of the 17th century, this term had become secular in its application and was applied to the three learned professions: Divinity, Law, and Medicine. Professionalism was also used for the military profession around this time. Professionals and those working in recognised professions apply expert knowledge and skills. How this knowledge should be applied when providing the service to the public can be well thought out as a moral issue and is termed professional ethics. Experts can make informed decisions, utilise their skills, and reach conclusions in situations that the general public cannot because they are unfamiliar with the necessary field knowledge and not acquainted with the relevant skills. One of the most famous examples of professional ethics is the Hippocratic Oath, which medical practitioners still adhere to. The majority of institutions define ethical approaches in terms of discrete components. In general, they are:

- Honesty,
- Integrity,
- Social skills,
- Transparency,
- Confidentiality,
- Communication skills,
- Interactive skills,
- Objectivity,
- Punctuality,
- Regularity,
- Respect for others,
- Obedience to the law,
- Loyalty,
- Productivity,
- Sense of responsibility.

There are five dispositions of effective teachers:

1. Empathy, seeing and tolerating the other individual's perspective.

[118] Jones M. (2009). Transformational Learners: Transformational Teachers. *Australian Journal of Teacher Education*, 34(2). http://dx.doi.org/10.14221/ajte.2009v34n2.2

2. Positive perspective of others, putting belief in the value, ability, and potential of others. Normally, people approach others by feeling that they "can" and "will" as opposed to saying that they "cannot" or "will not."
3. Positive perspective of self, having faith in their worth, capacity, and potential, and having a built-up self-image that is generally positive and gives a general feeling of self-adequacy.
4. Authenticity, which is feeling a sense of opportunity and openness, empowers them to be interesting individuals in trustworthiness and purity.
5. Meaningful purpose and vision, identifying goals that are essentially individual-focused, wide, deep, freeing, and long-range. Sees the significance of being visionary and intelligent as a teacher. Focuses on the development of all students in mental, physical, and emotional domains through a feeling of "mission" in teaching. It recognises, clarifies, and extends information and individual beliefs about what is most important.

Teachers' professional relationship with students is often described as pedagogical love. A related ethical perspective is agapism, which is rooted in Christian thought and centred on unconditional love for others. Ethicist William Frankena (1908–1994) placed agapism alongside teleological and deontological ethics, presenting it, when combined with equality and justice, as an ethical ideal that is, however, never fully attainable. For teachers, unconditional love mirrors pedagogical love: acting in students' best interests regardless of personal feelings or circumstances. In practice, no single ethical framework can be prescribed for teachers. Each school community functions on shared values that coexist with individual value bases.

Most research on morality has centred on the development of moral judgment, building on the cognitive theories of Jean Piaget (1896–1980) and Lawrence Kohlberg (1927–1987). Kohlberg, expanding on Piaget's work, proposed a stage-based model in which the highest level of moral reasoning is reached when individuals can resolve dilemmas through universal principles of justice, applying them deductively to specific cases. His method relied on presenting dilemmas to participants who lacked clear solutions, followed by interviews to analyse the reasoning behind their choices. Responses were coded against predefined criteria, later systematised in a detailed codebook.

This cognitive approach highlights justice as central to moral reasoning, aligning it with the aims of moral education. Teachers, in particular, must justify their pedagogical decisions in ethically diverse contexts and guide students in articulating and defending their moral arguments. Searching for the morally correct solution in educational settings emphasises the most rational argument, supported by knowledge and research. The Finnish teachers' ethical code underscores truthfulness as a core value, framing honesty as essential to both teaching practice and moral development.

Truthfulness has long been recognised as a cornerstone of professional ethics in education. It encompasses speaking and acting consistently with one's understanding of truth while rejecting dishonesty, plagiarism, or deceit. Clark

(1990) and Sockett (1993) identify honesty as a foundational teaching virtue, since education is directed toward truth. In schools, moral issues with students most frequently emerge around truthfulness, particularly in cases of cheating.

The acquisition of ethical expertise in teaching can be conceptualised through the Dreyfus & Dreyfus model, which explains how a person's professional and moral activity evolves from strict rule-following to intuitive and mature ethical action. According to this framework, the learning trajectory of ethical decision-making resembles activities such as playing chess or driving a car, where repeated practice gradually reduces the reliance on explicit instructions. In teaching, however, ethical success is often not immediately measurable, making cultivating professional intuition especially significant. The model highlights that ethical growth is not static but develops through five stages, each reflecting a teacher's progress in understanding and applying moral principles in real educational practice.

At the **novice stage**, ethical behaviour is primarily guided by rigid rules, regulations, and guidelines provided by mentors or institutional codes. Teachers at this level tend to act strictly by adhering to prescribed norms and often feel insecure when faced with situations where rules are unclear or absent. Their moral action is externally regulated rather than internally chosen.

The **advanced beginner** demonstrates greater sensitivity to context. Experience enables the teacher to identify specific features of various situations and apply ethical principles with a certain degree of flexibility. The strict dependence on rules diminishes, giving way to the first attempts at interpretation and adaptation, although the scope of independent judgement remains limited.

The **competent practitioner** – sometimes called the practised stage – relies increasingly on accumulated experience. At this level, teachers can analyse problems holistically, build priority hierarchies, and formulate strategies for resolving moral dilemmas. Their actions, however, still require deliberate analysis and planning. Decision-making involves conscious effort, but it is already based on a sense of coherence and growing responsibility.

The **proficient or experienced teacher** transcends the strict framework of rules, applying knowledge flexibly and contextually. Ethical decisions are informed by the teacher's comprehensive understanding of the profession, successes and failures, and awareness of long-term consequences. At this stage, teachers demonstrate the ability to grasp a situation as a whole, see subtle distinctions, and deliberate confidently. Their moral reasoning acquires depth and nuance, reflecting professional wisdom and personal responsibility.

Finally, the **ethical expert** acts with an internalised and almost immediate moral intuition. In ethically challenging situations, such a teacher responds without conscious reliance on codified rules or external principles. Instead, their action reflects a mature, automatised ethical knowledge developed through years of reflective practice. This intuition is not a spontaneous emotional reaction but a form of practical wisdom, enabling the teacher to resolve dilemmas swiftly and appropriately. Expert teachers reduce the occurrence of ethically problematic

situations by anticipating risks and embodying ethical behaviour in their everyday practice.

The above-mentioned model emphasises that intuition is the primary marker of ethical expertise. Unlike in fields such as chess or driving, where clear outcomes measure success, teaching often involves ambiguous and multifaceted situations. A teacher's ability to rely on a finely honed intuition, shaped by experience and reflective evaluation, becomes essential in navigating these complexities. Thus, the development of ethical expertise in teaching is not merely a technical or procedural process but a deeply moral journey, in which professional responsibility, personal growth, and the cultivation of moral wisdom are inseparably intertwined[119].

3.6 Philosophy of Adult Teacher

A teaching philosophy is a statement that explains one's perspective on teaching and how that perspective will be applied in the teaching environment. It is a way to organise your thoughts and approach to interacting with students, as well as specific ways you want to facilitate learning.

A personal philosophy or vision for teaching is crucial. The numerous teaching methods indicate that various philosophical or personal visions underpin the process. There is no single correct philosophical orientation in teaching. By identifying beliefs, values, and attitudes, the teacher will establish the foundation for a focused and action-oriented vision or philosophy for teaching. You want to ask yourself, "How do I determine my values as a teacher of adults?" First, take a piece of paper and list up to 10 cherished values you hold. You can address such questions as:

- Do I value this based on experience?
- Do I value this as a part of a vision of how things should be?
- Did I deliberately and autonomously choose this value?
- Do I value what others value?[120]

Teaching philosophies are essential as a standard for teachers to evaluate their methods, and they can direct instructional decisions and change the educational approach. The reasons for writing a teaching philosophy may vary, and it may serve as an introduction to the teaching portfolio.

It can also serve as a means of professional growth, as it requires you to give examples of how you enact your philosophy, thus requiring you to consider the degree to which your teaching is congruent with your beliefs.

G. Conti (2007) has developed the Philosophies Held by Instructors of Lifelong-Learners (PHIL) instrument. It was designed to identify a respondent's preference" toward one of five major schools of philosophical thought. The PHIL

[119] Tirri K., Kuusisto E. (2022). *Teachers' Professional Ethics Theoretical Frameworks and Empirical Research from Finland.* Leiden, Boston.

[120] Galbraith W.M., Jones M. (2008). First Things First in Becoming a Teacher of Adults. *Journal of Adult Education.* 37(1), 1–12.

schools of thought are idealism (liberal), realism (behaviourist), pragmatism (progressive), existentialism (humanistic), and reconstructionism (radical)[121].

PHIL consists of four items that are organised in a flowchart design. Each item begins with a sentence stem that leads to two options. Each option leads the respondent to proceed to another page with an additional item or provides information about the respondent's correct group placement. Once the group placement is identified, the respondent is directed to a page that describes the various educational philosophies.

Another approach is to identify and adopt a philosophy that you can own and then build upon your framework. The beginning of your teaching philosophy conveys to the reader your general ideas and beliefs about teaching, and your introduction lays the foundation for your specific strategies. In the introduction, craft your ideas and try to avoid clichés. Describe your teaching purpose, including what you hope students gain from your instruction, relational goals, and how you view your role in a student's life.

A teaching portfolio is a personal record of achievement and professional development that demonstrates the level of attainment, scope of experience, range of skills, and activity, as well as progression as a university teacher. They are commonly used at the end of the probationary period or as part of an application for promotion. A more specific type of structured portfolio may also form part of the assessment for a professional development program. Portfolios must have a clear structure, and institutional evaluations or other specific requirements typically determine this. There will be a collection of selected illustrations related to practice, providing evidence of it.[122]

Moving from your general introduction, you can share which educational strategies you prefer to use to meet those standards. You can explain more about your approaches to areas such as:

- classroom management,
- the role of technology in education,
- incorporation of different modes of instruction,
- homework,
- feedback from students.

You can also describe the assignments and activities you implement in your classroom. If you have room in your teaching philosophy statement, consider referencing specific research or theories that inform your educational strategies.

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[121] Conti G. (2007). Identifying Your Educational Philosophy: Development of the Philosophies Held by Instructors of Lifelong-learners (PHIL). *J. Adult Educ.* XXXVI, No1.

[122] *A Handbook for Teaching and Learning in Higher Education Enhancing Academic Practice.* 3d edition. Ed. Heather Fry. New York, London: Routledge, 2008. P. 473.

The teaching philosophy includes an overall self-reflection on:

- the strengths of your teaching;
- areas for further improvement;
- action plan for further professional development.

Remember to provide concrete examples from your teaching practice to illustrate the general claims you make in your teaching philosophy. The following general statements about teaching are intended as prompts to help you develop examples to explain your claims about teaching. For each statement, how would you describe what happens in your classroom? Is your description specific enough to bring the scene to life in a teaching philosophy?

Strong teaching philosophy statements share five elements:

- They offer evidence of practice (specific examples).
- They are student-centred.
- They demonstrate reflectiveness.
- They demonstrate that the writer values teaching.
- They are well-written, clear, and easy to read.

Questions about teaching experience and background.

These questions help an interviewer evaluate your qualifications for the position and whether your values match those of the institution:

What do you like most about teaching?

What do you dislike most about teaching?

What do you consider the most significant challenges facing today's education system?

Describe your teaching style.

How would you organise this classroom?

How do you manage your teaching duties?

What is the most tremendous success you have had with teaching?

What do you think is the greatest challenge facing students today?

What is the greatest challenge facing teachers today?

What qualities make a great teacher?

Describe your worst teaching day. What did you learn from the experience?

How do you motivate your students to become active learners in your classroom?

A brief example of the teaching philosophy is in the Appendix to Chapter 3.

3.7 Teaching Styles

The teaching style refers to the method by which knowledge and information are conveyed to students. As a result, the way we display our teaching styles has two effects on students. It may facilitate or hinder their ability to acquire content and skills, influencing our students' learning styles. Teachers' personal qualities influence the way they present the subject matter. There is a symbiotic relationship among personal qualities, teachers' instructional processes to convey discipline content, and the styles students display as learners.

There are three goals of teaching styles: to develop effective classroom management skills, to achieve lesson mastery, and to have positive expectations. Teaching styles vary considerably based on individual classroom settings, the subject, and the diverse group of students in your class.

For example, an authority or lecture-based teaching style is well-suited to large classes and subjects that require heavy memorisation, like history. A delegator or group teaching style might be more conducive to subjects that require lab activities, such as chemistry, or subjects that involve significant feedback, like debate and creative writing. The teacher inspires and observes rather than recites facts in the latter style. The goal of any teaching style is to remain focused on teaching objectives and engaging students as effectively as possible.

Match or mismatch between teaching and learning styles:

- When teachers are aware of students' learning styles and teaching style preferences, they can manage their classes more effectively. They can adapt their teaching to students' preferences to enhance the quality of their instruction.
- The mismatch between students' learning style preferences and teachers' instructional approaches may significantly influence students' attitudes and motivation.
- It is essential for teachers to be aware of their students' learning style preferences and to create a learning environment that accommodates those differences.
- A mismatch between teaching and learning styles can cause failure, frustration, and demotivation.

The discussion surrounding the issue of matching learning and teaching styles has evolved among researchers. It is about the lack of evidence regarding the efficacy of such matching and, secondly, the possibility of achieving it. How can a university lecturer consider learning styles and their diversity? Critics of the theory of matching styles argue that the most effective way to engage students is to introduce a variety of teaching methods. However, awareness of one's learning and teaching style is recognised as necessary for designing professional activities.

Several approaches to identifying a teacher's style utilise different tools. The Staffordshire Evaluation of Teaching Styles (SETS) is a newly developed instrument by Mohanna, Chambers, and Wall. It is a self-evaluation tool with items to be scored on a range of 1 to 5, from 'not agree at all' to 'strongly agree'.

A procedure for style identification is described in Section 3.11.1. The six defined teaching styles are described in much greater detail in the article mentioned below, but short descriptions of each are as follows (Table 3.8).

A. Grasha coined five approaches to teaching styles in the mid-1990s. He believes that all educators possess each of these five teaching styles to varying degrees, although they tend to gravitate to some more than others. He likens teaching styles to an artist's palette: the teacher's primary or dominant teaching style(s) are similar to the foreground of a painting, while the other qualities still

exist but are farther into the background.[123]

Table 3.8

Characteristics of six SETS teaching styles

A student-centred, sensitive teacher emphasises emotions and gives students more responsibility for their learning; it is used by educators who are uncomfortable delivering lengthy presentations or when a subject does not necessarily require formal lectures. Roleplay and drama can even be involved.	Straight facts, no-nonsense teacher. This teaching style describes educators who like to teach facts and figures, typically in a lecture format. These educators are less focused on multi-disciplinary teaching and learning and place more value on specific course material that needs to be taught. It is most suitable for students at the beginning of the subject who need to grasp the foundation of the topic. This teaching style also works well for subjects that involve heavy memorisation.
Official curriculum teacher. This teaching style focuses on external targets for teaching, faculty development, and "teaching the teacher," providing a sense of dependency and security to instructors and students alike. Of course, knowledge of the curriculum is paramount, and this teaching style cannot work without it.	Big conference. This teaching style is employed by professors who enjoy standing before large audiences to share their knowledge of the tropics. These teachers can potentially be very engaging speakers who can hold students' interest, even if there is little interaction in class. This teaching style is particularly effective in psychology, philosophy, or law, especially for large introductory courses.
One-off. The one-off teaching style is characterised by professors who prefer to deliver small, self-contained lessons one-on-one rather than lecturing on a topic for an hour in front of a large audience. There are no props or fancy presentations—just the teacher and student. This approach can also cover any impromptu teaching time or guest workshops. The downside to this teaching method is that students often have a limited connection with their professor, making the learning experience feel highly impersonal.	All-round: Flexible and adaptable. Those who prefer this teaching style are comfortable using different skills and methods in the classroom. Educators consider the environment and individual student needs, adapting on the fly, knowing that students differ in their needs and learning styles. The integrated approach is inclusive and allows professors to adjust as needed, thereby potentially reaching a greater number of students more effectively.

[123] Grasha A.F.(1994). A Matter of Style: The Teacher as Expert, Formal Authority, Personal Model, Facilitator, and Delegator. *College Teaching,* 42(4), 142–149.

According to Grasha, however, all styles and colours are needed to some degree to create a painting with dimensions and layers (Fig. 3.4).

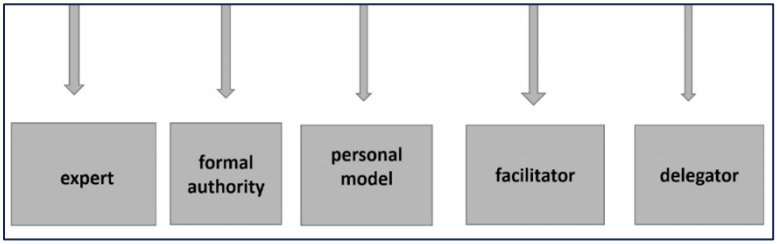


Figure 3.4 Five types of teaching style (by Anthony Grasha)

Expert. The expert teaching style is characterised by professors who aim to showcase a high level of knowledge and expertise in a subject and use this information to challenge students. The goal is to transmit information to prepare students for assignments, exams and further studies. This knowledge transfer can be beneficial for students seeking to absorb information from credible resources. However, this method can be intimidating for students if it is overused. While this style focuses on facts and figures, it may not effectively convey the processes used to solve problems.

Formal authority. Educators who use the formal authority teaching style establish status among students, clearly define their learning goals and expectations and follow a set list of rules of how things should be done. This teaching style is ideal for students who require structure, as it provides clear guidelines and expectations, along with an understanding of the acceptable way to approach tasks.

However, this teaching style can be too rigid and standardised for many students who appreciate more active learning settings, interaction, and better engagement. This teaching method can be effective in disciplines such as law or music, where established rules must be followed and where an instructor can lead by example by playing an instrument or discussing legal procedures.

Personal model. In the personal model, educators seize every opportunity to teach by using real-life examples and establishing a prototype of how to think and behave based on their own beliefs and methods. Educators oversee, guide, and direct work but do not necessarily present themselves as authorities. Instead, they show students how to do things and encourage them to observe and follow directions to complete tasks. This educator, then, is essentially a role model.

This type of teaching style provides hands-on experience and direct observation. However, some educators run the risk of presenting their approach as the only way, which can cause some students to feel inadequate if they cannot meet the standards. Nevertheless, this method could work well in a higher education setting where students already grasp the material and abstract concepts, and all students work on the same level.

Facilitator. The facilitator's teaching style emphasises teacher-student interaction on a personal level, creating a warm and emotionally charged climate. Students are encouraged to ask questions, explore different options and suggest alternatives, and are guided along the way as they learn by trial and error. The goal is to help students think independently and be more responsible for their learning process.

The instructor is more consultative in this teaching style, providing support and encouragement to students. This style offers greater flexibility in the classroom, focusing on students' needs and goals. However, it can be time-consuming and ineffective if the subject matter requires a more direct approach. Some students might also be uncomfortable with a less structured approach. Facilitation can work well in smaller classroom settings or upper-level and graduate courses, where creativity and exploration are encouraged, particularly when students reach a point where they feel willing to take risks.

Delegator. The ultimate goal for someone adopting this teaching style is to function autonomously, working independently on assignments and projects or as part of small teams with peers. The instructor is available as a resource when needed. Educators who use the delegator style do not host formal lectures.

A teaching style like this can help students develop the tools to be confident and independent learners. Still, students who are not ready for such autonomy may become anxious and perform poorly. This method is ideal for upper-level studies, where students already possess a sufficient level of knowledge and require minimal guidance. They are ready to rise to the next level of learning and view the educator as a guide, not someone there for standard instruction.

The advantages and disadvantages of all five teaching styles are shown in Table 3.9.

Teaching styles are not set in stone, and course delivery should not be placed in specific boxes.

Every educator falls somewhere on a spectrum, from the authoritative expert to the student-centred facilitator and delegator. More important than defining where you fall on the spectrum—though this is useful for determining—is analysing and observing your curriculum, students, and subject matter to find the best teaching style to match.

Teaching styles that match students' learning styles and prioritise student needs and learning can lead to more positive academic outcomes. Students tend to be more engaged and thus better grasp the material.

Educators who are aware of their teaching style, reevaluate it, try new approaches and solicit feedback from students can elevate their teaching to a new level.

Table 3.9

Description of teaching styles following Anthony Grasha

Style	Description	Advantage	Disadvantage
Expert	Possesses knowledge and expertise that students need. Strives to maintain status as an expert among students by displaying detailed knowledge and challenging students to enhance their competence. Concerned with transmitting information and ensuring that students are well prepared.	The information, knowledge, and skills that individuals possess.	If overused, the display of knowledge can be intimidating to inexperienced students. It may not always show the underlying thought processes that produce answers.
Formal authority	Possesses status among students because of knowledge and role as a faculty member. Concerned with providing feedback and establishing learning goals and expectations for students. Concerned with the "correct, acceptable & standard ways to do things."	The focus is on clear expectations and acceptable ways of doing things.	A strong investment in this style can lead to rigid, standardised ways of managing students and their concerns.
Personal model	Believes in "teaching by personal example" and establishes a prototype for how to think and behave. Oversees, guides, and directs by showing how to do things and encouraging students to observe and emulate the instructor's approach.	The 'hands-on' nature of the approach. An emphasis on direct observation and following a role model.	Some teachers believe their approach is the best, which can make some students feel inadequate if they cannot meet such high expectations and standards.
Facilitator	Emphasises the personal nature of teacher-student interactions. Guides students by asking questions, exploring options, suggesting alternatives, and encouraging them to develop criteria for informed choices. The goal is to develop students' capacity for independent action and responsibility. Works with students in a consultative mode, providing them with much support and encouragement.	The personal flexibility, the focus on students' needs and goals, and the willingness to explore options and. alternative courses of action to achieve them.	Style is often time-consuming and ineffective when a more direct approach is needed. It can make students uncomfortable if it is not used in a positive and affirming manner.
Delegator	Concerned with developing students' capacity to function autonomously. Students work independently on projects or as part of autonomous teams. The teacher is available upon request by students as a resource person.	It contributes to students perceiving themselves as independent learners.	May misread students' readiness for independent work. Some students may become anxious when given autonomy.

3.8 Learning Styles

An individual approach to those being taught is one of the essential principles of pedagogy. Pedagogical influence on a person is based on studying and considering their psychological traits, interests, abilities, attitude to learning, and motives for educational and cognitive activity.

In the scientific literature devoted to studying the impact of student characteristics on the effectiveness of educational activities, concepts such as "learning preferences," "approaches to learning," "thinking style," "cognitive style," and "learning style" are increasingly used. The most significant importance is given to studying the individual's peculiarities in cognitive and learning styles. These concepts are integrative, reflect individual characteristics, and are of great significance in predicting a person's effective cognitive activity.

Let us explore concepts that consider individual differences in educational activities from the perspective of learning styles.

First, the meaning of the term "learning style" should be clarified. This term appeared in Western psychological and pedagogical literature in the 70s of the last century. It characterised the approach to the learning process typical for a given individual (schoolchild, student, adult). Defining learning styles is a complex process; the theory is developed at the intersection of psychological, physiological, and pedagogical sciences. Different approaches and models characterise people's learning styles, each with advantages and disadvantages. There is no generally accepted universal theory until now. However, among the existing developments, common features can be identified that make it possible to determine the most critical differences in the educational preferences of students, establishing connections between the degree of their manifestation and the effectiveness of students' study of specific subject areas.

In 2004, a group of scientists from the University of Newcastle, led by F. Coffield, conducted a study that identified 71 theories and concepts of learning styles developed since the beginning of the 20th century. In each of them, from 3 to 20 different learning styles are defined, corresponding to a particular set of the most effective learning methods. Based on these theoretical and practical research results, the most important models were identified, the effectiveness of which has been proven in practice. Among them are the model of cognitive styles according to R. Ryding and his analysis of cognitive styles, as well as indicators I. Myers and K. Briggs (from now on Myers-Briggs); a learning style profiler (a program for collecting information) of learning style as described by K. Jackson; a definition of learning style by D. Kolb; and an index of cognitive styles by K. Elinson and J. Hayes, etc.[124] It is necessary to pay attention to two main, still unsolved problems.

First, the definition of the "learning style" differed. Authors of different methods often describe the same phenomenon using different terms. The

[124] Coffield F., Moseley D., Hall E., Ecclestone K. (2004). *Learning styles and pedagogy in post-16 learning. A systematic and critical review.* London, Learning and Skills Research Centre.

concepts of "cognitive style" and "learning style" are frequently confused. For example, traditional cognitive styles, such as field dependence/field independence and impulsiveness/reflexivity, are often discussed in conjunction with learning styles.

Secondly, learning styles are typically identified through questionnaires. According to some authors, they are not always sufficiently reliable and valid. Educational preferences, verbally declared by the test subjects as desirable during the independent assessment, may differ significantly from individual preferences at the level of real academic behaviour.

These two problems forced scientists to revise the view on the nature of learning style, namely, to abandon its interpretation as a bipolar measurement and move to its analysis as a multidimensional mental phenomenon in which different levels of stylistic behaviour can be distinguished.

So, L. Curry proposed a model that tried to combine different approaches in the study of styles by analogy with the structure of a light bulb.[125]

L. Curry's model, the so-called "onion model," suggests that nine possible learning styles are organised into three layers (Fig. 3.5).

The inner layer is formed from the characteristics of individuality (cognitive individuality). Average - shows a person's ability to process information. The outer layer characterises the learning preferences of people.

The model explains the peculiarities of style malleability. Its author believes that styles in the most distant layer (learning preferences) are easier to change, and the innermost layer (cognitive individuality) is the most stable.

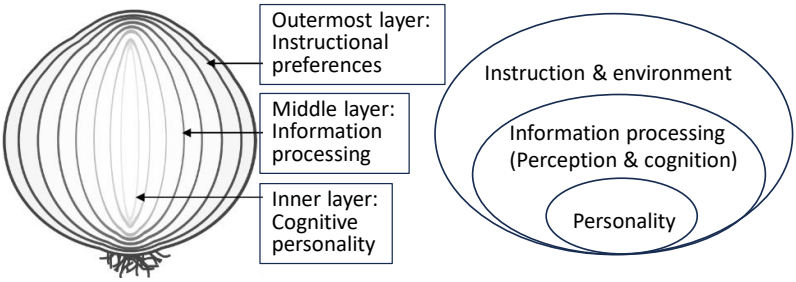


Figure 3.5 Curry's onion model of learning style theories, taken from[126]

Coffield et al., in the research cited above, criticised the theoretical foundation of Curry's onion model because it uses psychoanalytic assumptions rather than quantitative evidence to determine learning style stability. Based on

[125] Curry L. (1991). Patterns of learning style across selected medical specialties, *Educational Psychology,* 11(3–4), 247–278.

[126] Wolf C. (2007). *Construction of an Adaptive E-learning Environment to Address Learning Styles and an Investigation of the Effect of Media Choice.* PhD Thesis, RMIT University.

several learning style overviews and quantitative evidence, they classified learning style models according to 'families of learning styles.' The model suggests that there are five families of learning styles as follows.

• **Constitutionally based learning styles and preferences**. These styles are largely constitutionally based, including the four sensory modalities: visual, auditory, kinaesthetic, and tactile. Learning styles belonging to this family are assumed to be fixed and very difficult to change.

• **Cognitive structure.** Learning styles reflect the cognitive system's structural characteristics, which are embedded in the construction of personality. The styles belonging to this family are assumed to be generalised habits of thought (i.e., an enduring structural basis for such behaviour).

• **Stable personality types.** Learning styles are viewed as embedded characteristics within the personality traits, which are assumed to shape all aspects of an individual's interaction with the environment. These styles and preferences are primarily stable but can change over time.

• **'Flexibly stable' learning preferences.** Learning styles are viewed as flexibly stable learning preferences. Although the preferences can change slightly from one situation to another, there is some long-term stability in learning styles.

• **Learning approaches and strategies.** Moving on from learning styles to a holistic and active view of approaches to learning, study strategies, orientations, and conceptions of learning. These approaches and strategies must be adapted to match the learning context, so they are frequently adjusted depending on the situation.

This classification may provide general insights into the concept of learning style. However, some dimensions of learning style are consistent across different learning style models, and these models can be classified according to various layers, groups, or categories.

The above examples illustrate some approaches to style models and show a close relationship between different theories of learning styles. Scientists often use the phrase "cognitive type" as a psychological term that characterises a person's typical way of using the mind. Cognitive type is often considered an element that collectively describes learning styles. Cognitive types are also defined as the typical means of solving tasks, thinking, perceiving, and remembering.

Viewing the learning style as the result of integrating various forms of individual experience enables us to distinguish between the concepts of cognitive style and learning style.

Cognitive styles are a highly organised mechanism of regulation of intellectual activity, the influence of which is manifested in various situations (including educational ones).

Instead, learning styles are learning strategies that characterise an individual's actions in response to the demands of a specific learning situation. By their nature, they directly depend on educational technology (characteristics of the educational situation, the uniqueness of the individual's academic motivation, teaching methods, types of educational resources, the teacher's position, the educational

institution's status, etc.). In turn, individual methods of educational activity are produced under the influence of human cognitive styles (styles of encoding and processing information, posing and solving problems, cognitive attitude to the world, etc.).

From the pedagogical perspective, the most acceptable definition of learning style is the typical cognitive, emotional, and psychological behaviour, which is a relatively stable indicator of how students feel and interact with the learning environment. This definition considers learning styles to be adaptive and strategic responses to the situation, depending on various factors (for example, the level of interest). They manifest themselves as more stable types associated with individual characteristics. The wording also does not exclude that the learning style can be cognitive, affective, or a combination of both types.

Currently, the question of changing people's learning styles over a long period is influenced by factors such as age, gender, socioeconomic status, the academic discipline being studied, experience with practical work, extracurricular expertise, and others.

Most researchers agree that it is impossible to determine which styles are better at all. For example, the advantage of an introverted or extroverted style depends on the situation. An introvert may benefit from working alone, while an extrovert may benefit from working in a group. A reflective style is more adaptive than blind impulsiveness (active style).[127] There is empirical evidence that, in the context of real educational activities, students exhibit a multi-style approach.

The factual material confirms that the peculiarities of studying certain academic disciplines in various fields of knowledge change the intellectual types of people. It shows that the types are at least partially socialised. It has also been established that the intellectual characteristics of people change as a function of their traits. According to the modern view, types of thinking are essentially states rather than traits. However, the characteristics of people create the conditions for the emergence of these conditions.

There are contradictions in the conclusions obtained by various scientists. Thus, some studies suggest that targeted learning of specific styles can improve learning outcomes for students. Others show no relationship between student achievement and their learning preferences. Conflicting data regarding the problem of style malleability are presented in the literature. Different readings suggest the complexity of the problem and necessitate further research in this area.

Thus, some general conclusions can be drawn.

1. Existing concepts of learning styles are vastly interconnected and consider different aspects of the problem. There is no universal theory.

2. Models in which learning styles are considered integral formations in terms of the combination and interaction of various learning advantages (differences in

[127] Zhang L.F., R.J. Sternberg. (2005). A Threefold Model of Intellectual Styles. *Educ. Psychol. Rev*, 17(1), 1–53.

methods of encoding and processing information, techniques for solving learning problems, etc.) have much greater explanatory potential.

3. A specific student in a real educational activity demonstrates not separate learning and cognitive styles but an individual learning style at a certain level of its formation. At the limit of its development, it acts as a hierarchically organised, multifaceted form of intellectual behaviour that flexibly changes.

4. Styles are not free from value judgments.

5. Learning styles are unstable over time, as they can change under the influence of the learning process itself, the use of new teaching methods, student motivation, and other factors.

6. The development of a reflective style in a person is more often associated with better academic and cognitive performance.

7. The critical condition for high-quality educational activity is the readiness of a person to work with a problem at two levels simultaneously. When being taught, the person does not concentrate solely on solving the task as the primary goal; they are also interested in the learning process.

Currently, many questions remain open for pedagogical research. There is no single scientific approach to determining the conditions for overcoming a person's stylistic limitations to improve the quality of education. The problem of optimising stylistic characteristics has not been studied theoretically and practically. The most pressing issue is integrating students' diverse learning styles with effective learning methods to enhance their educational outcomes. In this regard, it is unsurprising that the question is increasingly discussed in the literature: what is the condition for successful learning – the coincidence or, conversely, the discrepancy between the student's learning styles and forms of learning?

3.8.1 Learning Styles by R. Felder and B. Soloman

The model of R. Felder and B. Solomon (hereinafter referred to as the Felder-Solomon model) is among the most widely studied and recognised worldwide. According to this model, the learning styles of an individual can be determined based on answers to four questions:

1. How does the student perceive information? Predominantly sensory (physical sensations, sounds) or intuitive (in thoughts, the ability to penetrate the essence)? Students are distinguished by being inclined towards concrete, practical, and fact-based approaches, as well as experimental procedures. They are also intuitive, operating better with abstractions (theories, mathematical models), and are more likely to act quickly and innovatively when solving problems. This scale is identical to the Myers-Briggs Intuitive Style Indicator.

2. What sensory information does the student perceive most effectively: visual (images, diagrams, technological process maps, demonstrations) or verbal (records and spoken explanations)?

3. How does the student process information actively (through participation in physical action or discussion) or reflectively (through introspection)? This scale

is identical to the active-reflective scale of D. Kolb's model and is related to the extraverted-introverted scale of other theories.

4. How does the student understand and remember the initial material sequentially (in a logical sequence of steps) or globally (from general to partial)? Sequential learners think linearly and can work after understanding part of the material. Global learners cannot apply new material until they fully understand it and see how it relates to what they have previously learned. However, as soon as they grasp the essence from a holistic perspective, they can solve tasks much faster than consistent students.

The components of the Felder-Solomon model, along with their descriptions and abbreviated names, are schematically presented in Table 3.10.

Table 3.10

Component models and learning styles, according to R. Felder and B. Soloman

Dimension	Style name (in short)	Description
Perception of information	Sensing (sen)	Awareness of information, facts
	Intuitive (int)	Intuition, forming an abstract concept
Sensors for perception	Visual (vis)	Preference for drawings and diagrams
	Verbal (vrb)	Preference for the written or oral explanation
Understanding information	Active (act)	Activity, experimentation
	Reflective (ref)	Reflections, observations
Learning patterns	Sequential (seq)	Step-by-step understanding, convergent thinking, and analysis
	Global (glo)	Understanding by jumps, systems thinking, and synthesis

The questionnaires of the methodology contain forty-four questions for selecting elements that enable the evaluation of preferences on four scales: sen/int, vis/vrb, act/ref, and seq/glo.

For each scale, a special form calculates the difference in points characterising the educational preferences of students.

For example, if in the act/ref dimension, there are 4 "act" answers and 7 "ref" answers, then the final score difference is 3 "ref."

Index of Learning Style

The degree of manifestation of educational preference is evaluated as follows:

- If the score difference is between 1 and 3, the styles on this scale are fairly well balanced in two directions (in the above example, active and reflective learning styles are balanced).
- If the difference varies from 5 to 7, the student is characterised by a moderate preference for one style over another. Learning will be easier in an environment that corresponds to this style.

- If the score difference corresponds to 9 or 11, the student strongly prefers one aspect of the scale over the other. He may experience learning difficulties in an environment that does not match this advantage.

Characteristics of learning styles and recommended behaviours for students with specific learning preferences are provided below.

Active and reflective styles. Active students tend to retain and understand learning material better if they actively discuss or apply the information received or explain the material to others. Reflective - prefer calm thinking at first. "Let us try it and see how it works", and "Let us think about it first" illustrate the typical reaction of active and reflective students, respectively.

Active learners tend to prefer working in groups, whereas reflective learners tend to prefer working alone. For both personality types, sitting through a lecture without engaging in any physical activity other than taking notes is challenging, and it is most difficult for active students.

All people are sometimes active and sometimes reflective. The preference of one of the categories can be strong, medium, or light. It is desirable, of course, that there should be a balance. If a student always acts without thinking about their action, they may act prematurely and then make a mistake. However, he may never do anything if he spends too much time thinking.

Recommended behaviour for active students. If the teaching method provides little (or no) time for discussion and problem-solving during the activity, students should try to compensate for this. They need to study in a group, where the members take turns explaining different topics to each other, work with other students, imagine what might be asked on the next test, and find out the answers. Active students will never forget information better if they find a way to apply it.

Recommended behaviour for reflective students. In classes with little (or almost no) time for understanding new information, students should try to compensate for this lack in the work process. While reading and memorising the material, they must stop and periodically review what they have already read. Consider potential issues and methods for applying the received data. Writing a short summary of the reading in your own words is useful. It may take longer, but it will allow students to remember the material more effectively.

Sensing and intuitive styles. Sensing people tend to like facts. Those with a dominant intuitive perception often prefer to open up opportunities and relationships.

Students with sensing perception often solve problems using known methods; they do not like surprises and difficulties. Intuitive learners prefer innovation and dislike repetition. The former students are more often than the latter indignant when materials appear in tests that were not clearly discussed in class. Students with sensing perception, as a rule, remember facts well, are meticulous in detail, and perform practical (laboratory) work effectively. Intuitive students tend to grasp new concepts more effectively and are often more comfortable working with abstract ideas and mathematical formulations.

Sensing learners are more practical and cautious than intuitive learners. Generally, the latter work faster and are more resourceful than the former.

Sensing learners tend to dislike courses that lack an obvious connection to the real world. Intuitives do not like plug-and-play courses that contain a lot of memorisation and routine calculations.

Each person sometimes has sensory perception and sometimes has intuitive perception. The preference of one of the categories can be strong, medium, or weak. Students must perform equally well in both areas to effectively learn and solve problems. If they overestimate intuition, they may miss important information or make careless mistakes in calculations or practical work. If students overestimate sensing perception, they may rely too much on memorisation and known methods and will not focus on understanding and innovative thinking.

Recommended behaviour for sensing students. Such students remember and understand information better if they see its connection with the real world. They may struggle in classes where much of the material is abstract and theoretical. For them, it is necessary to provide concrete examples of implementing concepts and theories and demonstrate how these concepts are applied in practice. If the teacher does not provide such information, the sensory student should try to find it independently in the course literature or other references.

Recommended behaviour for intuitive students. Most of the lectures are designed for students with intuitive minds. If a student with this type of perception finds himself in classes where it is mainly necessary to memorise and mechanically solve formulas, he may have problems and boredom. The teacher needs to provide interpretations or theories that connect the facts being studied. Otherwise, the student must independently establish the connection between the actual data. Intuitive students tend to make careless mistakes on tests because they are impatient with details and dislike repetition (for example, when reviewing completed solutions). They must read all the questions before answering and checking the results.

Visual and verbal styles. Students with visual perception tend to remember images better, including pictures, diagrams, charts, graphs, movies, and demonstrations. Students with verbal perception receive more information from both written and oral explanations. Both types of learners learn better when the learning material is presented both visually and verbally.

Most classes in educational institutions use very little visual information: students mainly listen to lectures and read materials written on the board and in textbooks and handouts. Facts show that most people are visual learners, which means that students are not getting as much as possible if classes were more about the visual presentation of learning data. Good students can process information presented both visually and verbally.

Recommended behaviour for students with visual perception. Suppose the student has a visual type of perception. In that case, it is necessary to find graphs, sketches, diagrams, photographs, or any other visual representation of the educational material presented orally. Referrals to reference books and e-

resources containing educational materials related to this course will be useful. For them, it is better to prepare a map or diagram that lists key points inside rectangles or other figures, demonstrating connections between concepts (in the form of lines or arrows). It is helpful to use coloured highlights (accents, labels) in the notes.

Recommended behaviour for students with verbal perception. Students of this type need to briefly describe the structure of the educational material in their own words. Working in a group can be particularly effective for them, as they gain an understanding of the material by hearing their peers explain it and learn even more when they explain the material themselves.

Sequential and global styles. Generally, students who excel at processing material sequentially tend to achieve a deeper understanding when the material is taught step by step, with each new step logically following the previous one. Globally minded learners are more likely to learn in large leaps, absorbing material almost haphazardly without seeing the connections, and then suddenly grasp the concepts.

Students with sequential perception tend to follow a logical step-by-step path to finding a solution. Students with a global perception can solve problems quickly and combine the parts once they understand the overall picture. However, they may struggle to explain how they did it.

Many people may mistakenly conclude that they have a global perception because everyone has the experience of not understanding something and then having a sudden flash of understanding. What makes perception global or sequential occurs before understanding. Students with sequential comprehension may not fully understand the material and apply it (for example, solve homework or take a test) because the parts they understand are not logically connected. Students with a strong global perspective who struggle with sequential thinking can experience significant difficulties until they grasp the broader context of their learning. Even after seeing it, they can vaguely imagine the details of the object. Students with a sequential perception tend to have a deep understanding of specific aspects of a subject but may struggle to connect these concepts with related ideas from other subjects.

Recommended behaviour for students with a sequential type of perception. Most educational courses at universities are taught in a sequential manner. However, if the student has a sequential learning style and the teacher jumps from topic to topic, skipping steps, it may be difficult for them to follow and remember the subject. It is necessary to fill in the missing steps with the help of the teacher's answers or independently by referring to the reference books. Students need to arrange the lecture material in a logical order. To develop global thinking, one must connect each new topic with the previously studied ones. The more the student engages in this, the deeper their understanding of the topic will be.

Recommended behaviour for students with a global type of perception. A student with a global perception can organise their work to get the overall picture faster. For example, before studying the first part of the text, he needs to skim through the entire chapter to get a general idea. It may take longer initially, but it

will save time later when returning to individual parts of the text. Rather than reviewing each subject briefly each day, such students may benefit more from studying subjects in large blocks. The teacher needs to help students see the connections between the new material and other topics and disciplines.

3.8.2 Learning Styles for Students of Different Study Fields

To develop an effective teaching method, a teacher must consider many factors. He should understand that students from different training areas have distinct educational preferences. The characteristics of groups of students from various specialities, as obtained from the meta-analysis results, are given in Table 3.11. In addition to student data, the table describes the styles of teachers. Some results of this meta-analysis concerning learning preferences in different study fields will be discussed later in this Section.

Table 3.11

Generalised quantitative characteristics of the processed sample of respondents

Study fields	Participated in surveys:						
	University	Country	Respondent together	Student	Teacher	Trainee	PhD student
Technic science	14	10	4538	4409	129	-	-
Natural science	12	7	1772	1587	13	164	8
Economics	11	6	2111	2005	89	17	-
Liberal arts	6	5	743	608	-	135	-
Medicine	2	2	560	560	-	-	-
Total	33	16	9724	9169	231	316	8

In Fig. 3.5, averaged profiles of groups of students by learning styles are presented in the form of eight-petal-filled diagrams. For example, we compare data for students of technical specialities with traditional ideas about educational types in technical education. From Fig. 3.5, one can see, for example, that 67% of engineering majors consider themselves sensory learners, while traditional engineering training tends to be heavily oriented toward an intuitive style. The educational and professional training programs emphasise the critical role of theory and modelling compared to experimentation for most training modules.

Approximately 85% of students identify themselves as visual learners, whereas most technical training is delivered verbally, with teachers explaining physical phenomena using notes and mathematical explanations. A majority of students (64%) prefer an active learning style. At the same time, most technical courses, apart from laboratory work, rely almost exclusively on lectures and readings as the primary means of information transfer.

Fifty-six per cent of the studied students chose a sequential learning style. Traditional technical education is mainly sequential. Thus, unlike others, this aspect does not contradict theoretical expectations and experimental results.

Global students comprise a substantial and essential minority of samples across all majors. People of this type are multidisciplinary thinkers; they have a broad perception.

Unfortunately, traditional technical education does little to develop a systems perspective in students. In most cases, when students take the time to grasp the issues thoroughly, they often do not fit into the curriculum and are at risk of academic underachievement.

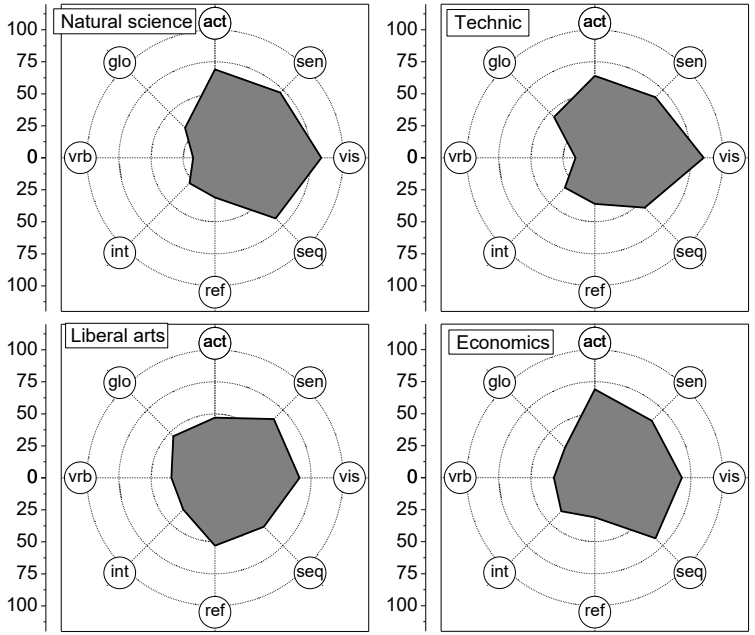


Figure 3.5 Comparison of learning styles of students of different fields of study (average values are shown in %)

Figure 3.6,a compares the average indicators of learning styles for students majoring in technical and natural sciences, while Fig. 3.6,b compares liberal arts and economics majors.

The most significant difference between technical and natural sciences students is the higher percentage of sequential students (and correspondingly lower percentage of global students) in natural sciences faculties (Fig. 3.6,a). In other parameters, the differences are much more minor.

A comparison of the preferences of humanitarians and economists indicates a significantly higher percentage of humanitarian reflective students. At the same time, there are practically no differences in the other two pairs of parameters.

Suppose you compare the preferences between students from the technical-natural block and those from the economic-humanitarian block. In that case, the differences between them become much more remarkable.

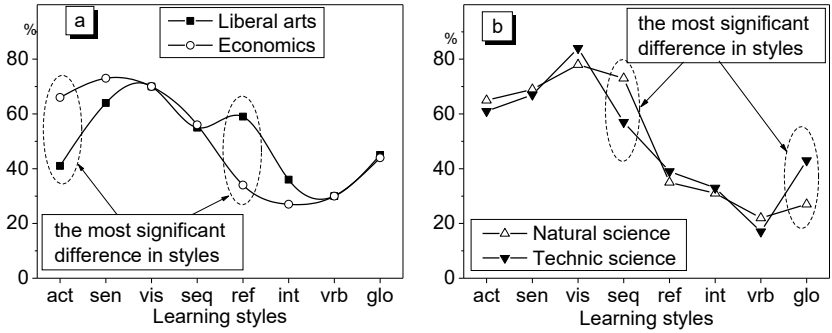


Figure 3.6 Average data-based profiles of learning styles of students majoring in natural and technical fields of study (a) and humanitarian and economic fields (b)

3.9 Teaching-Learning Style Conflicts and Ways to Overcome Them

Teaching styles of teachers and students. Establishing the optimal combination of teaching and learning methods, taking into account the unique characteristics of both students' and teachers' learning styles, remains a key challenge. Figure 3.7 illustrates the extent to which the profiles of learning styles of samples of teachers and students of different fields of training overlap.

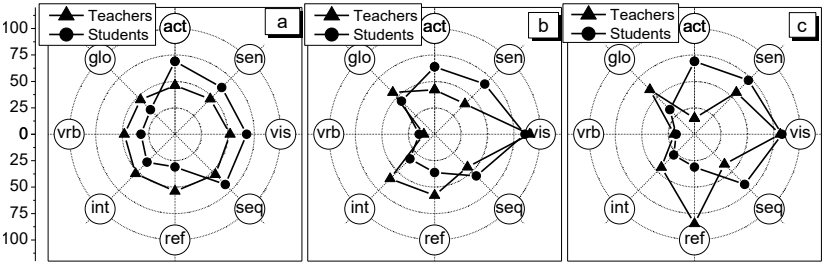


Figure 3.7 Profiles of learning styles of students and teachers in the fields: a) economic; b) technical; c) natural

In all the images, among the teachers, we see a significantly larger number of people who are reflective in nature and a more pronounced predominance of global and intuitive learning styles. It is worth noting that among teachers, the degree of emphasis on educational advantages is often slight, indicating that most teachers tend to be individuals with balanced learning styles, allowing them to adapt easily to different conditions.

Pedagogical research has shown that the learning process is carried out more effectively when teaching styles match learning styles than when they do not. However, the student's identification of learning styles should not lead to a complete adaptation of the teacher's behaviour to him. To function effectively as a specialist in any profession, a student must develop traits of each type:

- ability to observe and pay close attention to details;
- developed perception and possibility of abstract thinking;
- ability to understand the information presented both visually and orally;
- systematic analytical skills and multidisciplinary synthesis skills.

If the teaching style or instruction is biased toward one aspect of learning styles, some students may find it too uncomfortable to learn. In the mode of "conflict of styles," such negative phenomena as extreme polarisation of intellectual behaviour, a decrease in productivity and mobility, and a sharp narrowing of the range of educational methods will be observed. The student's learning behaviour, losing its individuality, will gradually become role-based or situational. On the contrary, if learning maximally expands the repertoire of ways of activity (regardless of whether it is traditional or innovative), it enriches the stylistic sphere of the individual's intelligence. At the same time, within the framework of forming an individual cognitive style, the flexibility of intelligent behaviour in various educational situations increases. In this way, the individual's originality of thought will expand in combination with increased intellectual activity and productivity.

Aligning the learning styles of those being taught with teachers' teaching methods is a prerequisite for increased academic achievement. The problem of the most rational combination of styles and methods is acute enough due to a severe contradiction.

The need to rebuild the learning process (including teaching methods, forms of presenting educational material, and characteristics of the teacher's behaviour, etc.) from the perspective of aligning it with individual differences in the methods of educational activity for those being taught is a valid idea. Some examples confirm this.

Suppose the educational process takes into account the individual pace of learning. Each student can spend as much time studying the educational material as they need. In that case, approximately 95% of students demonstrate a high and above-average level of mastery of educational material in tests. Whereas with traditional education, which ignores individual differences in the speed of assimilation of educational information, the distribution of children's abilities is subject to the action of the law of normal distribution (that is, up to 50% of children have low and average levels of educational and cognitive abilities).

However, a problematic picture emerges regarding learning styles. The analysis of the described studies reveals that, generally, there is a connection between an individual's specific cognitive style and academic success. The facts indicate that high school students with field-independent, reflective, and theoretical (in the sense of P. Hani and A. Mumford) styles, as well as those with deep learning styles (in the sense of N. Entwistle), tend to learn more effectively. However, as soon as the teaching method is strictly adjusted to the educational preferences of the student (including students in professional education), the connection between style and academic performance practically disappears. The question of what actually constitutes a condition for successful learning - coincidence or, on the contrary, the divergence of learning styles and forms - remains unclear.

Prospective ways of overcoming the conflict of styles. Let us formulate possible options for preventing the occurrence of a "conflict of styles":

- Adapting teaching aids (teaching methods, forms of presentation of educational material, and the teacher's behaviour) to the educational preferences of those being taught. At the same time, as a rule, homogeneous groups are created, and appropriate educational methods and materials are used;
- Creation of an educational environment in which individuals with different learning and cognitive styles can choose a line of learning that matches their characteristics, mastering other, subjectively new ways of studying reality as their intellectual development progresses. At the same time, a variable educational program is implemented.

The first of two named options is incompatible with the scientific perspective on the nature of learning styles, which are not a stable mental property of the individual. For example, the study by E.L. Grigorenko and R. Sternberg showed that the degree of development of certain thinking styles in American schoolchildren depends on several factors, including the socioeconomic status of parents, the type of school, and the teachers' style. Evidence that stylistic properties have the resource of mobility is their changes under the influence of specially organised training. Thus, a purposeful shift in students' styles towards a transition to a deeper approach to learning was shown to be possible under the influence of developing skills for working with scientific information.

Suppose we proceed from the generally accepted principle that an individual's learning style is stable. In that case, by "adjusting" all forms of the educational process to the existing learning style of the student, we will fix and consolidate a particular style of assimilation of information. As a result, the individual's mental outlook will be narrowed and possibly deformed. By stimulating unproductive forms of stylistic behaviour in the learning process, it is possible to slow down the individual's intellectual development.

Secondly, suppose the educational process is built on the generally accepted principle that the success of educational activities is equivalent across different poles of the same style. In that case, serious mistakes may be made in its organisation, and, as a result, the basic mechanisms of effective intellectual activity may be destroyed. Thus, the predominant use of either verbal or figurative material makes it impossible to build an adequate mental representation of the problem. The mental basis of understanding is the interaction of verbal-linguistic and visual forms of experience. A prerequisite for ineffective learning appears if a single method dominates information processing. For example, such single methods include impulsiveness, reflexivity, analytical thinking, synthetic thinking, deductive thinking, and inductive thinking, among others. It sharply narrows the range of ways of studying reality. If you set people up only for a "deep" approach to learning the educational material, you can compromise the mechanism of selectivity in evaluating its relevant and irrelevant aspects.

It would be appropriate to inquire about the necessity of considering students' learning styles in the educational process. In the learning process, conditions should be created to foster the development of each student's cognitive style. At the same time, individuals with different learning styles (and different cognitive styles) should be able to choose a line of learning according to their stylistic preferences within a single educational space. Taking individual styles into account in the learning process is transformed into the task of forming an individual cognitive style, which, in turn, is one aspect of an individual's intellectual education in modern education.

One of the criteria for the effectiveness of the educational process is the uniqueness of the minds of those being taught. The formation of this uniqueness is related to the evolution of each person's cognitive style. It results from the complication of all forms of mental experience under the influence of an enriched educational environment.

Returning to the definition of terms, we again emphasise that an individual cognitive style is a mental formation. It is, firstly, multidimensional in its manifestations; secondly, hierarchical in its structure (including different levels of stylistic behaviour); thirdly, integral, a product of the integration of various forms of mental experience; and fourthly, flexible in its adaptive capabilities.

An individual's cognitive style is formed during their intellectual development, determining the peculiarities of their behaviour in various situations, such as life, education, and profession. The higher an individual's level of intellectual maturity, the more pronounced their cognitive style becomes.

The formation of an individual cognitive style involves:

1. Identifying the personal stylistic preferences and awareness of the "weak" and "strong" aspects of this type of stylistic behaviour while mastering the material by the student and the teacher.

2. Development of mechanisms of stylistic behaviour at the level of styles:

- Coding of information – development of the ability to utilise different modalities (verbal-linguistic, visual, kinaesthetic, sensory-emotional) in the application of various coding methods when constructing mental representations.

  Processing of information (cognitive styles) – development of the ability to involuntary intellectual control in the form of the two most productive types of stylistic behaviour (reflective and fast/accurate – within the framework of the cognitive style impulsivity/reflectivity, flexible and integrated into the aspect of flexible/rigid styles, etc.), as well as the mobility of stylistic behaviour (possibility of transition from one pole of a given style to another depending on one's own needs and requirements of the educational situation).
- Posing and solving problems (thinking styles) – developing the ability to use all possible methods to solve the given task, choosing them depending on the nature of the problem situation. The willingness to vary the methods of posing and solving problems is crucial in situations where students must work in an independent intellectual search mode.

- Cognitive attitude to the world - development of the ability to realise the advantages of one's style, to take into account the existence of people with other characteristics, and to build a dialogue in the conditions of the existence of radically different approaches to the construction of cognitive "pictures of the world."

3. Enrichment of stylistic characteristics of intellectual behaviour, including:

- expanding the repertoire of stylistic behaviour associated with mastering different styles at different levels of stylistic behaviour, as well as different styles within each level (developing skills in using different methods of encoding and processing information, posing and solving problems, organising a cognitive "picture of the world");
- creation of conditions for the interaction of different cognitive styles when studying a specific topic, mastering a concept, or solving a particular problem, etc.

Thus, it can be concluded that forming an individual cognitive style in professional training means gradually levelling the differences in individual styles. The thesis is paradoxical only at first glance, as its true content is that a mechanism for integrating different types of stylistic behaviour should be developed during the learning process. Therefore, the pedagogical approach, according to which individualising and adapting education means adapting it to the existing cognitive style of one student with appropriate "adjustment" to this style of content and teaching methods, is not entirely correct. It is more accurate to talk about forming each student's cognitive style based on actualising and enriching the entire system of stylistic behaviour mechanisms.

The formation of an individual cognitive style (and, accordingly, an increase in the effectiveness of educational activities) involves creating an educational environment that incorporates elements corresponding to the students' style. In contrast, others do not and are intended to develop missing mechanisms of stylistic behaviour. In current conditions, the possibility of such individualisation using ICT is promising. Solving this task involves creating didactic materials that enable everyone being taught to choose their unique line of learning at work and establish prerequisites for the gradual development of individual cognitive styles. At the same time, the mental experience of each student is enriched. It determines the productivity of intellectual behaviour and the growth of the originality of the composition of the mind.

From the teacher's perspective, it is often said that a balanced teaching style, which partly aligns with the student's preferences, is optimal. The level of discomfort should not be too great for the students, but the teaching style may work against their strengths, encouraging them to grow in less developed areas.

Preliminary diagnosis of students' learning styles in a group can provide additional support for effective instructional design. For example, knowing that most students are visual individuals motivates the teacher to find visual ways of presenting material that might usually be presented entirely abstractly and verbally.

There is often a discrepancy between what lecturers think about their classroom actions and what happens there. Such conclusions were made based on determining teachers' teaching styles, analysing their interview data, and observing their work styles in the classroom. For an adequate analysis of their pedagogical actions, teachers are recommended to establish their predominant learning styles and identify their teaching styles.

We will formulate some recommendations that will help teachers prevent ineffective work with students:

The course material must be well-structured. Students note that the good structure allowed them to work with the material flexibly.

It is essential to present the information in a way that makes its connection to the real world clear and understandable. It means that it is essential to illustrate each discussed topic with relevant examples, draw on your experience for models, and integrate the details into the overall picture of the question.

Students consider active and group methods of work to be the best. Lectures should be replaced as much as possible with working in small groups in the classroom, in practical laboratory settings, or through project activities. It is necessary to engage students during a traditional lecture.

Students believe that the way the content is delivered, even if it differs from what they are comfortable with, is less important than the good organisation and structure of the material. For the successful delivery of the content, it is necessary to identify tasks and goals, correlate them with real-world expediency, organise educational resources well in printed or electronic format, instil enthusiasm in the teacher, and provide timely feedback (or response) to student concerns about the program or academic issues.

According to the survey results, students at higher education institutions believe they receive essential support from one another. Everything that the educational institution organises to facilitate cooperation between students (from the conditions of a dedicated space, such as a joint study centre, to well-managed collective work) they evaluated very positively. Students consider online resources, such as lectures, important because they allow them to review their work at their own pace and in their own time.

Students will feel supported by teachers and the educational institution if:

- there is open communication, an opportunity to inform and transfer information about students' needs, and the institution or the lecturer provides a timely response;
- provided resources that can be accessed at the students' own pace in their free time;
- organised cooperation of students with peers is considered a correct, acceptable, and logical continuation of education.

3.10 Self-assessment Questions

1. Why is teaching a profession?

2. What are the main components of pedagogical professionalism?

3. What strategies have adult educators developed to help adult learners transition to self-directed learning?

4. What are the characteristics of the "ultimate educator", and what combination of approaches do they employ?

5. What is the primary goal of coaching, and how does it differ from teaching?

6. What challenges arise when defining coaching, particularly in differentiating it from mentoring, counselling, and consulting?

7. What are the characteristics of a teacher's misbehaviour?

8. What could the consequences be for the learners?

9. What is the teaching style? Are teaching styles contextual or fixed? Provide an example.

10. What is the correspondence between learning style and teaching style?

3.11 Practice Exercises

3.11.1 Steps for Staffordshire Evaluation of Teaching Styles

Task: Determine your teaching style using the Self-Evaluation SETS Tool.[128]

1. Rate how much you agree with each statement below on a five-point scale (Table 3.12).
2. Write the score in the indicated spaces on the scoring sheet.
3. Calculate each column's total score corresponding to a particular style (Table 3.13).
4. Next, fill in your scores from the chart totals in the six boxes corresponding to each teaching style below.
5. Add the columns on the previous page to obtain your score for each of the six teaching styles (out of a maximum of 20 points).
6. Take the marks from the six boxes and put a cross along each of the six axes (Fig. 3.8).
7. Crosses will represent your score in the six teaching styles.
8. You may wish to join the crosses to produce a shape of your combination of styles.

Style One: The all-around flexible and adaptable teacher. This teacher can utilise various skills, teach peers and juniors, and is very aware of the entire environment in the context of teaching and learning.

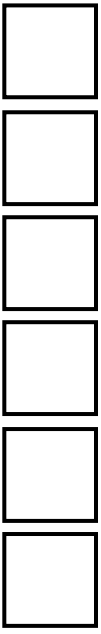
Style Two: The student-centred. Sensitive teacher. This teacher is very student-centred and teaches in small groups, with emotions to the fore, using role-play and drama, and is uncomfortable with straight presentations.

Style Three: The official curriculum teacher. This teacher is very well-prepared, accredited, and aware of the formal curriculum, teaching to it, and follows external targets for teaching.

Style Four: The straight facts, no-nonsense teacher. This teacher prefers to teach clear facts straightforwardly, concentrating on specific skills, and would rather not be involved in multidisciplinary teaching and learning.

Style Five: The big conference teacher. This teacher takes great pleasure in standing before a large audience. This teacher prefers not to sit in groups or engage in one-to-one teaching.

Style Six: The one-off teacher. This teacher prefers to deliver small, self-contained lessons one-to-one, with no props to help and no follow-up.



[128] *https://ocpe.mcw.edu/sites/default/files/KN%20Worksheet_Staffordshire%20Evaluation%20of%20Teaching%20Styles.pdf*

Table 3.12

Self-Evaluation Tool

		Not agree at all ⟺ Strongly agree				
Q1	I tailor my approach to suit my audience.	1	2	3	4	5
Q2	I am less comfortable giving straight presentations than teaching through games and exercises.	1	2	3	4	5
Q3	I prefer to teach through games to relay learning.	1	2	3	4	5
Q4	I appreciate having external targets to guide my learning.	1	2	3	4	5
Q5	I prefer teaching sessions that are self-contained with no follow-up.	1	2	3	4	5
Q6	Props often detract from a talk.	1	2	3	4	5
Q7	I am comfortable addressing large audiences.	1	2	3	4	5
Q8	Preparation for my teaching focuses on me and my role in the classroom.	1	2	3	4	5
Q9	I am usually standing up when I teach.	1	2	3	4	5
Q10	The best teaching sessions convey facts directly and clearly.	1	2	3	4	5
Q11	I avoid being distracted from running sessions as I plan to run them.	1	2	3	4	5
Q12	I am happy teaching general skills.	1	2	3	4	5
Q13	I put no value on being formally employed as a teacher.	1	2	3	4	5
Q14	I dislike one-to-one teaching.	1	2	3	4	5
Q15	I am consistent in delivering a topic, regardless of the audience.	1	2	3	4	5
Q16	I like to allow students to explore how to learn.	1	2	3	4	5
Q17	I have developed my style as a teacher.	1	2	3	4	5
Q18	I prefer one-to-one teaching.	1	2	3	4	5
Q19	Eliciting emotions through role-play or drama is a valuable aspect of teaching.	1	2	3	4	5
Q20	I am comfortable using humour in my teaching.	1	2	3	4	5
Q21	I rarely sit down when with students.	1	2	3	4	5
Q22	It is important to me that an official body accredits my teaching.	1	2	3	4	5
Q23	I am uncomfortable when I have to teach multi-professional groups of learners.	1	2	3	4	5
Q24	I'd best organise my teaching to fit an external curriculum or organisational structure.	1	2	3	4	5

Table 3.13

The Scoring Grid

Question	Style One	Style Two	Style Three	Style Four	Style Five	Style Six
Q1	Q1 =					
Q2		Q2=				
Q3		Q3=				
Q4			Q4=			
Q5						Q5=
Q6						Q6=
Q7					Q7=	
Q8			Q8=			
Q9					Q9=	
Q10				Q10=		
Q11				Q11=		
Q12	Q12=					
Q13						Q13=
Q14					Q14=	
Q15				Q15=		
Q16		Q16=				
Q17	Q17=					
Q18						Q18=
Q19		Q19=				
Q20	Q20=					
Q21					Q21=	
Q22			Q22=			
Q23				Q23=		
Q24			Q24=			
TOTALS						

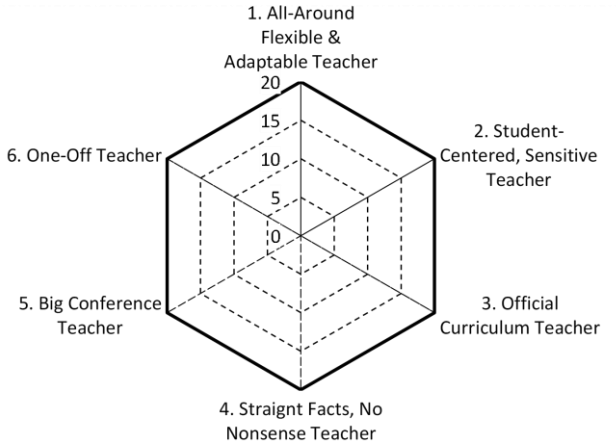


Figure 3.8 One's combination of teaching styles by Staffordshire Evaluation of Teaching Styles Instrument

3.11.2 Teaching Styles (the Grasha-Riechmann Model)

Directions: The following is a Grasha Teaching Style Survey, which includes 40 items (Table 3.14).

Table 3.14

Grasha's teaching style survey

No	Question	Response
1.	Facts, concepts, and principles are the most important things that students should acquire.	
2.	I set high standards for students in this class.	
3.	What I say and do model appropriate ways for students to think aboutissues in the content.	
4.	My teaching goals and methods address a variety of student learning styles.	
5.	Students typically work on course projects alone with little supervisionfrom me.	
6.	Sharing my knowledge and expertise with students is very important to me.	
7.	I give students negative feedback when their performance is unsatisfactory.	
8.	Activities in this class encourage students to develop their ideas about content issues.	
9.	I consult with students to improve their work on individual and/or group projects.	
10.	Activities in this class encourage students to develop their ideas about content issues.	
11.	What I have to say about a topic is essential for students to acquire a broader perspective on the issues in that area.	
12.	Students would describe my standards and expectations as strict and rigid.	
13.	I typically show students how to approach and what to do to master the coursecontent.	
14.	Small-group discussions help students develop their critical thinking skills.	
15.	Students design one of the more self-directed learning experiences.	
16.	I want students to leave this course well-prepared for further work in this area.	
17.	I am responsible for defining what students must learn and how they should learn.	
18.	Examples from my personal experiences often illustrate points about the material.	
19.	I guide students' work on course projects by asking questions, exploring options, and suggesting alternative ways.	

No	Question	Response
20.	Developing students' ability to think and work independently is an important goal.	
21.	Lecturing is a significant part of how I teach each class session.	
22.	I provide very clear guidelines for how I want tasks completed in this course.	
23.	I often show students how they can use various principles and concepts.	
24.	Course activities encourage students to take the initiative and responsibility for their learning.	
25.	Students take responsibility for teaching part of the class sessions.	
26.	My expertise is typically used to resolve disagreements about content issues.	
27.	This course has concrete goals and objectives that I want to accomplish.	
28.	Students receive frequent verbal and/or written comments on their performance.	
29.	I solicit student advice about how and what to teach in this course.	
30.	Students set their own pace for completing independent and/or group projects.	
31.	Students might describe me as a "storehouse of knowledge" who dispenses the necessary facts, principles, and concepts.	
32.	The syllabus clearly defines my expectations for what students should do in class.	
33.	Eventually, many students began to think like me about the course content.	
34.	Students can make choices among activities to complete course requirements.	
35.	My approach to teaching is similar to that of a workgroup manager, who delegates tasks and responsibilities to subordinates.	
36.	This course has more material than I have time available to cover.	
37.	My standards and expectations help students develop the discipline they need to learn.	
38.	Students might describe me as a "coach" who works closely with individuals to help them correct problems in their thinking and behaviour.	
39.	I provide students with considerable personal support and encouragement to excel in this course.	
40.	I assume the role of a resource person available to students whenever they need help.	

Respond to each of the items above in terms of how you teach. Use a 7-point Likert-type scale ranging from strongly disagree to agree strongly. If you teach some courses differently from others, respond in terms of only one specific course. Fill out another survey for the course(s) you teach in a different style. Please answer as honestly and objectively as possible.

Every eight items identify one of the five basic teaching styles. Regarding this instrument, Grasha (1996) reported acceptable reliability ($\alpha = 0.72$ for the entire test) and validity. The items associated with each particular teaching style are shown below.

Teaching Style	Items
Expert	1, 6, 11, 16, 21, 26, 31, 36
Formal Authority	2, 7, 12, 17, 22, 27, 32, 37
Personal Model	3, 8, 13, 18, 23, 28, 33, 38
Facilitator	4, 9, 14, 19, 24, 29, 34, 39
Delegator	5, 10, 15, 20, 25, 30, 35, 40

3.11.3 Index of Learning Styles (Felder-Silverman's Instrument)

Determining one's learning preferences according to the Index of Learning Styles

According to the Index of Learning Styles methodology, determine your learning preferences. Felder and Silverman initially designed it at North Carolina State University in the USA. Answer the 44 questions in the survey below and create an eight-petal diagram, a profile of your learning preferences.

Guideline

To complete the questionnaire, please circle "a" or "b" to indicate your answer to every question. You may only choose one answer for each question and must answer every question. If both "a" and "b" seem to apply to you, please select the one that applies to you more frequently.

Questionnaire

1. I understand something better after I
   (a) try it out.
   (b) think it through.
2. I would rather be considered
   (a) realistic.
   (b) innovative.
3. When I think about what I did yesterday, I will most likely get
   (a) a picture.
   (b) words.
4. I tend to
   (a) understand details of a subject but may be fuzzy about its overall structure.
   (b) understand the overall structure but may be fuzzy about details.
5. When I am learning something new, it helps me to
   (a) talk about it.
   (b) think about it.
6. If I were a teacher, I would rather teach a course
   (a) that deals with facts and real-life situations.
   (b) that deals with ideas and theories.

7. I prefer to get new information in
    (a) pictures, diagrams, graphs, or maps.
    (b) written directions or verbal information.
8. Once I understand
    (a) I understand all the parts.
    (b) I see how the parts fit the whole thing.
9. In a study group working on difficult material, I am more likely to
    (a) jump in and contribute ideas.
    (b) sit back and listen.
10. I find it easier
    (a) to learn facts.
    (b) to learn concepts.
11. In a book with lots of pictures and charts, I am likely to
    (a) look over the pictures and charts carefully.
    (b) focus on the written text.
12. When I solve maths problems
    (a) I usually work my way to the solutions one step at a time.
    (b) I often see the solutions, but then struggle to figure out the steps to get to them.
13. In classes I have taken
    (a) I usually get to know many of the students.
    (b) I rarely get to know many of the students.
14. In reading non-fiction, I prefer
    (a) something that teaches me new facts or tells me how to do something.
    (b) something that gives me new ideas to think about.
15. I like teachers
    (a) who put a lot of diagrams on the board.
    (b) who spend a lot of time explaining.
16. When I am analysing a story or a novel
    (a) I think of the incidents and combine them to figure out the themes.
    (b) I know the themes when I finish reading, and then I have to go back and find the incidents that demonstrate them.
17. When I start a homework problem, I am more likely to
    (a) start working on the solution immediately.
    (b) try to understand the problem fully first.
18. I prefer the idea of
    (a) certainty.
    (b) theory.
19. I remember best
    (a) what I see.
    (b) what I hear.
20. It is more important to me that an instructor
    (a) lay out the material in clear sequential steps.
    (b) give me an overall picture and relate the material to other subjects.

21. I prefer to study
    (a) in a group.
    (b) alone.
22. I am more likely to be considered
    (a) careful about the details of my work.
    (b) creative about how to do my work.
23. When I get directions to a new place, I prefer
    (a) a map.
    (b) written instructions.
24. I learn
    (a) at a fairly regular pace. If I study hard, I will "get it."
    (b) in fits and starts. I will be totally confused, and then suddenly, it all "clicks."
25. I would rather first
    (a) try things out.
    (b) think about how I am going to do it.
26. When I am reading for enjoyment, I like writers to
    (a) clearly say what they mean.
    (b) say things in creative, interesting ways.
27. When I see a diagram or sketch in class, I am most likely to remember
    (a) the picture.
    (b) what the instructor said about it.
28. When considering a body of information, I am more likely to
    (a) focus on details and miss the big picture.
    (b) try to understand the big picture before getting into the details.
29. I more easily remember
    (a) something I have done.
    (b) something I have thought a lot about.
30. When I have to perform a task, I prefer to
    (a) master one way of doing it.
    (b) come up with new ways of doing it.
31. When someone is showing me data, I prefer
    (a) charts or graphs.
    (b) text summarising the results.
32. When writing a paper, I am more likely to
    (a) work on (think about or write) the beginning of the paper and progress forward.
    (b) work on (think about or write) different parts of the paper and then order them.
33. When I have to work on a group project, I first want to
    (a) have a "group brainstorming" where everyone contributes ideas.
    (b) brainstorm individually and then come together as a group to compare ideas.
34. I consider it a higher praise to call someone
    (a) sensible.

(b) imaginative.

35. When I meet people at a party, I am more likely to remember
    (a) what they looked like.
    (b) what they said about themselves.
36. When I am learning a new subject, I prefer to
    (a) stay focused on that subject, learning as much about it as possible.
    (b) try to make connections between that subject and related subjects.
37. I am more likely to be considered
    (a) outgoing.
    (b) reserved.
38. I prefer courses that emphasise
    (a) concrete material (facts and data).
    (b) abstract material (concepts, theories).
39. For entertainment, I would rather
    (a) watch television.
    (b) read a book.
40. Some teachers start their lectures with an outline of what they will cover. Such outlines are
    (a) somewhat helpful to me.
    (b) very helpful to me.
41. The idea of doing homework in groups, with one grade for the entire group,
    (a) appeals to me.
    (b) does not appeal to me.
42. When I am doing lengthy calculations,
    (a) I tend to repeat all my steps and check my work carefully.
    (b) I find checking my work tiresome and have to force myself to do it.
43. I tend to picture places I have been
    (a) easily and fairly accurately.
    (b) with difficulty and without much detail.
44. When solving problems in a group, I would be more likely to
    (a) think of the steps in the solution process.
    (b) think of possible consequences or applications of the solution in various areas.

Now, turn to the scoring sheet to see where your preferences are.

1) Place a "1" in the appropriate spaces in Table 3.15. For example, if you answered "a"to Question 3, put a "1" in Column "a" by Question 3.
2) Add the columns and write the totals in the indicated spaces.
3) For each of the four scales, subtract the smaller total from the larger one. Write the difference (1 to 11) and the letter (a or b) with the larger total. Example: If your total in the act-ref dimension was 3 for "a" and 8 for "b": 8 – 3 = 5, b is a letter of larger, so you would enter 5b (bottom of Table 3.15).

To interpret the results, use the following:

1) If your score on the scale is 1-3, you are pretty well balanced on the two directions of this scale.

2) If your score is 5 or 7 on the scale, you have a moderate preference for one of the aspects of the given scale, and learning will be easier in an environment that corresponds to that aspect.

3) If your rating on the scale corresponds to 9 or 11, you strongly prefer one of the aspects of styles on this scale. You may find it challenging to study in an environment that does not suit your preferences.

For clarity, construct an eight-petal diagram that represents your learning preferences in all four aspects of style at once. Use the Figure below as a sample. For a defined profile of your learning preferences, describe recommended student behaviour to prevent discomfort and promote learning efficiency. Use the recommendations given in Section 3.8.1.

Table 3.15

Learning Styles Questionnaire Scoring Sheet

Activist/Reflector			Sensing/Intuitive			Visual/Verbal			Sequential/Global		
Q	a	B	Q	a	b	Q	a	B	Q	a	b
1			2			3			4		
5			6			7			8		
9			10			11			12		
13			14			15			16		
17			18			19			20		
21			22			23			24		
25			26			27			28		
29			30			31			32		
33			34			35			36		
37			38			39			40		
41			42			43			44		
Total (add up each column)											
Activist/Reflector			Sensing/Intuitive			Visual/Verbal			Sequential/Global		
Q	a	B	Q	a	b	Q	a	B	Q	a	b
Larger – Smaller + Letter of Larger											

Mark your score on the four scales on the style index chart below.

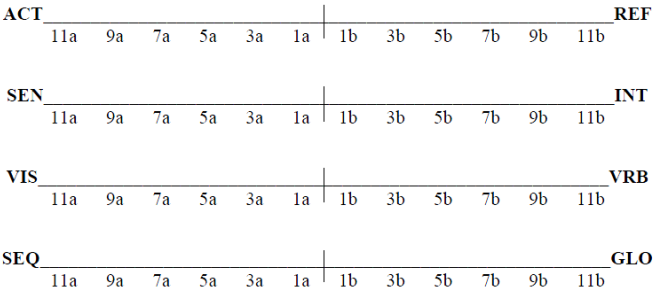


Figure 3.9 A scheme to illustrate aspects of style indexes

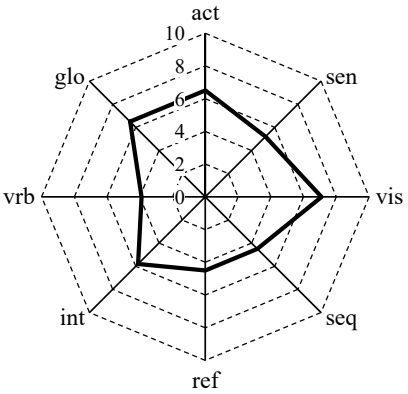


Figure 3.10 Eight-petal diagram representing the profile of one's learning preferences

3.11.4 Learning Profiles of Student Groups by ILS

Build a generalised profile of the learning preferences of academic group students by completing the following tasks:

1. Combine the data obtained from the survey of each group member according to the ILS method into a single table.

2. Build an averaged group profile in the form of an eight-petal diagram in two versions: a) according to the obtained average points of educational advantages; b) by the number in % of persons with certain educational advantages.

3. Describe the generalised characteristics of the group's profile.

4. Using the system below, select the forms, methods, and e-resources that are most highly regarded by the majority of students in the group.

Taxonomy of selection of e-resources and learning methods for each type of student

For the development of teaching methods, a taxonomy is compiled to select appropriate e-resources and teaching methods for each type of student. Taxonomy is based on four dimensions of learning styles ILS. Based on the accepted notation, the expression can be written as follows:

Combination ILS = {ILS1, ILS2, ILS3, ILS4},

ILS1 represents data processing and corresponds to the active/reflective dimension,

ILS2 describes the perception of information in the sensing/intuitive dimension,

ILS3 shows preferences in perception channels (visual/verbal) and

ILS4 corresponds to learning patterns (sequential or global).

There are 16 combinations of styles, for example, (sen, vis, act, seq), (sen, vis, act, glo), (sen, vis, ref, seq), and so on.

The choice of optimal learning methods, depending on students' learning styles, is based on the following components: a pedagogical approach to organising learning, the most suitable learning methods, and the characteristics of the corresponding e-resources.

For each type of student, one or more learning methods can be implemented using one or more e-resources most relevant to their preferred learning styles.

For example, a student with a clear sensing style prefers teaching materials and methods that focus on problem-solving. When selecting teaching methods for him, it is essential to pay particular attention to practical work, such as problem-based learning, practical exercises, and other hands-on activities.

The following e-resources support the implementation of learning methods that involve problem-solving, such as animation, simulation, and collaborative work in forums, among others.

The integration elements for ILS1 (act/ref), ILS2 (sen/int), ILS3 (vis/vrb), and ILS4 (seq/glo) are illustrated in Tables 3.16-3.19, respectively.

The selection of e-resources is carried out by[129].

[129] Franzoni-Velázquez A.L., Cervantes-Pérez F., Assar S. (2012). A Quantitative Analysis of Student Learning Styles and Teacher Teachings Strategies in a Mexican Higher Education Institution. *Journal of Applied Research and Technology,* 10(3), 289–308.

Franzoni A.L., Assar S. (2009). Student Learning Styles Adaptation Method Based on Teaching Strategies and Electronic Media. *Journal of International Forum of Educational Technology and Society,* 12(4), 15–29.

Table 3.16

Taxonomy of methods and e-resources for active/reflective dimension (ILS1)

	Active	Reflective
Characteristics of student style	I prefer experimentation and active, collective work with learning data, with the possibility of practical application of the results.	I prefer thinking and observation, and I also prefer to work alone. Good perceived work with text
A pedagogical approach to the organisation of learning	Students need to take active action by discussing or applying data and explaining the material to others. It is challenging for them to listen to lectures without engaging in activities beyond simply taking notes. It is better to organise training in groups	During training, it is essential to schedule periodic breaks to review the material, write summaries, and consider the potential applications of the study. Without such activity, students experience discomfort.
Learning methods that are best suited	Problem-searching Practical Modelling Creating game situations A study based on solving problems Expert discussion group (discussion panel) Brainstorm Method of projects	Presentations Case method Method of questions and answers Individual work with text Writing a short resume paraphrased in your own words may be helpful. It can take longer, but it will enable students to retain the material more effectively.
E-resources are qualified for use.	Static visualisation Program package E-mail Search engines, teaching database E-textbooks Teaching programs Tests are ready for use	Static and dynamic visualisations Quantum chemical simulation Lab complex with measuring sensors Wiki, Forum, Chat, E-mail Search engines, teaching database E-textbooks, hypertext Teaching programs Tests are ready for use Test shells

Table 3.17

Taxonomy of methods and e-resources for sensing/intuitive dimension (ILS2)

	Sensing	Intuitive
Characteristics of student style	I prefer courses directly related to the real world, where I can study facts and conduct experiments. Pay attention to details, work well practically, and often solve problems using established methods; they are cautious and prefer not to encounter surprises or difficulties.	They are innovators and hate tedious work and repetition. Working with abstract problems, formulating concepts, and understanding mathematical dependencies is enjoyable. They do not enjoy courses that contain a lot of material for memorisation and routine calculations, as they become bored studying details and prefer to be more inventive.
A pedagogical approach to the organisation of learning	Teaching material with specific examples of implementing theories and their practical application. Solving tasks in a particular order involves implementing specific procedures and actions to achieve the desired outcome. Work in the laboratory	Teaching material with a guide to the theory and conceptual examination. It is necessary to provide theories that connect the facts being studied. Recommended lectures, exercises, and innovative methods.
Learning methods that are best suited	Verbal, visual, practical Simulation, problem-searching Experiment, execution of exercises, question and answer method; a study based on solving problems	Modelling Role games, games, and simulations The case method, the project method Discussion panel
E-resources are qualified for use.	Static visualisation Program package Virtual labs for laboratory work E-textbooks Teaching programs It is advisable to provide students with resources to independently find facts, such as email, search engines, and teaching databases. Tests are ready for use.	Static visualisation, 3D models Quantum chemical simulation E-textbooks, Encyclopaedias All types of communication are well-suited for learning, including forums, video conferences, audio conferences, chats, and email. Search engines, teaching database Ready tests are of little use for learning.

Table 3.18

Taxonomy of methods and e-resources for the visual/verbal dimension (ILS3)

	Visual	Verbal
Characteristics of student style	Well-perceived and better-memorised images: drawings, diagrams, charts, graphs, etc.	With well-perceived language and text elements, more information is obtained from words, as well as written and oral explanations.
A pedagogical approach to the organisation of learning	Both types of students study better when the teaching material is presented both visually and verbally	
	Students had better remember what they see.	They perceive spoken or audio information more quickly. It is better to remember what one reads or hears.
Learning methods that are best suited	Visual, practical Problem-searching Modelling Experiment Games and simulations Independent work with training programs and simulators	Verbal, visual Problem-searching Lecture, Exercises Method of questions and answers Discussion panel Brainstorm Individual work with text Working in a group can be particularly beneficial: students understand the material, hear their groupmates' explanations, and learn even more when they explain the material themselves.
E-resources are qualified for use.	Static and dynamic visualisations Quantum chemical simulation of spectra Modelling of experiments Virtual labs are best suited for learning Teaching programs Teaching database Tests are ready for use	Static visualisation Quantum chemical simulation of spectra Lab complex with measuring sensors E-textbooks Chat, E-mail Teaching programs Search engines,

Table 3.19

Taxonomy of methods and e-resources for sequential/global dimension (ILS 4)

	Sequential	Global
Characteristics of student style	Convergent thinking prevails. Achieve an understanding by studying the material step-by-step, where each new step logically follows from the previous one.	Systems thinking prevails. Seeing everything, studying with high jumps, mastering the material almost by accident, not seeing the connections, and suddenly "understanding them" can innovatively combine things.
A pedagogical approach to the organisation of learning	Students learn better through small, orderly, and logically related sequential steps to solve problems. It is necessary to teach the material in a logical order and to try to link each new topic with those studied earlier for a broad and holistic understanding.	Students can study through high jumps, suddenly and almost in any order. Such students may find it more useful to consider subjects in large blocks of time. Lecturers must help students see the links between the material and other topics and disciplines.
Learning methods that are best suited	Verbal-dialogical Visible - manuals Reproductive exercises Method of questions and answers Modelling Problem-searching works with reference books	Case method Method of projects Role games Brainstorm Independent work Creative activities on systematisation
E-resources are qualified for use.	Static and dynamic visualisations are of little use for learning Quantum chemical simulation of spectra E-mail, search engines, teaching database E-textbooks, teaching programs Tests are ready for use	Static visualisation, 3D models Quantum chemical simulation of molecular structure The following e-resources are best suited for learning: virtual labs for laboratory work; video-, audio-conferences E-mail, search engines, teaching database E-textbooks, hypertext, teaching programs Tests are ready for use

Analysis of the results collected in Tables 3.16-3.19 allows lecturers to design the teaching methodology best suited to the course material. Different approaches can be employed to achieve this goal. The first approach is to group students into subgroups with similar learning styles and utilise various teaching methods and materials tailored to each subgroup. Typically, the lecturer cannot implement such an approach because of time constraints, inaccessibility of technical support, etc.

Another similar method is identifying a "group average type" and selecting appropriate learning materials.

The third alternative approach, perhaps the most realistic, involves using different learning materials that cater to the needs of various students for specific units of study.

Integrating aspects of various styles and selecting effective e-resources and teaching methods enables one to adapt the teaching methodology, focusing on the unique characteristics of students. The optimal methodology seeks to balance teaching and learning styles rather than to achieve absolute consistency between each lecturer's actions and students' learning preferences. The discomfort that students experience when working according to a method that does not fit their learning styles should not be significant. Still, it is necessary to form the knowledge and qualifications of a future specialist. Entirely consistent with students' learning preferences, teaching methods often fail to create conditions that support their progress. Our approach enables the application of an indicative quantitative characteristic that helps determine the above balance. The main stages of the developed approach are as follows (Fig. 3.11).

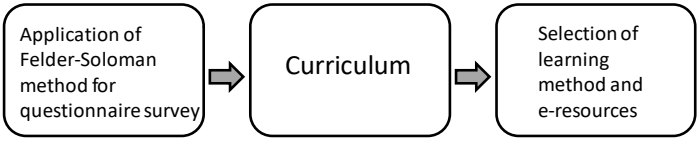


Figure 3.11 Integration stages of learning styles with teaching methods and learning e-resources in the course of development of instructional technology

The developed approach includes the following:

- Methodical work on the content of a discipline, the development of a training and work program.
- Establishing the goals and objectives of the study.
- Investigation of the composition of a student group using the Felder-Solomon questionnaire. When a lecturer works in a traditional group setting, it is impossible to make the material accessible to all types of students. Therefore, it is necessary to consider the dominant category of students, which will serve as the basis for selecting methods and learning means.
- Selection of teaching methods and essential electronic resources according to the taxonomy illustrated in Tables 3.16–3.19.

Not all teaching methods, accompanied by corresponding e-resources, should be used for each type of student. You can select the most convenient and affordable option.

Example of application of the developed technology for inorganic chemistry learning

In the first stage, 63 students in the first year of the Faculty of Chemistry at DNU completed a questionnaire based on the Felder-Solomon method. The results are shown in Table 3.20.

Table 3.20

The results of an ILS survey of the first-year students of the Faculty of Chemistry at Dnipropetrovsk State University

Subgroup	The relative number of students, %							
	act	ref	sen	int	vis	Vrb	seq	glo
1	77.8	22.2	88.9	11.1	55.6	44.4	77.8	22.2
2	88.9	11.1	66.7	33.3	66.7	33.3	22.2	77.8
3	63.6	36.4	90.9	9.1	90.9	9.1	54.5	45.5
4	77.8	22.2	66.7	33.3	66.7	33.3	77.8	22.2
Total:	77.0	23.0	78.3	21.7	70.0	30.0	58.1	41.9

A sizable average difference was found to be connected to the channels of perception, where 70% of students identified the prevailing visual style, and only 30% preferred the verbal style. The most significant difference is observed in the processing and perception of data: most students work actively (77% versus 23% of reflective students) and are more sensing and practical than intuitive (78.3% and 21.9%, respectively). Finally, in comprehension, students mainly prefer a sequential style. As a result, the dominant combination of the styles for each dimension in the studied group is {act, sen, vis, seq}.

The lecture course is supplemented by four hours of laboratory practice, where the group is divided into subgroups. During the organisation of laboratory classes by subgroups, lecturers will need to consider the specific characteristics of each subgroup, as subgroup 1 has a higher proportion of verbal students. In contrast, subgroup 2 differs from the others in having a higher proportion of students who are both global and intuitive (Table 3.20).

Based on the general characteristics of this course, students are recommended to undertake the majority of tasks in the form of problems to be solved. Practising and repeating the material while solving problems will enable students to fully understand the theory.

In the third stage, optimal teaching methods and e-resources are selected based on the taxonomy of Tables 3.16–3.19 and according to the results of the students' educational preferences survey (Table 3.20). The results of optimisation are shown in Table 3.21. A lecturer can select a type of e-resources that better matches the content of the material and the category of students. Table 3.21 facilitates a comparison of learning methods that are better perceived by students of these types, allowing for the selection of the most effective one.

For example, most students in a group with the profile {act, sen, vis, seq} are better trained in the problem-searching method in its different versions and quickly comprehend modelling. The computer simulation method, which is rarely currently used, shows promise in developing teaching methods for basic chemical disciplines.

Table 3.21

Taxonomy of integration of learning methods and e-resources for {act, sen, vis, seq}

	Active	Sensing	Visual	Sequential
Characteristics of student style	I prefer experimentation and active, collective work with learning data, with the possibility of practical application of the results.	I prefer courses that are directly related to the real world, where students study facts and conduct hands-on experiments. Pay attention to details, work well practically, and often solve problems using established methods; they are cautious and prefer not to encounter surprises or difficulties.	Well-perceived and better-memorised images: drawings, diagrams, charts, graphs, etc.	Convergent thinking prevails. Achieve an understanding by studying the material step-by-step, where each new step logically follows from the previous one.
A pedagogical approach to the organisation of learning	Students need to take active action by discussing or applying data and explaining the material to others. It is challenging for them to listen to lectures without engaging in activities beyond simply taking notes. It is better to organise training in groups	Teaching material with specific examples of implementing theories and their practical application. Solving tasks in a particular order involves implementing specific procedures and actions to achieve the desired outcome. Work in the laboratory	Students study better when the teaching material is presented both visually and verbally. Students tend to remember what they see better.	Students learn better through small, orderly, and logically related sequential steps to solve problems. It is necessary to teach the material in a logical order and to try to link each new topic with those studied earlier for a broad and holistic understanding.
Methods qualified for use	Practical Problem-search (brainstorming, project method) Modelling Creating game situations	Verbal, visual Practical Problem-searching Modelling Experiment	Visible Practical Problem-Finding Modelling Experiment Games and simulations	Verbal, visual Problem-searching (Work with reference books) Modelling

	Active	Sensing	Visual	Sequential
	A study based on solving problems Expert Group Discussion	Method of questions and answers A study based on solving problems Exercise	Independent work with training programs and simulators	Method of questions and answers Reproductive exercises
E-resources are qualified for use	Static visualisation, Program package, E-textbooks, Teaching programs, E-mail, search engines, Teaching database, Tests are ready for use	Static visualisation Program package, Virtual labs for laboratory work, E-textbooks, Teaching programs, E-mail, search engines, Teaching database, Tests are ready for use	Static and dynamic visualisations, Virtual labs for laboratory work, Quantum chemical simulation of spectra, Teaching programs, Teaching database, Tests are ready for use	Quantum chemical simulation of spectra, E-textbooks, Teaching programs, E-mail, search engines, Teaching database, Tests are ready for use

3.11.5 Possible Conflicts between Teaching and Learning Styles

Imagine yourself in the place of a teacher who plans to work in a group with the profile of learning preferences defined in Paragraph 3.11.4. Graphically combine the pictures of your profile and the average group profile. Compare the data obtained for the average scores of the students' learning preferences in the group.

Determine if there are significant (>3 units) differences in the profile of the imaginary teacher (your profile) and the group's profile.

Describe possible "conflicts of learning and teaching styles" and ways to overcome them.

Use the recommendations given in Section 3.9.

Appendices to Chapter 3

1. Teaching Philosophy

Education helps to discover and develop students' potential. My classroom fosters open-mindedness, celebrates diversity, and adheres to established norms and laws. The primary teaching method for my class is to encourage students. In my personal experience, encouragement has a way of bringing out the best in people. I respect the needs of each student, and there is no double standard in place. Again, teaching is not about showing off how much you know. If students feel compelled to guess what is on the teacher's mind without examining their critical thinking, the teacher will fail.

Interest is a good teacher and a good friend. My primary goal is to inspire students to be excited about design studies, and I serve as a role model for conveying my enthusiasm for design research to my students. After class, students could see their interests. They believe in their ability to learn. The second goal is to teach students how to inspire passion. By the end of the course, students would think systematically. They can identify the root causes of specific design problems, think globally, and act locally.

There are three levels of teaching: guidance, demonstration, and training, which depend on the level of education, disciplinary background, and social context of the students. Secondly, a technical course, such as "Interior Lighting Design," may require training, whereas a conceptual course, like "Foreign Excellent Design Appreciation," needs to be primarily instructional. I would also like to develop a new course, "Digital Exhibition Design," which combines industrial design, interior design, and virtual reality technology.

A typical course involves lectures, discussions, and writing assignments. After my lessons, I expect each student to ask one to five questions. Ultimately, students are required to write a closing statement. Impromptu writing helps students think critically and also aids them in their academic writing, such as term papers. Special sessions include role-playing case studies where students can take on the role of designers, entrepreneurs, developers, or residents and participate in design projects.

I focus on process assessment and class participation to assess students, and I emphasise post-class quizzes and class discussions more than final summaries. Additionally, students' assignments and class participation provide me with regular feedback on the effectiveness of my teaching, enabling me to reflect more effectively on and improve my teaching methods.

2. Identify your type of adult education philosophy according to the instructions in the PHIL chart below.

PHIL ™

Philosophies **H**eld by **I**nstructors of **L**ifelong-learners

Considerate of the learner's needs so that each learner can explore and make educational decisions in consultation with me.

Open this flap, and proceed to the next box.

Continue from front flap.

I I believe that the effective instructor:

Capitalizes on the learners' feelings during the learning process to accomplish the learning objectives.

Helps learners increase their awareness of significant social and political issues so they can have an impact on these situations.

You are in Group 3.

You are in Group 5.

Go to the **Description of Philosophies** section in the middle of the other side of this page. Read the description of your educational philosophy.

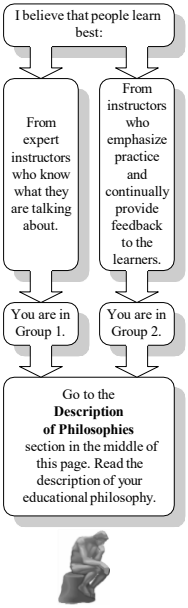
PHIL™ : **P**hilosophies **H**eld by **I**nstructors of **L**ifelong-learners
Gary J. Conti © Copyright 2002

Directions: Read the sentence stem in the box below, and choose one of the two options that best applies to you. Follow the arrow, and ***flip open your flap.*** Continue the process until you find the number for your group. Only read the material in the boxes to which you are sent.

As an educator, I seek to create a learning environment that has content and educational activities that are:

Controlled with careful analysis by me of the material to be covered and concepts to be taught so that learners can systematically move toward the learning objectives.

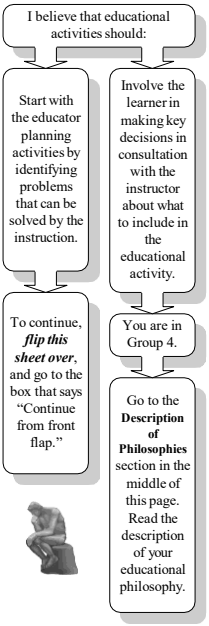
Open this flap, and proceed to the next box.



Description of Philosophies

Group 1 is **Idealism** which holds that *ideas* are the only true reality. This philosophy goes back to ancient Greece and claims greats such as Socrates and Plato. This school seeks to discover true knowledge rather than create it. The aims of the philosophy are to search for truth and further the character development of learners. The role of the teacher is to serve as a guide for immature learners, judge important material, and model appropriate behavior. The instructional process is holistic, seeks to develop critical thinkers, and deals with broad concepts rather than specific skills. This is a content-centered approach to education with a heavy emphasis on seeking universal truths and values and with a strong and defined role for the teacher.

Group 2 is **Realism** which holds that reality exists independent of the human mind; matter in the universe is *real* and independent of man's ideas. This philosophy grew out of the Age of Enlightenment and strongly supports the use of the scientific method. Its aims are to understand the world through inquiry, verify ideas in the world of experience, teach things that are essential and practical, and develop the learner's rational powers. The instructional process seeks to teach fundamentals, encourage specialization, and teach the scientific method. The role of teacher is to present material systematically, encourage the use of objective criteria, and be effective and accountable. **Behaviorism** is congruent with this broader teacher- centered philosophy.



Group 3 is **Pragmatism** or **Progressivism** and is associated strongly with the works of John Dewey. It seeks to inquire and to then do what works best; that is, it seeks to be *pragmatic*. However, everything centers on the human experience. It seeks to promote democracy by developing strong individuals to serve in a good society. It supports diversity because education is the necessity of life. Its aims are to seek understanding, coordinate all environments into a whole, teach a process of inquiry, and promote personal growth and democracy. The instructional process is flexible with a concern for individual differences and for problem solving and discovery. In this learner-centered approach, the role of the teacher is to identify the needs of the learner and to serve as a resource person.

Group 4 is **Existentialism** or **Humanism** and draws heavily from the ideas of Carl Rogers. This philosophy focuses on the individual and believes that individuals are always in transition. People interpret the world from their own perceptions and *construct* their own realities. Its aims are to promote self-understanding, involvement in life, an awareness of alternatives, and the development of a commitment to choices. Learning is viewed as a process of personal development which seeks to provide learners with options. The role of the instructor in this learner-centered philosophy is to be a facilitator. The cornerstone of this philosophy is trust between the teacher and learner.

Group 5 is **Reconstructionism**. It strongly believes that education can be used in *reconstructing* society. In order to achieve social justice and true democracy, change rather than adjustment is needed. This philosophy is futuristic and takes a holistic view of problems. Its aims are to encourage social activism and the development of change agents. Its purpose is to empower people to think critically about their world, develop decision-making abilities, get involved in social issues, and take action. The role of the teacher in this learner-centered philosophy is to help learners develop problem-posing skills and lifelong-learning skills. This school of thought has been greatly influenced by the work of Paulo Freire and Myles Horton.

Chapter 4. Strategies for Engaging Adult Learners

4.1 Digital Learning Environments and Technologies in Adult Education

4.1.1 Digital Pedagogy and Andragogy

Digital pedagogy refers to the pedagogical use of digital technologies or the study of how to teach with them. The goal is to use the unique capabilities of these technologies to achieve effective teaching. Recent research on digital pedagogy reveals three interconnected dimensions that researchers have focused on.

1. Pedagogical Orientation refers to a teacher's approach to education, particularly whether they favour constructivist or student-centred pedagogies.

2. Teaching Practices involve teachers' classroom methods, such as engaging students, using problem-based approaches, or encouraging knowledge creation.

3. Digital Competencies include a teacher's knowledge, skills, attitudes, and confidence in using digital technology for teaching[130].

These three dimensions are deeply connected. For example, teachers' beliefs about education can influence their online interactions with students. If technology is not balanced with effective teaching methods, the potential benefits of e-learning may not be realised.

The term "digital pedagogy" is defined in several ways, with some definitions being more expansive than others.

- Technology-focused: This narrow approach defines digital pedagogy as the use of educational technology to enhance learning. However, the text warns that this view can be limiting, as it risks allowing technology to constrain creative teaching.
- Method-focused: This approach views digital pedagogy as the use of digital resources to create new, flexible, and high-quality learning experiences.
- Experience-focused: This perspective emphasises using digital tools to improve or transform the educational experience by addressing the learning process, collaboration, and even play.
- Paradigm-focused: The broadest definition positions digital pedagogy as a new learning paradigm. In this view, it is a way of thinking about facilitating active learning and enabling personalised, interactive experiences through a range of digital tools.

The researcher offers valuable insights into the potential of digital technologies to shape new teaching methods. They highlight a generational difference in cognitive styles, contrasting "deep attention" (focused, linear reading) with "hyper attention" (multitasking and quickly switching focus), which is common among younger people.

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[130] Väätäjä J. O., Ruokamo H. (2021). Conceptualizing Dimensions and a Model for Digital Pedagogy. *Journal of Pacific Rim Psychology*, Vol. 15, 1–15.

> "Digital pedagogy is the part of pedagogy that studies the design, implementation and evaluation of educational situations comprising a significant component of digital technologies, as well as the necessary conditions for their implementation – synchronous and asynchronous interactions in virtual and mixed learning environments, learning management platforms and tools, digital educational resources, educational usage of various digital applications and tools, virtual assistants for learning and teaching, digital competences of teachers, educational policies and specific programs".[131]

For example, K. Hayles points out the conflict this creates in classrooms, where traditional educators expect deep attention from students who are more accustomed to a hyper-attentive mode of thinking. She also examines how classrooms can utilise interactive, high-stimulation technologies to address hyperactivity and attention deficit. According to Hayles, the key question for educators is not whether one style is better than the other but how much to adapt teaching to fit students' cognitive styles and how much to help students develop new ones[132].

Technology's role in education has evolved through distinct periods, each defined by new technologies and changing pedagogical approaches.

- Early Integration (Early 1900s - 1980): During this era, education began to utilise media and telecommunications to deliver distance education.
- Internet Expansion (1990-2000): The rise of the internet led to the creation of concepts such as e-learning and virtual education, which began to replace traditional distance learning models.
- The Social Web (2000-2010): With the advent of Web 2.0, social media and mobile learning emerged as significant developments. E-learning has evolved to adopt a constructivist approach, focusing on active knowledge construction.
- Digitalisation and MOOCs (2011-2015): This period was marked by the development of the "semantic web" (Web 3.0), leading to the growth of online educator training and the widespread adoption of digital classrooms and Massive Open Online Courses (MOOCs).
- The Rise of Digital Pedagogy (2016-2023): The development of highly interactive Web 4.0, combined with the significant impact of the COVID-19 pandemic, led to a rapid and large-scale expansion of digital pedagogy as universities adapted their teaching methods.

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[131] *A term according to:* Istrate O. (2002). Digital Pedagogy. Definition and Conceptual Area. *Journal of Digital Pedagogy.* Vol. 1(1), 3–10.

[132] Hayles N.K. Hyper and Deep Attention: the Generational Divide in Cognitive Modes. *Profession.* New York, NY: Modern Language Association, 2007, P.187–199.

This era saw a significant increase in research on how to effectively teach with technology[133].

The roots of digital pedagogy are deeply connected to the history of distance education, a concept that dates back almost two centuries. The term "distance education" first appeared in university documents in the late 1800s and gained widespread adoption in the mid-20th century. Its definition has evolved constantly alongside technological advancements, beginning with correspondence courses and progressing as new digital tools became available.

Distance education is a broad concept that encompasses various methodologies and institutional models, combining both remote and in-person learning approaches. Over time, as technology advanced, terms like "online education" and "e-learning" emerged. These new models are defined as a pedagogical approach that uses digital technologies to create spaces for dialogue, group learning, and interpersonal interaction. Models of Technology Integration aim to understand and predict how teachers use technology in the classroom. In particular:

Will the Skill Tool Pedagogy Model have evolved from the earlier "Technology Acceptance Model"? It emphasises that for effective technology integration, teachers need the skills to use technology and the tools (hardware/software), the will (a positive attitude), and a strong pedagogical orientation toward teaching[134].

TPACK Model: The Technological Pedagogical Content Knowledge (TPACK) model argues that teachers need to understand three core knowledge domains and their intersections:

- Content Knowledge: Deep knowledge of the subject being taught.
- Pedagogical Knowledge: Understanding of teaching methods and strategies.
- Technological Knowledge: Proficiency in using technology[135].

Good teaching with technology, therefore, cannot be achieved by simply adding a new piece of technology to existing structures. Effective teaching, combined with technology, necessitates a shift in existing pedagogical and content domains. The TPACK framework also emphasises the role of the context within teaching and learning (Fig. 4.1).

Teaching is a context-bound activity, and teachers with developed TPACK use technology to design learning experiences tailored for specific pedagogies, crafted for specific content, as instantiated in specific learning contexts.

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[133] Santoveña-Casal S., López S.R. (2024). Mapping of Digital Pedagogies in Higher Education. *Educ Inf Technol,* 29, 2437–2458.

[134] Knezek G., Christensen R. (2016). Extending the Will, Skill, Tool Model of Technology Integration: Adding Pedagogy as a New Model Construct. *Journal of Computing in Higher Education*, 28(3), 307–325

[135] Howard S. K., Tondeur J., Siddiq F., Scherer R. (2020). Ready, Set, Go! Profiling Teachers' Readiness for Online Teaching in Secondary Education. *Technology, Pedagogy & Education*, 30(1), 1–18

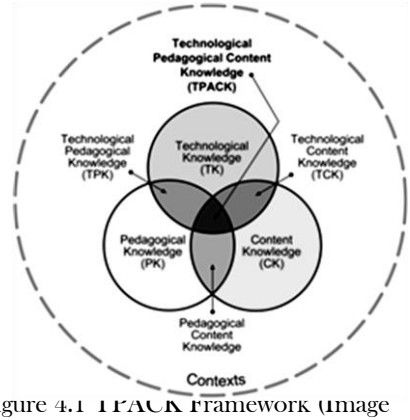

Figure 4.1 TPACK Framework (Image taken from http://tpack.org)

In the sections below, we describe each component of the TPACK framework and, most importantly, its interactions with the others[136].

What is the TPACK Model?

Digital andragogy is "a practice of educators to equip and encourage adult learners to choose and use the affordances of accessible digital technologies to personalise their learning and facilitate their interactions with peers and tutors"[137]. This approach requires a subtle shift in the locus of control, moving responsibility for learning from the teacher to the learner. It is built on three key pillars:

1. 21st Century Learning Skills: The emphasis shifts from simply acquiring knowledge to being able to do things with that knowledge. The text identifies four essential skills:

- Critical Thinking: The ability to quickly and fluently evaluate the massive amount of digital information.
- Communication & Collaboration: The capacity to engage in rich dialogue and sophisticated teamwork in both face-to-face and online environments.
- Creativity: The ability to innovate and solve problems is viewed as a skill that can be developed, not just an innate characteristic.

2. The 21st Century Learner: The text challenges the stereotype of the "digital native," noting that adult learners are diverse, including career-changers and older generations. It highlights key behaviours and needs of modern students:

- They use digital technologies as a way of life and to form their identities.
- They want personalised, flexible learning and instantaneous feedback.
- They are multitaskers who often switch between tasks.
- They often lack basic digital skills, such as troubleshooting and file management, a gap that educators need to address.

[136] Mishra P., Koehler M.J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, 108(6), 1017–1054.

[137] Blackley S., Sheffield R. (2015). Digital Andragogy: A Richer Blend of Initial Teacher Education in the 21st Century. *Issues in Educational Research*, 25(4), 397-414.

3. Web 2.0 Technologies: These technologies provide the tools for this new approach.

Several key models and concepts explore the evolving roles of teachers and students in digital learning environments. Critical Digital Pedagogy (CDP) is presented as a framework that extends beyond the mere use of technology as a tool. Instead, it views digital education as a democratic, participatory, and empowering process in which teachers and students collaboratively co-create knowledge. It encourages critical reflection on the social, cultural, and ethical issues related to technology. The text suggests that teachers can facilitate CDP by:

- Raising awareness of ethical issues like data privacy and equity.
- Using technology in a reflexive, thoughtful way.
- Promoting inclusivity, social justice, and equality.
- Considering students' well-being and emotions.
- Using an authentic assessment that requires student reflection.
- Promoting digital platforms for social justice initiatives[138].

Critical digital andragogy is a framework for teaching adults in the digital world that combines three key concepts: critical theory, andragogy, and digital technology.

- Critical: This component draws on critical theory, a philosophy that addresses marginalisation and oppression. It is particularly relevant for adults who face various societal and personal hurdles in pursuing lifelong learning, including challenges in the digital world.
- Digital: This component utilises digital technologies to create interactive, open, and networked learning environments. It transcends simply storing content to develop platforms where teachers and students actively engage in their learning.
- Andragogy: This framework for adult learning emphasises the adult learner's self-directedness and values their life experiences. A digital andragogical approach empowers adult learners to personalise their learning using digital tools and interact with peers and instructors.

To apply critical digital andragogy, educators should design online experiences that are easy to navigate and offer diverse ways to access information. These environments should foster collaboration, encourage individual contributions, and promote reflection and self-reflection.

Practising this approach requires educators to:

- Model digital literacy and provide technology training.
- Critically reflect on digital policies to avoid marginalising learners.
- Address equity gaps and reduce inherent inequities in digital learning.

[138] Köseoğlu S., Veletsianos G., Rowell C. *Critical Digital Pedagogy in Higher Education.* AuPress, 2023

- Prioritise access, accessibility, equity, inclusion, ethics, privacy, safety, and learner agency when using digital tools.

Ultimately, this framework offers a nuanced approach to creating inclusive and transformative learning environments for adults by aligning critical methodologies with the unique needs of adult learners in a digital context[139].

Researchers offer an interesting approach to analysing modern technological realities, particularly artificial intelligence, in the context of Knowles' concept of andragogy. According to the principles of **andragogy,** as defined by Malcolm Knowles, adult educators must actively embrace these technologies while teaching learners about their potential and limitations. Knowles would view GenAI as a powerful tool for supporting the autonomy of adult learners. AI-driven tools can provide personalised, real-time feedback on projects and assignments, allowing learners to get help when needed without relying entirely on an instructor; this aligns perfectly with Knowles's emphasis on self-directed learning and incorporating real-life experiences as part of the educational process.

Knowles would also advocate for teaching **digital literacy skills** related to GenAI. They would empower busy adults to work more efficiently by using AI to handle tedious tasks, such as editing, or to "kickstart" projects by generating ideas. However, he would also likely urge caution, stressing the importance of ensuring technology is accessible to everyone to avoid creating or worsening a **digital divide.**

Knowles believed that adults learn best when actively involved in experiences relevant to their lives and work. The rapid integration of AI into the workforce makes it essential for adult educators to teach students how to be competent and responsible users of AI, as well as to be aware of potential risks, such as privacy violations, security concerns, and algorithmic biases. By doing so, educators can prepare graduates for success in a workforce that is increasingly relying on AI.

Overall, a Knowles-inspired approach would see GenAI not as a threat but as a vital tool for empowering adult learners and creating more personalised, efficient, and relevant educational experiences[140].

4.1.2 Flexible Learning Modalities: Distance, Blended, and Remote Approaches

One area of application for information and communication technologies (ICT) in education is distance learning. It has now spread and is organically integrated into the unified information space of the educational institution.

Distance learning is an individualised process of acquiring knowledge, skills, and abilities through the mediated interaction of distant participants in the educational process. This process is conducted in a specialised environment

[139] Jacqueline M. McGinty and Kimberly M. Rehak Critical Digital Andragogy. *Conference: American Association for Adult and Continuing Education, Paper presented at the American Association for Adult and Continuing.* Milwaukee: WI, 2022.

[140] Storey V.A., Wagner A. Andragogy in the Age of AI: Transformative Pathways for Adult Education. In: V. Wang (Ed.). *Integrating AI into Pedagogical and Andragogical Education.* IGI Global, 2024.

utilising modern psychological and pedagogical information and communication technologies. Distance learning cannot be implemented without adequate technical support for students and teachers, as well as the necessary computer and Internet skills.

In English, the term "distance education" encompasses both distance teaching, which involves the teacher's activities, and distance learning, which involves the student's activities. These activities occur within a single distance learning process, where the teacher and students are separated spatially. By this term, we understand the process of acquiring knowledge and skills with the help of a specialised environment based on modern ICTs that ensures the exchange of educational information at a distance.

The term "blended or hybrid learning" has different definitions. In general, it combines offline and online learning in different proportions. Blended learning emerged as early as the 1990s as a counterpoint to online learning, but it was not widely implemented until the 2000s. Educational institutions and teachers independently set the proportions of the so-called mix.

The definition and separation of the term “remote learning” from related terms have been recently established. This term refers to temporarily changing the forms of educational organisation from offline to online modes in conditions that contain elements of uncertainty (such as the introduction of quarantine restrictions or martial law). For teachers, this means new challenges. It is necessary to create lesson plans and develop educational materials that can be conveniently used in both modes of learning, which can be carried out over varying periods of time. Additionally, educational resources should be designed for a variety of modern mobile devices that students can use during unforeseen, unplanned transitions to distance learning.

In recent years, remote learning has become increasingly in demand, especially during the COVID-19 pandemic and for countries that must carry out the educational process under war conditions. Schools and universities around the world must periodically transition to online learning to ensure the safety of students and staff.

However, remote learning is not a new concept. This form has been used for many years by students who are unable to attend school or university in person due to a disability, illness, or other reasons. In our opinion, remote learning is, to some extent, a form of inclusive education organisation. It became widespread in response to the challenges of the 21st century and requires the development of teaching methods in this form for groups of students.

Let us consider the features of distance and mixed-learning organisations in more detail.

Distance learning

The primary advantage of distance education is its accessibility, openness, and the ability for students to complete tasks and access necessary information at a convenient time and from any location worldwide. The positive aspect of distance

learning is the ability to adapt teaching to any subject, taking into account students' abilities and preferences.

One disadvantage of distance learning is the lack of direct contact between teachers and students. Online classes only partially compensate for the so-called real-time live communication.

For distance learning to be effective, it must be organised appropriately, requiring appropriate personnel, systems, and technical support.

In general, it can be said that the distance learning system should contain the following components:

- A set of technical and software tools that ensure the use of modern technologies for working with information.
- Complexes of scientific and methodological support of the educational process;
- Resources for organising the communication of participants in the educational process;
- Repositories (libraries, media libraries, or depositories) of various types of educational materials for managing students' independent work;
- Means for organising knowledge controlling, and monitoring the quality of the educational process.

Distance learning can be organised in different modes: asynchronous, synchronous, and mixed.[141]

Asynchronous mode. The teacher prepares educational materials, lecture recordings, and educational tasks in advance and places them on the appropriate Internet resource. The student performs the proposed work according to his own or an approved general schedule. This form of work is the most common and is used by most educational institutions.

Synchronous mode (online learning). As with face-to-face learning, interaction between students and the teacher occurs in real time. These are video conferences, online classes, and live broadcasts. The primary difference between authentic learning and this form is that students and the teacher work and interact at a distance, rather than directly in the same room.

Mixed approach. It involves a combination of asynchronous (providing educational materials) and synchronous (direct communication between students and the teacher in real-time) modes. In the mixed approach, students and the teacher communicate, discussing problematic issues.

The scientific and methodological support of distance learning includes:

- External normative documentation at the state level determines the requirements for organising the educational process. On this basis, each educational institution develops its regulations, which govern the rules and conditions for organising distance learning. As external documents are

[141] Amelina O.S., Tsurkan O.V. *Distance, and Blended Learning. Experience, Advice, Tools.* Kharkiv: Osnova, 2022.

considered, both theoretical and practical recommendations can be found, including those from official sources (such as the Ministry of Education or local and regional authorities) and the experiences of colleagues.

- Distance learning monitoring and control systems. They help identify shortcomings and difficulties and activate interaction between participants in the educational process.
- Methodical and didactic acquisition with resources of training systems based on relevant platforms.

An important aspect is the choice of a platform for organising distance learning. By this term, we refer to the software, which comprises a set of essential applications necessary to ensure the functioning of the above-listed components of the distance learning system. Such a platform becomes the central element of the system.

When introducing distance learning in an educational institution, certain principles should be followed, as stated in Amelina and Tsurkan (2022), namely, to ensure:

- Adaptability – personal training of the student according to his abilities and skills;
- communicativeness – active interaction between the student, the teacher, and the administration of the educational institution;
- student-centeredness – orientation to the individual learning trajectory of the student, creation of comfortable conditions;
- pedagogical prudence and expediency, which involves monitoring the effectiveness of training and adjusting, if necessary, its conditions;
- network security is one of the main principles today, from the viewpoint of protecting personal data and protecting the learning process;
- basic level of education – educational services in the period of distance learning must meet the standards of education; each student must acquire a basic level of knowledge;
- mobility - educational materials should be accessible to all students with minimal technical support. It is worth creating your educational networks to save databases. Assignments and other materials stored in the cloud are accessible and can be updated at any time. However, information can be transferred to electronic media or a paper version after leaving distance learning or during mixed education;
- social integration - explanatory work among the public is essential;
- the use of health-saving technologies, which means preventing the overloading of students, as well as compliance with sanitary requirements regarding the time of distance classes for students of different age categories. For example, teachers use the time of continuous work at the computer to conduct synchronous classes (online), explain educational material, consolidate what has been learned, and check learning results. Teachers can utilise other parts of the class for students to complete "asynchronous" tasks or review additional

materials independently. At the end of the lesson, the teacher can return to the video conference mode again to discuss the completed tasks and reflect.

Distance learning can be provided via email, teleconferences, educational forums, and chats. Modern trends in distance learning development include hosting academic multimedia courses and distance lessons, featuring interactive content, various visualisations on educational topics, intelligent search services, and more, on dedicated servers.

In distance learning, students receive a set of educational materials. This set typically contains texts, lecture support materials, problem books, workshops, and tasks for independent work, available on various media, including traditional printed forms and multiple digital formats, as well as audio and video materials, interactive computer software, and training tools.

The distribution of time and forms of work depends on the teacher and the specifics of the educational programs. For more comfortable and systematic work, educational institutions develop a schedule of distance classes that follows teachers' workloads and the educational program. A combination of synchronous and asynchronous training is considered the most effective. However, the key role in choosing the quantitative ratio of time for the combination belongs to the administration of the educational institution.

Blended learning

During blended learning, the same principles are followed as during distance learning. However, the blended form is methodologically more complex, as it combines traditional and distance learning tools and approaches.

At this stage of educational development, remote learning is considered even more complex, as it encompasses elements of uncertainty in learning conditions across different periods. Research into the possibility of optimising the conditions of remote learning to ensure its quality and efficiency continues and is the subject of scientific discussion by leading experts in pedagogy and psychology.

During blended learning, group forms of work are most often used in both face-to-face and remote modes. This approach allows the teacher to work with several groups simultaneously. For example, the first group works face-to-face, and the second group – remotely. After a certain period (as determined by the administration or local authorities), the groups switch places. All students are generally involved in the educational process; the teacher is constantly in contact with them.

The role of the teacher in blended learning is changing. He does not broadcast information but directs, coordinates, and organises collective work. It develops important competencies in students, including the ability to work in a group, defend their opinions, and search for and interpret data. Institutions of higher education were among the first to use blended learning technology.

The advantage of blended learning is the possibility of direct communication between the student and the teacher. Students can independently distribute their working time, complete tasks, and receive online consultations. For both parties

involved in the educational process, the time spent at the computer decreases, positively affecting health.

Advantages of blended learning:

- Live communication, active communication, and interaction with the teacher.
- Working with educational materials located on distance learning platforms contributes to the development of independence.
- Cooperation, on the one hand, with the teacher, and, on the other hand, with classmates. The skills of a "team player" are formed.
- Mastering the skills of working in real conditions (laboratories, equipment, etc.).
- Creation of an evaluation system that allows for determining the degree of independence of the student and the quality of their acquisition of knowledge and skills more reliably, using various forms and methods of control.
- Coordination of actions - not only in the educational sphere but also in educational and extracurricular work.
- Disadvantages of blended learning.
- The presence of students with different levels of training in the same group (the effectiveness is affected by the insufficient level of computer literacy and culture of students).
- Non-systematic attendance at classes.
- Often, the passive nature of acquiring knowledge and skills;
- The quality of technical support can vary greatly depending on the type of devices used by students.

Webinars as a means of improving teachers' qualifications

Modern ICTs enable the creation of powerful educational electronic environments that are rapidly evolving, erasing the boundaries between traditional formal and informal education. The correct organisation of these educational settings encourages scientific and pedagogical workers to search for and find innovative educational and scientific activity methods that will motivate them to engage in cognitive activity and develop students' independent learning skills.

At the same time, education informatisation emphasises and changes the requirements for information and communication competence (ICC) of teachers who develop educational materials using new ICT means. The formation and development of ICC among teachers in educational institutions are primarily implemented through professional development programs.

Modern ICTs (such as blogs, wiki technologies, and webinars) enable the implementation of professional development through real-time communication, cooperation, and reflection, as well as the integration of innovative pedagogical technologies. The primary areas of webinar use include holding group training classes, distance learning, particularly for conducting lectures, seminars, and practical classes. Let us consider some recommendations for conducting webinars.

Conducting webinars (also known as online seminars) requires the use of specialised software. The level of development of modern technologies is such that

the process of preparing and holding a webinar is no more complicated than the similar process of organising a traditional training or seminar in the classroom. However, entering the network should be preceded by preparing appropriate didactic materials. They should correspond not only to the topic but also to the target audience and the peculiarities of the perception of the material in such a specific mode.

First, to successfully conduct the webinar, the teacher must verify the availability of suitable technical support for themselves and the participants: a microphone, headphones, a web camera, and an Internet connection with a speed of at least 2 Mbit/s for both the teacher and the participants. A low-quality webcam can distort the teacher's face and movements, distracting listeners' attention and often distorting their perception. In this case, it is better to turn off the camera and draw attention to the presentation slides or the "whiteboard."

When choosing the material, the teacher should remember that listeners' attention spans are limited to approximately 45 minutes, after which they tend to become tired. So, first of all, you should not set too many goals and tasks that must be achieved during the lesson. It is better to concentrate the material around one leading idea and choose various means of its delivery, such as theoretical explanations, practical examples, memories of how another audience perceived this material, and accompanying presentation slides.

At the same time, every 7-10 minutes, the monologue should be interrupted by asking questions to the listeners, showing a video sequence, drawing on the "whiteboard," etc.

The next 45 minutes of the class should be devoted to answering questions and discussing with the listeners. The listeners will demonstrate their prepared materials if the webinar is part of a training course. A convenient option is to send handouts so listeners can prepare questions in advance, or offer all webinar participants the opportunity to answer one or two questions before it begins. Then the second half of the lesson can be devoted to analysing the answers.

When preparing a presentation for a webinar, pay attention to the following requirements: minimising animation, avoiding complex drawings and pictures, using a large enough font, a contrasting background, and keeping the number of slides to a minimum. The title slide should include the webinar's topic, the teacher's last name, first name, and position, as well as any other relevant information. This slide should be included as a screensaver for the webinar 10-15 minutes before its start, so that listeners who join in advance do not see a teacher who is conversing with colleagues. Not a blank screen, but information that they have not made a mistake with the site, and they are waiting for a lesson on a specific topic.

It is also worth carefully considering the nuances of working with questions that students will ask the teacher. During the presentation of the material, questions should be accepted only in the chat. It is appropriate to contact them after every 7-10 minutes of the presentation, voicing the questions that have come in (otherwise, while the teacher reads the questions, there will be an awkward pause

on the air). Questions relevant to the teaching can be answered immediately, but in the central part of the teaching, the answers should not take more than 5 minutes for each question-answer session. Some questions should be postponed until the end of the webinar, informing the listeners about it out loud. Irrelevant and narrowly focused questions should not be left unanswered. They should receive a response from the instructor, for example, a message that assures listeners' questions will be answered verbally or in chat after the webinar.

When conducting a webinar, it is beneficial to have an assistant nearby who can guide participants through resolving technical issues that may arise and answer questions or provide insightful responses, as previously discussed with the instructor. The experience of conducting a webinar together with another teacher is an interesting one. In this case, each participant should have their computer, headset, and camera. In the case of paired work, one of the teachers can play the role of a presenter, asking interesting and provocative questions to the other, an expert on the topic under discussion. On the other hand, the teachers can act out a "debate" scene. When one defends a particular opinion, the other denies it, providing counterarguments, and listeners are drawn into the debate. Such work revives listeners' interest but should be alternated with "classic" webinars with one teacher.

Here are a few rules for working on a webinar:

1. 5-7 minutes before the start, start communicating with the listeners in chat or orally.

2. Do not start presenting the primary material exactly at the beginning of the webinar - most listeners connect late. Conduct an "icebreaker" exercise that will take 5-10 minutes.

3. Announce the rules of the webinar. Those who openly violate them, for example, by deviating from the topic, writing or pronouncing harsh and inappropriate remarks, should be punished, not by giving words orally and disconnecting from the chat.

4. You should not sit on a chair, put on a headset, check the microphone, and at the end of the webinar, take off the headset and get up from the chair with the camera turned on. Listeners should see the teacher only when they are fully ready for work.

5. Presentation slides should not be changed too quickly, but should not be delayed for more than 3-4 minutes.

6. Be aware of a signal delay of about 3 seconds between when a person says something and when other participants hear it.

In our opinion, it is advisable for educational institutions, in particular for students of higher education, to use the:

- educational webinar - provision of new information on a specific topic, similar to a lecture in the educational process, can also be used as a short-term seminar (from a few hours to days);
- informative webinar - is more general, includes more interactive forms of work, informs more than teaches;

- webinar-training – a method of checking the students' performance of seminar tasks and practical classes, implemented in the form of several classes;
- consultation webinar (webinar-support) – a form of conducting consultations with the supervisor regarding final theses in a remote format;
- in-class webinar – connecting listeners engaged in webinar mode to a classroom session allows for a synergistic effect due to the interaction of listeners with diverse experiences.

The interactivity of the webinar can be ensured by various methods, including an online survey of participants, visualisation of the discussion, the ability to take notes during the webinar and ask questions, file sharing, and the function of recording and distributing the webinar content. Let us consider each of these methods in more detail.

The online survey of participants. In the beginning, during the webinar, and after its completion, the organiser can conduct an online survey, during which all participants must answer one or more questions. An online survey can be conducted to update participants' basic knowledge on the topic, summarise the material, and motivate them to participate actively as listeners.

The survey settings can either hide the results from participants or, conversely, make them visible. In any case, the identification of answers with the names of the participants is available only to the organiser. Therefore, if the participant gives an incorrect answer and the results are open, only the organiser can see the participant's name who gave the wrong answer.

During the webinar, the organiser can visualise their report with the help of presentations, images from their desktop, and work in specific applications. Similarly, participants also have the option to visualise their responses (presentation during the webinar) for all participants. A key point is the ability to provide constant interactivity with the aid of board elements.

During the presentation, the speaker can ask participants to make markings on specific slides, such as geographical maps, diagrams, models, tables, or images. Webinar visualisation can be done using the Whiteboard element, allowing participants to share a part of the screen where slides, images, diagrams, or tables can be placed. Currently, all participant actions are automatically updated and can only be identified by the webinar organiser.

Each participant can use pre-prepared notes during the webinar, for example, in the Microsoft OneNote environment, or take these notes directly during the webinar. It is also possible to make these notes simultaneously available to all participants, whose actions will be automatically updated and available online for shared use.

Sometimes, during a webinar, it is necessary to distribute multiple files to the participants. A special module enables you to quickly accomplish this and specify specific levels of permissions (for viewing and editing).

The webinar host can record the webinar in video format, making it relatively easy to view the content in most players and publish it online at any time for rewatching or analysis of the session.

4.2 Applying Student-centred and Active Learning Methods

4.2.1 The Foundations of Self-regulated Learning

Self-regulated learning (SRL) has emerged as a prominent theoretical framework in both psychological and educational research. SRL is an active, constructive process whereby learners set learning goals and then attempt to monitor, regulate, and control their cognitive and metacognitive processes in the service of those goals. We acknowledge that SRL also encompasses other key processes, such as motivation and affect; however, our research focuses on the underlying cognitive and metacognitive processes involved in learning about complex scientific concepts.

Zimmerman, one of the first SRL authors, who has developed three different models of SRL, gives a helpful description of what a successful self-regulated learner looks like:

> These learners are proactive in their efforts to learn because they are aware of their strengths and limitations and because they are guided by personally set goals and task-related strategies, such as using an arithmetic addition strategy to check the accuracy of solutions to subtraction problems. These learners monitor their behaviour in terms of their goals and self-reflect on their increasing effectiveness. It enhances their self-satisfaction and motivation to continue improving their learning methods.'[142]

Zimmerman's Cyclical Phases model is organised into three phases: forethought, performance, and self-reflection (Fig. 4.2). In the forethought phase, the students analyse the task, set goals, and plan how to reach them. Several motivational beliefs energise the process and influence the activation of learning strategies.

In the performance phase, the students execute the task. At the same time, they monitor their progress and employ several self-control strategies to maintain cognitive engagement and motivation to complete the task. Finally, in the self-reflection phase, students assess how they have performed the task, making attributions about their success or failure. These attributions generate self-reactions that can positively or negatively influence how the students approach the task in later performances.

Effective learners use several strategies to help them learn well independently. According to Zimmerman, these can include:

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[142] Zimmerman B. J. Attainment of Self-regulation: A Social Cognitive Perspective. In: M. Boekaerts, P. Pintrich, M. Zeidner (Eds.), *Handbook of Self-regulation, Research, and Applications.* Orlando, FL: Academic Press, 2000. P. 13-39.

- setting specific short-term goals;
- adopting powerful strategies for attaining the goals;
- monitoring performance for signs of progress;
- restructuring one's physical and social context to make it compatible with one's goals;
- managing time use efficiently;
- self-evaluating one's methods;
- attributing causation to results and adapting future methods.

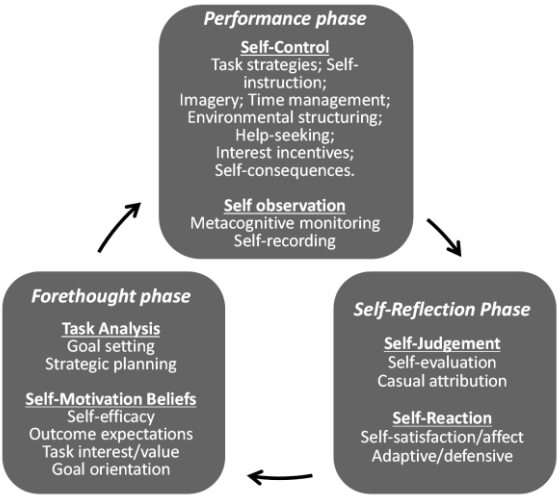

Figure 4.2 Zimmerman's Cyclical Phases model

Self-regulated learning includes the cognitive, metacognitive, behavioural, motivational, and emotional/affective aspects of learning.

Metacognition refers to the ways learners monitor and purposefully direct their learning. Self-regulated learners are aware of their strengths and weaknesses, and they can motivate themselves to engage in and improve their learning.

At the heart of this is metacognition.

When undertaking a learning task, we start with this knowledge, then apply and adapt it through metacognitive regulation.

It involves planning how to launch a task, working on it while monitoring the strategy to check progress, and then evaluating the overall success (Fig. 4.3).

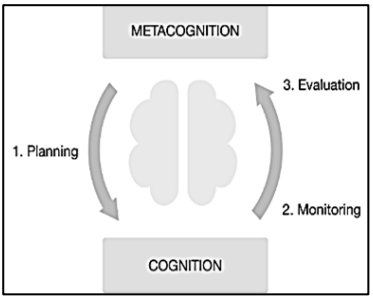

Figure 4.3 Zimmerman's Cyclical Phases model

It is not a one-off process of discrete steps but an ongoing cycle. In progress through the task of applying your metacognitive and cognitive skills, you update your metacognitive knowledge (of yourself, strategies, and tasks), as well as update your subject knowledge and skills.

Planning – encouraging students to think about the goal of their learning and consider how they will approach the task; this includes ensuring they understand the goal, activate relevant prior knowledge about the task, select appropriate strategies, and allocate their effort effectively.

Monitoring – emphasising the need for students to assess their progress while undertaking the learning task, including self-testing and self-questioning activities necessary to control learning and adjust their chosen strategies.

Evaluating – appraising the effectiveness of their plan and its implementation.

Metacognition refers to the knowledge of cognition and the strategies used to regulate and control it. However, it would be a mistake to see metacognition as somewhat 'higher order,' surpassing cognitive activities such as remembering knowledge. As pointed out, it is challenging to develop metacognitive knowledge about your competence in a given subject domain or how to learn most effectively without sound subject knowledge.

For the past 30 years, research into SRL has primarily focused on how students learn and achieve academically. It examines how students manage their thinking (cognition), how they reflect on their thinking (metacognition), their motivation, and how they approach a task. Think of it as a student taking charge of their learning process.

The Winne and Hadwin (1998, 2018) model is a key framework for understanding SRL. It is the only contemporary model that specifically emphasises metacognitive monitoring and control as the central "hubs" of SRL. This model has been tested in real-world educational settings and aligns well with research, particularly regarding how SRL processes unfold over time.

Winne and Hadwin suggest that learning happens in four main phases:

1. Task definition: Understanding what the task is.

2. Goal-setting and planning: Deciding what you want to achieve and how you will get there.

3. Studying tactics: The strategies you use to learn (e.g., reading, summarising, practising).

4. Adaptations to metacognition: Adjusting your thinking about your thinking based on how things are going.

What makes the Winne and Hadwin model unique is its idea that within these four phases, an "information-processing (IP)-influenced set of processes occurs". They use the acronym **COPES** to describe this:

- Conditions: What is given to the learner (e.g., instructions, prior knowledge, beliefs about the task).
- Operations: The learner's actions (e.g., reading, solving problems, evaluating).

- Products: The results of those operations (e.g., understanding, answers, notes).
- Evaluations: How the learner judges their products against their standards.
- Standards: What the learner aims for or expects to achieve.

All of these terms, except "operations", are types of information a person uses or creates during learning. The "work" of each phase is completed within this COPES structure. This framework adds a more detailed description of the processes within each SRL phase compared to other models.

Monitoring and control are crucial for this model. Monitoring involves learners comparing their "products" with their "standards" to determine if they have met their goals for that phase or if further work is needed. This comparison is referred to as a cognitive evaluation. A mismatch (e.g., your answer does not meet the expected quality) may lead to control actions. If the monitoring reveals a problem, the learner might take control over their "learning operations" to improve the product, change their conditions (like how much time they spend), or even revise their standards. This monitoring has two levels:

1. Object-level focus is about the task itself (e.g., "Is my answer correct?").

2. Metalevel (metacognitive) focus is about your beliefs and assumptions about the task or your learning (e.g., "I thought this task was easy, but my products are consistently bad. Maybe it is harder than I thought").

A metacognitive control strategy might be initiated if metalevel monitoring reveals a mismatch. For example, if students initially thought a task was easy but continued to struggle, they might change their belief ("this task is hard"). This change can affect other standards or goals they set earlier in the learning process, potentially leading them to review old material or try new study strategies[143].

4.2.2 The Benefits and Approaches of Inquiry-Based Learning

Inquiry-based learning (IBL) is a form of learning based solely on questioning to seek knowledge. At times, inquiry-based learning is presented as a problem or scenario for students to solve. In all formats of inquiry-based learning, student exploration is at the forefront of the teaching and learning experience.

Instead of passively receiving information, students are encouraged to ask questions, seek answers, and construct their knowledge. The concept of IBL is not new; it has a long and rich history. It predates Socrates, who famously used intensive questioning (the Socratic method) to help people develop self-knowledge. The concept of learning through questioning has been a long-standing tradition. Later, early proponents of progressive education, such as John Dewey

[143] Winne P. H., Hadwin A. F. Studying as Self-regulated Learning. In: D. J. Hacker, J. Dunlosky, A. Graesser (Eds.), *Metacognition in Educational Theory and Practice*. Hillsdale, NJ: Lawrence Erl, 1998

Winne P. (2018). Theorising and Researching Levels of Processing in Selfregulated Learning. *British Journal of Educational Psychology*, 88, 9–20.

(1938), introduced inquiry learning into modern educational reforms in the United States. Dewey believed learning was directly linked to real-world experiences.

The concept of IBL is consistent; the specific steps or "phases" that an inquiry process takes can be described in various ways by different educational models. Inquiry cycles are often presented as a series of ordered phases (Table 4.1).

Table 4.1

Phases and sub-phases of the synthesised inquiry-based learning framework[144]

Definition of general phases	Sub-phases	Definition of subphases
General phases: Orientation		
The process of stimulating curiosity about a topic and addressing a learning challenge through a problem statement		
General phases: Conceptualisation		
The process of stating theory-based questions and/ or hypotheses.	Questioning Hypothesis Generation	The process of generating research questions is based on the stated problem. The process of generating hypotheses regarding the stated problem
General phases: Investigation		
The process of planning exploration or experimentation, collecting and analysing data based on the experimental design or exploration.	Exploration Experimen-tation	The process of systematic and planned data generation is based on a research question. The process of designing and conducting an experiment in order to test a hypothesis
General phases: Conclusion		
The process of concluding the data. Comparing inferences drawn from data with hypotheses or research questions.	Data Interpretati on	The process of making meaning out of collected data and synthesising new knowledge
General phases: Discussion		
The process of presenting findings of particular phases or the whole inquiry cycle by communicating with others and/or controlling the whole learning process or its phases by engaging in reflective activities.	Communi-cation Reflection	The process of presenting outcomes of an inquiry phase or of the whole inquiry cycle to others (peers, teachers) and collecting feedback from them. Discussion with others. The process of describing, critiquing, and evaluating the whole cycle or a specific phase. Inner discussion.

[144] Pedaste M., Mäeots M., Siiman A.L., Jong T.de, Riesen S.A.N., Kamp E.T., Manoli C.C., Zacharia Z.C., Tsourlidaki E. (2015). Phases of Inquiry-based Learning: Definitions and the Inquiry Cycle. *Educational Research Review,* Vol. 14, 47–61.

IBL is not a "prescribed, uniform linear process". The connections between the phases can vary significantly depending on the learning context.

The cognitive development of adult learners suggests that the principles of IBL are also highly effective for older students, encouraging them to develop critical skills for seeking truth, information, and knowledge. For IBL to be effective, students must question and investigate new information while actively building their own understanding. However, IBL is not just about asking questions. Students learn to analyse, evaluate, and synthesise information, rather than memorise facts.

Inquiry-based learning occurs when students formulate questions, research answers to their posed questions, share their solutions and new knowledge and then reflect on the process. Rather than having the classroom teacher determine the topic or targeted questions of a unit of study, the students can choose the questions about the subject they want to explore further.

While there are several different types of inquiry-based learning, the result is the same. Students use open-ended questions to direct their learning based on their interests. They are making connections and deepening their knowledge. Inquiry-based learning enables students to understand the content and increase their comprehension.

What are the benefits of inquiry-based learning? This learning style fosters a student's curiosity and promotes opportunities for collaboration, thereby increasing student engagement. When students take ownership of their education, their interest level increases, leading to improved comprehension skills. A deeper level of knowledge is achieved through this style of learning. Instead of a traditional type of learning that often involves teacher talk, teacher-posed questions, student memorisation, and student recall, students plan and implement their learning. Teachers become facilitators of learning.

4.2.3 Project-based Learning: A Framework for Authentic Inquiry

Project-based learning (PjBL) is a collaborative, inquiry-based teaching method where students integrate, apply, and construct their knowledge as they work together to solve complex problems. Project-based learning enables students to integrate knowledge and skills from multiple subject areas and apply them in real-world situations. It also helps reinforce existing knowledge and provides a context for the theory.

Projects can operate within hugely diverse contexts and along a broad continuum of approaches. They may be used by a single lecturer or a course team within a department, primarily employing more traditional teaching methods. The choice of project work type will depend on the intended learning outcomes and whether you seek depth of knowledge-based skills. Projects may be open or closed, individual or group, conducted over a day or a year, or multidisciplinary. Projects are often well-suited to applied topics, where different solutions may have equal validity. Students will be required to discover new information and use that

knowledge to find solutions and answers, but they will need support to become independent learners.

The scientific practices identified in inquiry-based learning research can be applied to describe the practices found in PjBL. Students engage in the following scientific practices within a research project:

1. Orientation into the topic: at the end, students have a problem they must solve.
2. Conceptualisation:
    a. Presenting research questions.
    b. Presenting hypotheses.
3. Investigation:
    a. Exploration (if there is only a research question but no hypothesis).
    b. Experimentation (if there is a hypothesis).
    c. Data interpretation.
4. Conclusions: Students draw them based on the collected data.
5. Discussion:
    a. Communicating the results.
    b. Reflection.

In PjBL, the learning process involves producing an artefact or an end product that answers the driving question. The artefacts are concrete, for example, games, posters, models, plays, websites, or drawings. The artefact should:

1. Answer the driving question.
2. Reveal the students' level of understanding.
3. Support students in gaining an understanding of the topic when they are creating the artefact.

A PjBL unit may generate several artefacts, yet the process should ultimately result in a single artefact that directly addresses the driving question. The production of artefacts has clear pedagogical value: students typically learn more effectively when they externalise their ideas through tangible representations. By engaging in the creation of artefacts, learners are continually required to reconstruct and refine their understanding.

In the best case, artefacts are made public and shared with an audience. Within science education, however, the role of artefacts requires more explicit conceptualisation. Many studies fail to explain what makes particular artefacts unique to PjBL, and in practice, they often lack real-world purpose—undermining the essential aim of authenticity in PjBL. The driving question, by contrast, is meant to connect learning with students' lived experiences, whether through local contexts or socio-scientific issues. Such questions are deliberately open-ended, inviting exploration and fostering deeper engagement.

The idea behind retrieval practice is to develop methods for converting passively absorbed information into more deeply embedded knowledge and understanding. Instead of re-reading books and notes, retrieval depends on one's ability to "hack" their ability to recall information. This step occurs through visual note-taking, peer-to-peer teaching, or hands-on experiences.

The exceptional relationship between curiosity, critical thinking, and problem-solving is a cornerstone of all project-based learning models. These strengthen connections through guided discovery problems. These carefully constructed puzzles, challenges, or discrete questions push students to learn how to solve the issues and build a knowledge framework from these inquiries, before explaining the content to them. This discovery learning method is based on the profound and straightforward notion that students are more likely to remember concepts and principles when they initially discover them. These "learning-by-doing" exercises combine experiential learning and haptic engagement exercises. Ideally, introducing these lessons in a collaborative setting in which individuals experience the learning, reflect upon it, and convey the lessons they have learned to their teammates.

The impact of contextual factors on cognition has been the subject of extensive research. Within PjBL literature, these factors are frequently cited as strongly influencing the authenticity and autonomy of Project-Based Learning. Findings from studies on situated cognition emphasise that learning is most effective when the instructional environment closely reflects the real-world situations in which the acquired knowledge will ultimately be applied. In contrast, when the learning environment is disconnected from its practical use, learning effectiveness is significantly reduced. Learning in such settings is more likely to be remembered and applied in practice. Furthermore, this kind of learning is more flexible and adaptable than the inert knowledge typically associated with conventional, teacher-centred approaches.

The relationship between teaching and research is widely seen as important. For some, the proximity of teaching to knowledge creation processes gives higher education its 'higher' quality. Exercise strategies may distance research from undergraduate teaching, in particular, and reflect an alternative, standard view that teaching and research can be largely independent activities.

Conventionally, it has been assumed that insofar as there is a connection between research and teaching, it lies in the subject expertise of the staff. In other words, teaching will be research-led, where teaching and learning reflect and are directly based on the specialist research interests of the staff delivering the curriculum.

Such an approach can leave students as spectators rather than participants. They can admire the scholarship from a distance, but not necessarily gain any deeper understanding of research as a learning process. However, some methods enable undergraduate students to participate in research through learning and teaching that are explicitly research-tutored or research-based. The difference between these is that the former allows students to engage critically and reflectively with research literature and data. In contrast, the latter enables students to research and learn through inquiry. It is argued that such methods add real value to undergraduate work for learners and teachers. Learning becomes linked to the lecturer's research interests in ways that foster new and original research for the

lecturer while providing students with a direct experience of research and increasing their motivation to learn.

> Regarding measuring the perceived impact of PjBL on learning, 69% of all students in both samples agreed or strongly agreed that the project-based assignment enabled them to gain an in-depth understanding of project management concepts. Furthermore, 71% of students agreed or strongly agreed that the assignment allowed them to relate better to the project management concepts. 92% of students agreed or strongly agreed that the assignment enabled them to recognise the triple tasks of digitalisation projects. Moreover, 64% of students agreed or strongly agreed that the assignment provided an authentic learning experience.[145]

Investigative case-based learning (ICBL) is a variant of PjBL that encourages students to develop questions that can be explored further by reasonable investigative approaches. Students then gather data and information for testing their hypotheses, producing materials that can be used to persuade others of their findings. Students employ various methods and resources, including traditional laboratory and field techniques, software simulations and models, data sets, internet-based tools, and information retrieval methods.

Investigative cases draw from realistic situations in which scientific reasoning can be applied. Although the case defines a general area of geoscience under investigation, students generate specific questions to guide their study. Students investigate scientific problems. In the process, they also learn to:

- locate and manage information,
- develop reasonable answers to the questions,
- use scientific inquiry strategies and methods,
- provide support for their conclusions, and,
- work on decision-making abilities.

Investigative case-based learning methods incorporate problem-posing, problem-solving, and peer persuasion. Instructors and students collaborate in this three-phase process, often providing additional insights and identifying potential strengths and weaknesses in the design of the problem statement and the investigation. The resolution (or clarification) of the problem and its presentation extend opportunities for student practice in utilising and evaluating scientific approaches to problem-solving.

Learners use the case to brainstorm questions they will try to answer. Students become more aware of what they know and need to know, thus becoming more directed in their reading and more motivated in subsequent lectures, labs, and discussions. They are learning just as most of us learn – they have a problem or question first.

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[145] Ngereja B, Hussein B, Andersen B. (2020). Does Project-Based Learning (PjBL) Promote Student Learning? A Performance Evaluation. *Education Sciences*. 10(11), 330.

A case could be introduced at the start of the lecture, followed by a brief discussion (5-10 minutes) to generate a Know/Need to Know chart on the board. Students share their prior knowledge and experience, while also identifying areas where they need to acquire more knowledge. This pre-assessment strategy might then be tied into a lab or field assignment. The Harvard Kennedy School website illustrates techniques for organising the case method and recording case studies and additional sources.

Teaching with cases

4.2.4 Problem-based Learning: A Problem-Centric Approach to Knowledge Acquisition

Problem-based learning (PBL) encourages academics to place that aspect at the centre of the learning process. PBL is where students are confronted with the materials and facts underlying a problem, from which they have to work out the nature of the problem and find an appropriate solution, usually without prior instruction or the necessary knowledge to solve it. PBL emerged in the mid-1960s as a fresh approach to teaching, offering an alternative to traditional methods. It all began in medical education, specifically because many first-year medical students struggled to see how subjects like anatomy, physiology, or biochemistry connected to their future careers. They were eager to work with real patients and solve medical problems, a hands-on experience usually reserved for later internships.

The underpinning philosophy of PBL is that learning can be considered a "constructive, self-directed, collaborative and contextual" activity. The principle of constructivism considers students as active knowledge seekers and co-creators who organise new relevant experiences into personal mental representations or schemata with the help of prior knowledge. This approach is further reinforced by social learning theories, which postulate the merits of social interaction in cognitive development.

In PBL, students work in small collaborative groups and learn what they need to know to solve a problem (Fig. 4.4). The teacher acts as a facilitator to guide student learning through the learning cycle.

In this cycle, also known as the PBL tutorial process, the students are presented with a problem scenario. They formulate and analyse the problem by identifying the relevant facts from the scenario. This fact-identification step helps students represent the problem. As students gain a better understanding of the problem, they generate hypotheses about possible solutions. An essential part of this cycle is identifying knowledge deficiencies relative to the problem. These knowledge deficiencies become what is known as the learning issues that students research during their self-directed learning.

A PBL tutorial session begins by presenting a group of students with minimal information about a complex problem. From the outset, students must ask the facilitator to obtain additional information about the problem; they may also gather

facts by conducting experiments or other research during their problem-solving process. Students typically pause to reflect on the data they have collected so far, generate questions about it, and hypothesise about underlying causal mechanisms that might help explain the data.

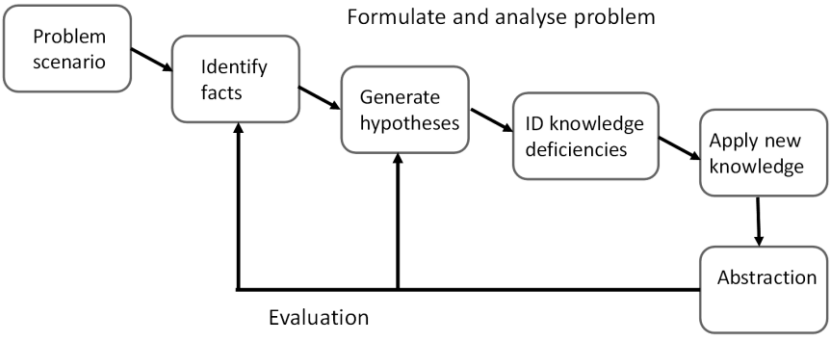

Figure 4.4 Main steps of Problem-based learning

Students also identify concepts they need to learn more about to solve the problem, labelling them "learning issues". After considering the problem with their knowledge, students independently research their chosen learning issues. They then regroup to share what they have learned, reconsider their hypotheses, and/or generate new hypotheses in light of their new learning. When completing the task, learners deliberately reflect on the problem to abstract the lessons learned about it and their self-directed learning and collaborative problem-solving processes.

Collaborative problem-solving groups are a vital feature of PBL. One assumption of PBL is that the small-group structure helps distribute the cognitive load among group members. Such a structure leverages the collective expertise of group members by enabling the entire group to tackle problems that are generally too complex for each student to handle alone.

The commonly acknowledged characteristics of problem-based learning are:

1. Stimulus materials help students define and discuss a significant problem, question, or issue.

2. Problems are presented as a simulation of professional practice or a real-life situation.

3. Students are guided in critical thinking and provided with limited resources to help them learn by defining and attempting to resolve the problem.

4. Students work cooperatively as a group, exploring information in and out of class with access to a tutor who knows the problem well.

5. Students are encouraged to identify their learning needs and the appropriate use of available resources.

6. Students use the knowledge gained to solve the original problem and define new learning issues.

The curriculum is organised around the problems. Therefore, problems must be carefully matched to the desired learning outcomes. There are no lectures where PBL has been fully integrated; students, usually working in groups, engage in self-directed learning, and the tutor acts as a facilitator, mentor, or guide. There are some disadvantages to using a wholly PBL approach. The content covered in this way is reduced compared to the amount that can be covered in lecture-based courses. In addition, many institutions may lack the space that facilitates PBL effectively. It also requires considerable staff time to manage the groups and develop practical problems; however, many academics believe the initial investment is worth the effort.

Problem-based learning is commonly confused with problem-solving learning. The latter means setting problems for students to solve after they have been taught conventionally and then discussing them later. In PBL, conversely, a problem, query, or puzzle the learner wishes to solve forms the starting point for learning. The problem, or a series of problems, is where learning begins, and in solving those problems, the learner seeks the knowledge of disciplines, facts, and procedures needed to address the issues. The traditional disciplines do not define what is to be learned; the problems do. However, the aim is not only to solve those particular problems, but in the course of doing so, the learner acquires knowledge, content-related skills, self-management skills, attitudes, and know-how: in a word, professional wisdom. It means the problems have to be carefully selected.

Problems need to be complex, ill-structured, and open-ended to support intrinsic motivation and foster flexible thinking. They must also be realistic and resonate with the students' experiences. A good problem affords feedback that allows students to evaluate the effectiveness of their knowledge, reasoning, and learning strategies. The problems should also promote conjecture and argumentation. Problem solutions should be complex enough to require many interrelated pieces and should motivate the students' need to know and learn.

A good problem has the following characteristics:

1. It calls on different disciplines and integrates them in solving the problem.
2. It raises options that promote discussion.
3. It activates and incorporates previous knowledge.
4. It requires new knowledge that the students do not yet have.
5. It stimulates participants to elaborate.
6. It requires self-directed learning.

Problem-based learning is one of a family of approaches that includes project-based science. As shown in Table 4.2, all three approaches use a common problem and rely on the teacher to help guide the learning process.

4.2.5 Scenario-based Learning for Practical Application

Scenario-based learning (SBL) is a training approach that emphasises learning through hands-on experience. It uses real-life situations to support active learning. Rather than passively absorbing information, learners are immersed in a story. Using realistic work situations provides relatable, relevant, and impactful learning

experiences that are both relatable and impactful. Adding interactivity to the scenario enables users to make decisions and learn by experiencing the consequences of their choices. Within higher education, "scenario-based learning" refers to any pedagogical approach that intentionally utilises scenarios to achieve desired learning outcomes. Scenarios can facilitate other significant aspects of identity formation, particularly through proactive deployment in learning and knowledge construction, which involves a growing ability for students to interact with various situations and people within a quasi-professional setting.

Table 4.2

Comparing problem-based and project-based learning

	Problem-based learning	Project-based learning
Problem	Realistic, ill-structured problem. Problem-based Learning begins with a problem that determines what students study. The problem derives from observable phenomena or events; the emphasis is on acquiring new knowledge, and the solution is less important.	Driving question. Project-based learning begins with assigning tasks to create a final product or artefact. The emphasis is on the end product.
Role of the problem	Focus on learning information and reasoning strategies.	Focus on the scientific inquiry process leading to artefact production.
Process	Identify facts, generate ideas, learn from issues, revisit, and reflect.	Prediction, observation, and explanation cycles.
Role of the teacher	Facilitate the learning process and model reasoning.	Introduce relevant content before and during the inquiry.
Collaboration	Negotiation of ideas. Individual students bring new knowledge to the group for application to the problem.	Negotiation of ideas with peers and local community members.

They differ in terms of the type and role of the problem, the problem-solving process, and the specific tools employed. For example, PBL uses realistic, ill-structured problems. In this setting, the problem is the focus on acquiring knowledge and reasoning strategies.

The strategy is derived from the works and ideas of Jean Lave and Etienne Wenger, who proposed the concept of situated learning in 1991. According to this theory, the most effective learning is context-dependent; a relevant context or story helps connect the points to create a broader picture. This broader perspective, in turn, enables learners to make sense of things and retain the knowledge for a longer period. Knowledge retention is a constant struggle for people.

The forgetting curve, as described by Ebbinghaus, illustrates that people forget up to 70% of what they learn within 24 hours (Fig. 4.5). Consequently, it is nearly impossible to retain all that we learn daily. SBL is an intelligent strategy that offers an optimal and easy solution to this crisis. A contextual setting enables

learners to easily manage it within their working memory and commit it to their long-term memory.

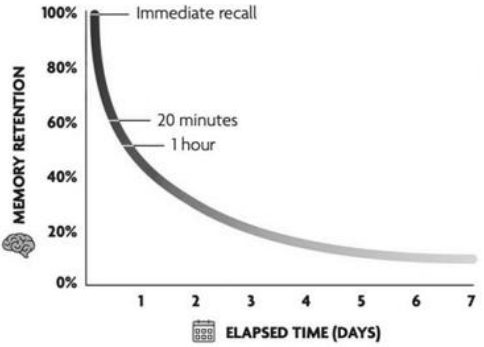

Figure 4.5 The forgetting curve

Scenarios help learners understand how the knowledge they gain can be applied in a professional environment. Within a scenario-based learning framework, students, as potential professionals, are presented with a scenario descriptor or set of realistic circumstances.

It is accompanied by one or more focus questions and/or dilemmas designed to pursue particular lines of inquiry and fulfil specific learning intentions along possible pathways. Students often assume specific roles and/or consider at least one perspective that allows them to explore the scenario from various vantage points. Students often work in teams and present their findings to the class, forming a collegial audience. Participants and the audience then evaluate and reflect on the process from various personal/professional perspectives. There is a clear overlap between problem-based learning per se and problem-based scenarios (Table 4.3). Scenarios can add to the realism of potentially abstract problems.

Table 4.3

Comparing project-based and predictive models

Problem-based Model	Predictive Model
These scenarios present learners with an open-ended problem to solve. For example, you can provide your teams with a dataset containing the results of a marketing survey and ask them to create a marketing plan based on that data.	These scenarios prompt learners to speculate on the outcome of an event based on their knowledge, provided details and content, and assumptions.
Example: imagine you are creating a marketing plan for a new WordPress plugin, and the dataset represents your potential market. Then ask them to figure out: What is your plan? How would you enter and create an impact in the market? It is an example of a problem-based scenario.	Example: You are trying to teach bank tellers how to recognise and prevent fraud. Provide different scenarios and ask learners to predict what a computer hacker might do next. Keep track of answers on a whiteboard to support a meaningful debrief.

Not all scenarios are problem-based, and some simply require students to demonstrate what they already know by reproducing set procedures and facts (skills-based scenarios). Students may explore concerns underpinning the discipline/profession (issue-based scenarios) and/or deliberate on past/future events supported by evidence (speculative-based scenarios). One or more scenario

options can be combined to create a rich set of simulated professional experiences for future graduates.

Scenarios are best used for having students explore, rather than replicate, the existing repositories of knowledge within the discipline. "Content" will incorporate key themes, specific issues, competencies, and professional concepts idiosyncratic to the profession. Scenario learning can fail if and when the amount of subject matter, albeit "useful," overwhelms the scenario and, subsequently, the student with too much detail.

Realism. To fully engage learners, the scenarios must be as realistic as possible while providing students or employees with the required information.

Learner-centric. The task should draw upon learners' core strengths and allow them to utilise skill sets they are developing while improving their weak points.

Involve applied learning strategies. Each scenario should involve skills or knowledge that learners have already acquired and can apply to the current task. Under this method, learners learn by doing rather than just reading or hearing about the information.

Interactive. Thanks to a high level of interactivity (even in virtual classroom settings), learners become fully immersed in the task and scenario. The interactive modules should rely upon real-world experience rather than theoretical information. Focus on a specific challenge or obstacle.

The scenario should mimic real-world experiences rather than overwhelming learners with information or ideas. It must show them how to behave or what to think rather than telling them. Various examples and tools for creating your script can be found on the resource Elucidat. The goal of any effective scenario is to allow learners to solve problems they might encounter outside of the virtual classroom. In essence, you need to ask why learners are making mistakes and what behaviours must be changed to avoid these errors.

Elucidat: Create engaging e-learning

4.3 A Comprehensive Guide to the Lecture as a Teaching Method

4.3.1 The Historical Roots of the Lecture

The traditional view of a "lecture" as simply a passive reading aloud, where knowledge is one-way, misinterprets its origins. Nowadays, a traditional lecture is often referred to as a transmissive approach. A transmissive lecture is characterised by a continuous exposition delivered by a speaker whose primary aim is for the audience to receive and learn information through listening[146].

[146] Bligh D. *What's the Use of Lectures?* San Francisco: Jossey-Bass, 2000.

Historically, the lecture can be traced back to the 5th century BC when it was popular with the Greeks. It was widely adopted in the early Christian and Muslim Universities in medieval times when books were scarce. The term "lecture" originated from the Latin word "lectio," which meant "reading aloud." In the 13th century, most books were extremely rare. A university would often have only one copy of a book, and it may have been the only copy available in the world. The library and its collection, therefore, became critical to a university's reputation, and professors had to borrow the only text from the library and read from it to the students, who dutifully wrote down their version of the lecture.

Lectures themselves belong to an even longer oral tradition of learning, where knowledge is passed down from one generation to the next by word of mouth. In such contexts, accuracy and authority (or power in controlling access to knowledge) are crucial for "accepted" knowledge to be transmitted successfully. Thus, accurate memory, repetition and a reference to authoritative sources become exceedingly important in terms of validating the information transmitted. The great sagas of the ancient Greeks and, much later, of the Vikings, are examples of the power of oral transmission of knowledge, which continues even today through the myths and legends of many indigenous communities[147].

The history of the lecture's development is important for understanding its internal dynamics and the transformations that led to its modern form. The following periods in its evolution are outlined.

1. The Ancient and Medieval Lecture: "Reading Aloud" and Knowledge Preservation (Pre-1450s).

Primarily about rescuing and preserving a written cultural heritage from loss and decay due not to the scarcity of information but the scarcity of the capacities and resources for reading and writing. Knowledge was viewed as a recovery of tradition, rather than a novel discovery. The lecture was a dictation of authoritative texts (e.g., the Bible, ancient authorities). Books were often designed for podiums; some were written in *scripta continua*, necessitating vocalisation. Lecturers were expected to adhere strictly to the text, sometimes facing fines for extemporising. Their authority stemmed from the *text*, not their charisma.

2. The Post-Gutenberg Lecture: Persistence of Dictation Amidst Abundance (1450s - 17th/18th Century).

The printing press (1450s) introduced an era of information abundance, challenging the role of the lecture reproduction and dictation. Books became cheaper and more plentiful. Despite the logical implication that printing would render dictation redundant, the lecture's basic form, including dictation and slavish note-taking, persisted for centuries. A gradual shift began with explanatory notes (glosses) written in manuscript margins to aid interpretation. These glosses eventually became authoritative, allowing for more unfettered commentary beyond simple dictation. By the mid-17th century, dictation and commentary were

[147] Bates A.W. *Teaching in a Digital Age*. 2nd Edition. British Columbia Pressbook, 2019. URL: https://pressbooks.bccampus.ca/teachinginadigitalagev

competing with each other. The lecture was no longer about the authority of the text but the authority of the lecturer. In other words, the lecturer is not a conduit for a tradition received from the past, nor is their task even a commentary on this tradition. The medieval practice of interchangeable lecturers reading from the same authoritative texts loses its meaning and value. What is instead meaningful and valuable is one lecturer speaking his mind and standing as the authentic origin of his speech, as the author of his spoken thoughts and words.

3. The Romantic Lecture: The Rise of Authorial Performance (Late 18th Century Onwards).

The radical shift was marked by figures like Johann Gottlieb Fichte in the 1790s, who began lecturing without a set text, presenting his work and ideas. Knowledge was not solely about recovering tradition but about the speaker's unique insights and ability to "stir the souls" of the audience. The lecturer became an "author" of spoken thoughts, creating knowledge from the cathedra (podium). Spontaneity, creativity, and originality became valued.

4. The 20th/21st Century Lecture: Dramaturgical Effect and Media Integration (Modern Era).

Several significant trends characterise the period. The first integrates projection, recording, and transmission technologies (e.g., overhead projectors, audio/video recordings, radio, TV, and the internet). Lectures by figures like Foucault and Feynman are preserved through these media.

E. Goffman (1970s) defined the second tendency as "Fresh-Talk Illusion". The sociologist analysed the modern lecture as a "dramaturgical effect", where the lecturer creates an illusion of spontaneity or "fresh talk." This involves skilful integration of a prepared "textual self" with an "animator self" responsive to the live situation.

"Memorisation, aloud reading, and fresh talk are different production modes. Each presupposes its special relation between speaker and listener, establishing the speaker on a characteristic "footing" regarding the audience. Switches from one of the three forms to another, that is, "production shifts," imply for the speaker a change of footing, and <...> are a crucial part of lecturing. ... The critical point that will later be addressed is that a great number of lectures (because of my incompetence, not including this one) depend upon a fresh-talk illusion"[148].

The modern period lecturer aims to appear direct, responsive, and spontaneous, often achieved by meticulously crafting and rehearsing material (using typewriters, word processors, PowerPoint, teleprompters, and audio/video editing). Despite technological advancements, the lecture retains many core epistemological traits from Fichte's time, adapting its performance through various media to maintain its perceived authenticity and impact.[149]

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[148] Goffman E. *On the Lecture: Forms of Talk*. Philadelphia: University of Pennsylvania Press. 1981. P. 170.

[149] Friesen N. (2014). A Brief History of the Lecture: A Multi-Media Analysis. *MedienPädagogik: Z. für Theorie und Praxis der Medienbildung,* 24, 136–153.

The lecture consisted of an oral reading of a text, followed by a commentary. A lecture occurs whenever a teacher is talking and students are listening. The Latin "lectura" implied interpretation, not just oral instruction. This interpretive function is particularly evident in the Humanities, where lectures often involve expert text analysis, building and modelling a sustained argument.

While the lecture primarily consists of one-way communication from the teacher, this does not mean there can be no discussion or dialogue between the lecturer and students. Often, such two-way communication is limited to the teacher asking questions to establish that the subject matter has been assimilated. Still, many skilled lecturers can make their lectures more thought-provoking and interactive to make deeper learning possible.

4.3.2 Criticisms of the Lecture and Their Counterarguments

The lecture remains one of the primary teaching methods in higher education. A lecture is a good teaching choice when the primary goal is the efficient transfer of knowledge. For this to work, three key conditions must be met: the lecture must be given by an expert who can provide a clear overview of the topic, the content should be intentionally limited to what is relevant to the learning outcomes, and the presenter must be both knowledgeable and enthusiastic, able to convey their passion to the students[150].

> "Lectures were once useful, but now, when all can read and books are so numerous, lectures are unnecessary. If your attention fails, and you miss a part of a lecture, it is lost; you cannot go back as you do upon a book ... People nowadays have got a strange opinion that lectures should teach everything. Now, I cannot see that lectures can do as much good as reading the books from which the lectures are taken. I know of nothing that can be best taught by lectures, except where experiments are to be shown. You may teach chemistry by lectures. You might teach making shoes by lectures."[151]

When the goal shifts from knowledge transfer to the development of higher-order skills and student interaction with the material, other, more active teaching methods are more effective. Accordingly, this method is criticised and considered a passive method with low efficiency within some learning theories. The eighteenth-century lexicographer Samuel Johnson made one of the most direct challenges to the prominence of the lecture as a teaching method.

Some critics view lectures as unreliable for transferring complex knowledge, leading to passive student memorisation. Modern digital technologies allow for the "media transformation" of lectures into polished, accessible study artefacts,

[150] Exley K., Dennick R. *Giving a lecture: From Presenting to Teaching*. Taylor & Francis Group, 2009

[151] Crook Ch. (2022). Locating the University Lecture as a Contemporary Educational Practice, *Journal of China Computer-Assisted Language Learning,* Vol.2, No.2, 203-227. URL: https://www.degruyter.com/document/doi/10.1515/jccall-2022-0013/html

seemingly marginalising both the lecture and the lecturer. As Ch. Crook shows, some state that the lecture keeps communication channels closed, freezes the hierarchy between lecturers and students, and removes any responsibility on the student to respond. Another stresses that lectures lead only to memorising the information, often without thinking about it. D. Bligh summarised a wide range of meta-analyses and studies of the effectiveness of lectures compared with other teaching methods and found consistent results:

- The lecture is as effective as other methods for transmitting information (the result, of course, is that other methods – such as video, reading, independent study, or Wikipedia – are just as effective as lecturing for transmitting information),
- most lectures are not as effective as a discussion for promoting thought,
- lectures are generally ineffective for changing attitudes or values or for inspiring interest in a subject,
- lectures are relatively ineffective for teaching behavioural skills.

However, we observe the resilience of traditional lectures. Even online courses often incorporate "video lectures," suggesting an enduring value in an expository voice. The enduring public perception that "university lectures" are synonymous with "university education". Let us pay attention to the valid remark by N. Bradbury[152].

> "If a student can get the identical learning experience viewing a YouTube video in bed, just as they can attending a lecture in person, why is this assumption not evident in other aspects of life? ... If a virtual experience is indeed identical to a real experience, then no one needs to go to a live music concert, no one needs to go to watch a live play or musical, no one needs to go to hear a distinguished speaker give a talk, and no one needs to attend a football or baseball game at a stadium. Yet, such venues are often sold out quickly. What is different between a live and recorded event is the emotional buy-in".

While lecture recordings risk promoting a "lecture as canon" view – suggesting the lecture is the ultimate authority and source of all knowledge – and may encourage students to over-analyse pre-recorded content, they also offer significant advantages (Table 4.4). Live lectures excel at presenting a comprehensive overview and a continuous narrative, qualities that can be fragmented by pausing and restarting recordings.

However, to widen participation among students (including those from semi-skilled/unskilled social classes), recordings provide essential flexibility, overcoming barriers such as financial limitations, care duties, or health issues that might prevent live attendance.

[152] Bradbury N. A. (2016). Attention Span During Lectures: 8 Seconds, 10 Minutes, or More?" *Advances in Physiology Education,* 40(4), 509–513.

Table 4.4

Lecture effectiveness[153]

Shortcomings	Main Point	Supporting Arguments
Lack of Student Engagement	Lectures often fail to engage students effectively.	Ineffective for critical thinking development. Leads to the lowest observed student engagement compared to other classroom types. Low attendance is common, as students prioritise understanding exam content over genuine knowledge acquisition, resulting in superficial learning. Limited attention spans (e.g., 15 minutes) lead to off-task behaviours, such as chatting or using social media, forcing teachers into a disciplinary role. Time constraints prevent comprehensive coverage of the subject, resulting in simplified explanations.
Lack of Learning	Students often learn less from lectures compared to other methods.	Studies consistently show that studying text leads to significantly better immediate recall than listening to a lecture. Curriculum-level studies even suggest that more lectures correlate with lower graduation rates and longer study times, indicating they can hinder overall academic progress.
Why Only Partially Effective?	Lectures are based on the "information transmission fallacy".	Human memory is constructive; learning requires students to process information actively (e.g., elaborating, rephrasing, discussing, explaining, applying). Lectures often provide insufficient opportunities for these crucial active learning activities, which are essential for long-term memory and understanding, aligning with constructivist learning theories.

The strength lies in integrating live lectures for social interaction, narrative delivery, and recordings as an inclusive, flexible resource.[154]

The experienced lecturers reveal a different perspective in their practice, prioritising orchestration, enactment, and dialogue.

Orchestration refers to the lecturer's role in structuring the learning experience at a macro level, weaving together various sources, cross-referencing ideas, synthesising information, and building overall coherence within the discipline. Essentially, lecturers "map pathways" for students to explore further in

[153] Henk G. Schmidt, Stephanie L. Wagener, Guus A.C.M. Smeets, Lianne M. Keemink, Henk T. van der Molen. (2015). On the Use and Misuse of Lectures in Higher Education*, Health Professions Education,* Vol. 1(1), 12–18.

[154] Nordmann, E., Hutchison, J., MacKay, J. R. D. (2021). Lecture Rapture: the Place and Case for Lectures in the New Normal. *Teaching in Higher Education,* 27(5), 709–716.

their independent study, connecting the lecture to the broader curriculum and available resources.

Enactment focuses on the expressive and inspirational aspects of lecturing. Rather than just conveying content, lecturers aim to "enact the discipline" itself, especially in the humanities and social sciences. It is not just about performance but about inspiring students and cultivating a "hidden conversation" that fosters engagement with the subject matter.

Dialogue highlights that lecturing talk is often dialogic, using "metadiscourse patterns" that resemble conversational style, subtly inviting "conversational reactions" from the audience. The paper plans to investigate these "hidden responses" by having students watch recorded lectures and verbalise their reactions collaboratively[155].

One of the fundamental problems associated with the lecture method is its duration. Proposals to reduce lecture time are based on aspects of attention, which is challenging to maintain when students are passively participating, and, accordingly, on the reduction of knowledge retention. However, the conducted studies demonstrate that the specified disadvantages are not mandatory.

> "We see evidence... once again to suppose that lectures should not be longer than twenty to thirty minutes, at least without techniques to vary stimulation."[156]

Discussions about the effectiveness of the lecture are ongoing. Researching the lecture from different points of view reveals the weak sides of the method, but also uncovers subtle aspects that cannot be realised by eliminating lectures from the curriculum.

> "As large-scale lectures are destined to be with us for some time, what can students extract from them? Student claims about the efficacy of their various study techniques can be questioned, but the emotional support offered by the informal networks created in lecture theatres is readily apparent. Moreover, maybe that is enough. While the measurable impact of the lecture may be muted, it provides the space for these informal networks to exist. It would appear that for many of these students, the conversations and clarifications that take place in the breaks and after the lecture are (at least) as important as the content of the lecture itself."[157]

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[155] Crook Ch. (2022). Locating the University Lecture as a Contemporary Educational Practice, *Journal of China Computer-Assisted Language Learning,* Vol.2(2), 203-227. URL: https://www.degruyter.com/document/doi/10.1515/jccall-2022-0013/html

[156] Bligh D. *What's the Use of Lectures?* San Francisco: Jossey-Bass. 2000. P. 56.

[157] Loughlin C., Lindberg-Sand Å. (2023). The Use of Lectures: Effective Pedagogy or Seeds Scattered on the Wind? *High Education,* 85, 283–299. URL: https://link.springer.com/article/10.1007/s10734-022-00833-9#citeas

***Further Reading**: McKeachie W. and Svinicki M. McKeachie's Teaching Tips: Strategies, Research and Theory for College and University Teachers. Boston, New York: Houghton Mifflin. 2006.*

Biggs J. Tan C. Teaching for Quality Learning at University What the Student Does. 4th ed. New York: Open University Press, 2011. P.146–148.

We can summarise the results of research and teaching experience in recent years, which indicate that the lecture as a teaching method continues to develop, acquiring the following characteristics:

Efficiency and Instructor Control: Lectures are a highly efficient use of an instructor's time, as they can be reused across semesters with minimal updates. The instructor maintains complete control over the content, its level of detail, and emphasis.

Versatility and Flexibility: Lectures are a versatile teaching method suitable for any group size and subject matter. They offer the flexibility to present new, unpublished content (like research findings) and allow instructors to adjust the lesson on the spot based on student understanding.

Personalisation and Elaboration: Instructors can customise lectures to align with students' interests and backgrounds. They can also use lectures to supplement or highlight particularly difficult or crucial information from other sources, like textbooks or online materials.

Engagement and Motivation: An effective lecture should be delivered interestingly and engagingly, inspiring students to learn more. A knowledgeable and enthusiastic instructor can motivate students by sharing their passion for the subject.

Student-Centred Outcomes: An outstanding lecture makes students feel involved, makes them think about the material, and leaves them with a clear sense of what they have learned.

4.3.3 Designing an Effective Lecture

What is a good lecture? Both students and staff emphasise the critical role of a clear lecture structure in enhancing learning. Students value structure as it provides a guiding pathway through complex information, enabling them to prioritise, process, and integrate content effectively. They prefer accessible language, limited information per session, and systematic connections between lecture components, often facilitated by PowerPoint slides and corresponding handouts delineating key points.

While highly structured approaches, characterised by systematic coverage and minimal digression, are lauded for improving comprehension and signposting key issues, some lecturers advocate for a balanced approach. Excessive structure risks "spoon-feeding", potentially hindering creativity and spontaneous critical thinking. This concern is also reflected in lecturers' ambivalence towards handouts, with some preferring "gap-fill" worksheets to encourage active engagement and independent note-making. A good lecture should provide a framework for

identifying key issues while simultaneously challenging students to think critically and formulate their ideas, thus serving as both a means of content transmission and a facilitator of learning.

What does a good lecture mean? One that is attended to or remembered? This question constantly worries both lecturers and researchers. The lecture as a method is constantly changing. However, are there any qualities that remain unchanged as signs of quality? To answer these questions, let us compare two representative studies on the characteristics of a good lecture, based on a broad survey of students, with a time difference of almost a quarter of a century (Table 4.5). In an earlier article, good lecturers are not just transmitters of information but skilled facilitators who create an engaging, well-structured, and supportive group learning environment through their charismatic delivery, strategic planning, and genuine connection with students[158]. In a later one, the most essential qualities of a good lecture are those that enable lecturers to be dynamic, engaging communicators, highly adaptive educators, and empathetic, inspiring mentors who actively involve students in their learning journey. These qualities move beyond mere information transmission to truly facilitate a deep and meaningful learning process[159].

The results have not changed fundamentally regarding the core qualities desired in a lecturer (engagement, structure, motivation, and good relationships). However, they have significantly evolved and expanded in their understanding of how these qualities are enacted, in particular:

- The granularity of engagement strategies: Moving from a general "atmosphere" to specific performative elements and interactive techniques.
- The integration of active learning: A stronger emphasis on embedding active learning strategies within lectures, reflecting modern pedagogical shifts.
- The lecturer's role as a co-creator/coach: A more pronounced student-centric view where lecturers actively involve students in shaping their learning journey.

The 2023 study (Battista et al.) builds upon and refines the ideas presented in the 1999 study (Waugh & Waugh), incorporating more contemporary pedagogical approaches and reflecting a deeper, more detailed understanding of student preferences in a potentially evolving learning landscape. The core human elements of good teaching remain, but the methods and explicit expectations of how those elements are expressed have certainly advanced.

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[158] Waugh G.H., Waugh R.F. (1999). The Value of Lectures in Teacher Education: The Group Perspective. *Australian Journal of Teacher Education*, 24(1). https://doi.org/10.14221/ajte.1999v24n1.3

[159] Battista S, Furri L, Pellegrini V, Giardulli B, Coppola I, Testa M, Dell'Isola A. (2023). Which Lecturers' Characteristics Facilitate the Learning Process? A Qualitative Study on Students' Perceptions in the Rehabilitation Sciences. *BMC Med Education*, 23(1). Doi: 10.1186/s12909-023-04308-y

Table 4.5

Comparative Analysis of Lecturer Qualities: S. Battista et al. (2023) vs. G.H. Waugh, R.F. Waugh (1999)

Quality/Aspect	Battista et al. (2023) - The "Modern" View	Waugh & Waugh (1999) - The "Classic" View
Engagement & Interaction	Highly Granular and Active: Emphasises specific "performer" skills, such as prosody, humour, and movement. Highlights the "facilitator" role where lecturers initiate debates, ask questions, and encourage dialogue to co-construct knowledge.	Atmosphere-Focused: Stresses the "happy, relaxed atmosphere" that makes learning "fun" and inspires students.
Planning & Adaptation	Flexible & Coach-like: Focuses on adaptive planning with strategic breaks and handouts. The lecturer is a "coach" who involves students in setting goals and personalises content based on their backgrounds.	Structured & Clear: Emphasises strong structure and clarity with logical organisation to help students follow the "journey" of the topic.
Role of the Lecturer	Mentor and Co-Creator: The lecturer is a "motivator" and empathetic leader who inspires passion and builds trust. They actively involve students in shaping the learning process.	Inspirational Deliverer: The lecturer's role is to present content in an engaging, stimulating, and inspiring manner. Their accessibility and concern for students are crucial for a strong relationship.
Use of Active Learning	Explicitly Integrated: Strong emphasis on embedding active learning strategies (e.g., role-playing, labs, group work) directly within the lecture to make students "actively do something."	Implicit/Less Central: While "light-heartedness" and "breaks" are mentioned for maintaining attention, the focus is less on formal active learning techniques and more on managing student attention within the lecture format.
Humour & Relatability	Specific & Strategic: Highlights the irony, humour, and relevant examples as tools to build rapport and aid comprehension.	Broad & Balancing: Notes that a "right balance" of seriousness and fun helps maintain concentration and makes learning more enjoyable.

To apply these findings and make a lecture a more effective learning experience for students, a lecturer can implement the following strategies:

- Find out as much as possible about the student cohorts who will be attending the lecture, particularly what they may already know about the subject, to profile the range of knowledge and subject disciplines of the students.
- Acknowledge to the students at the start that you know they are a varied group and that the lecture's content, organisation, and supporting materials will reflect this.

- Use varied examples or case studies that reflect the group's subject disciplines.
- When undertaking class tasks, suggest to the students that they work in their closest disciplinary cohorts.
- When appropriate, ask the students to work on different problems or consider different questions relevant to their knowledge base or subject discipline.
- Make explicit reference to specific additional resources each cohort can access for support after the lecture.

***Further Reading**: Biggs J. Tan C. Teaching for Quality Learning at University What the Student Does. 4th edition. New York: Open University Press, 2011. P. 146 – 148*

Qualities such as enthusiasm, passion, and the ability to "bring a subject to life" were consistently highlighted as paramount. Students valued lecturers who demonstrated expertise in delivery and pacing, used real-life examples, and could inspire genuine excitement for the subject. Some lecturers acknowledged a "performer" or "entertainer" role in addition to their facilitation role. Students consistently highlighted the need for lecturers to be dynamic and interactive. It goes beyond mere content delivery to creating a stimulating and approachable classroom environment. The "performer" aspect, encompassing enthusiasm, effective prosody, and strategic use of space and humour, is vital for capturing and maintaining attention. The "facilitator" aspect further emphasises active dialogue, encouraging students to share experiences, ask questions, and co-construct knowledge. This direct interaction helps bridge the gap between complex information and student comprehension, making learning less intimidating and more collaborative.

Furthermore, students noted that a lecturer's attributes and ability to build rapport had a significant influence on their engagement. Approachability fostered a less intimidating environment, encouraging questions and open admission of difficulties. The informal and personalised teaching approach, particularly observed in smaller class settings, was perceived to strengthen staff-student rapport and facilitate one-on-one guidance, ultimately enhancing the learning experience and student enthusiasm[160].

Some scholars offer practical tools for self-assessing the criteria for a successful lecture and guide how to improve. For example, M.J. Babic and P.V. Luther developed a checklist for an effective lecture to summarise the principles of learning, memory, and instruction.

The main principle to maximise the long-term memory of new material is

[160] Revell A., Wainwright E. (2009). What Makes Lectures 'Unmissable'? Insights into Teaching Excellence and Active Learning, *Journal of Geography in Higher Education,* 33(2), 209-223

> "Get the students' attention <...> tell the students what to pay attention to <...> and do not overload the system."[161]

To set the groundwork for constructing a memorable lecture, briefly reviewing the theory behind memory formation, learning, and effective teaching is important. The learning process has three core components: attention, comprehension, and integration (Fig. 4.6).

First, to focus the audience's attention, you can start your lecture with questions, case scenarios, personal anecdotes, powerful quotes, or illustrations. Second, you can facilitate comprehension by creating a 'roadmap' to an understanding with thoughtful consideration of a presentation's title, outline, and learning objectives. These first two steps help create short-term memories.

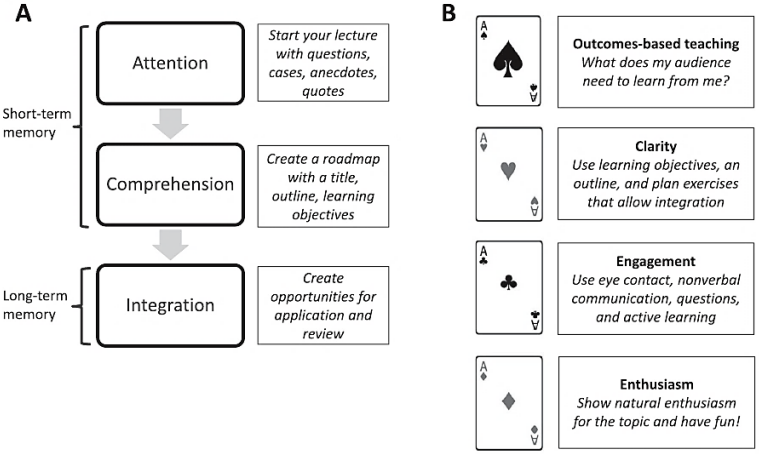

Figure 4.6 Three core components of the learning process[162]

However, to form long-term memories, you must also foster integration by creating opportunities for the audience to relate new information to existing information through application and review. You can ask the audience to apply information from your presentation to a case scenario, solve a problem or dilemma, or have them compare and contrast concepts. Opportunities for review may be challenging if you will not be with the audience after the lecture; however, you can still prime the audience for review by summarising important points, closing the presentation with instructions on how to apply material from the session, and providing a handout or identifying resources that allow the audience members to revisit key concepts from your presentation. The main principles of

[161] Davis J.R. *Better Teaching, More Learning: Strategies for Success in Postsecondary Settings.* Phoeniz, AZ: Oryx Press. 1994. P.141.

[162] Babik M.J. Luther P.V. (2020). Creating and Presenting an Effective Lecture. *JCEHP.* Vol. 40, 36–37.

effective teaching are linked to the above core learning components. These principles are sometimes referred to as the "four aces," and they are associated with increased retention of information (Fig. 4.6B).

Lectures are often the worst way to deliver many facts (use handouts for this purpose), but they are the best way to transmit concepts. It would help if you tried to synthesise the information from various sources, add your experience, and present a series of basic concepts. Each of the three to five central ideas in the body of the talk should contain five essential parts. First, the central concept should be stated in simple terms, and then examples and exceptions should be given. Then the central concept should be restated. A transition should then be made to the next central idea, followed by a brief pause to allow the listener time to reflect. Each of the five points of a single concept should take about five to seven minutes.

To keep students interested during the rest of the session, the lecturer could:

- Use relevant and current examples to illustrate the point,
- where possible, draw on the student's experiences,
- use rhetorical questions to encourage students to keep on track,
- change the demands on the student as the lecture progresses,
- vary between note-taking, listening, and active participation (considered later);
- use visual materials or artefacts that are relevant to the topic of the lecture,
- use live links to the web to demonstrate the currency of the presented material.

The student's working memory is processed when a lecturer reveals new information. As a lecture continues, the influx of new information can *interfere* with processing previously presented information. This cognitive overload makes longer lectures less effective and enjoyable, hindering knowledge acquisition. Shorter lectures respect learners' attention spans and help educators focus on delivering the most high-yield content.

The lecture's structure should include a precise chronology, which should be planned during preparation. For example, A. Long and B. Lock[163] suggested that a 1-hour lecture plan may include the following:

- Introduction and scoping – this sets minds (5 min).
- Ascertain knowledge base – this question engages the mind and memory; it is important in a lecture series to demonstrate how new content relates to previous lectures (5 min).
- Delivery – just enough new information at just the right speed (15 min).
- Question and discussion – set connections in long-term memory that may be carried out using realistic mock exam single best answer (SBA) questions (10 min).
- Delivery – check volume and speed of delivery (15 min).
- Questions – consolidate connections (5 min).

[163] Long A, Lock B. (2010). Lectures and large groups. In: T. Swanwick, ed. *Understanding Medical Education: Evidence, Theory, and Practice.* Chichester, West Sussex: Wiley Blackwell, P. 139–150.

- Summary and Close – pull it together (5 min).

Based on a synthesis of adult learning approaches and cognitive theory, researchers suggest reducing lectures to 1 hour (Fig. 4.7) and maintaining efficiency by adhering to time-based activities according to the schedule.[164]

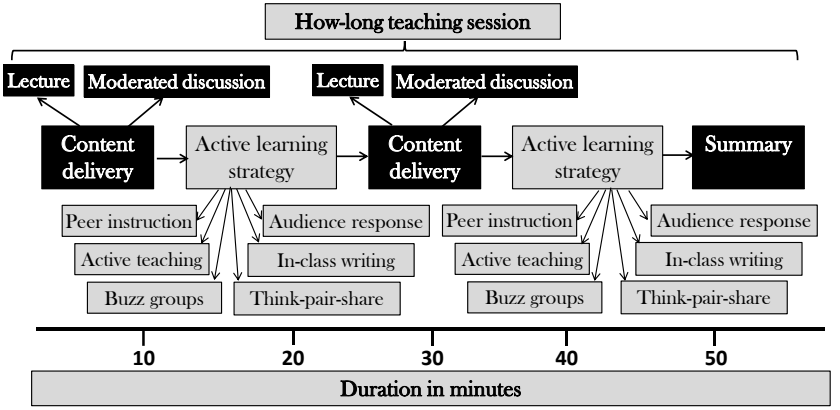

Figure 4.7 Time structure of the proposed one-hour lecture

Most lecturers agreed that the department had a mix of styles, from highly structured to more free-flowing approaches to lecturing, and each style had its merits. A highly structured approach was considered well-prepared in advance, with the lecturer covering points systematically on slides with only a limited degree of digression. The advantages of this approach were the logical sequencing of points, which aided comprehension, and the explicit signposting of critical issues, allowing students to separate the 'wood from the trees.' Moreover, a clear structure helped students see linkages between previous lectures and other parts of the course. Linking the individual learning outcomes of lectures with the broader goals of the module and the course itself was perceived as encouraging students to construct meaning using a deep rather than a surface approach to learning. Some lecturers also emphasised that a balance was needed, as too much structure could border on spoon-feeding. A more free-flowing approach encouraged creativity and spontaneity, which helped students think critically and independently.

Further Reading: Revell A., Wainwright E. (2009). What Makes Lectures 'Unmissable'? Insights into Teaching Excellence and Active Learning, *Journal of Geography in Higher Education.* 33(2), 209–223.

Some ways of coming to a robust, recognisable conclusion include using one or two (not more) of the following:

[164] Cooper Z.A., Richards B.J. (2016). Lectures for Adult Learners: Breaking Old Habits in Graduate Medical Education. *The American Journal of Medicine*, Vol. 130(3).

• go back to the agenda of intended learning outcomes, re-showing a slide containing them, and briefly summarise how each has been addressed (this helps students with the making sense stage of their learning),

• giving students a minute or so, ask all students to jot down the most important thing they wish to carry forward from the lecture. Then ask them to compare with their nearest neighbours. Finally, ask for one or two volunteers to share the thing they had chosen,

• pick out any unfinished business from the agenda, to be included in a future lecture, or to be diverted to tutorial sessions for in-depth exploration (note that this allows you to turn occasions when time runs out on you into what seems like an intentional strategy),

• formulate a new agenda for the next lecture, to whet students' appetites for what is to come next, and to allow them to do some preparation for the next lecture,

• set a task for all students to complete before the next lecture, or for them to bring along to forthcoming tutorial sessions,

• present in advance the intended learning outcomes for the next lecture, allowing students to add focus to their preparatory work or reading.

Any of these techniques is better than simply having an 'any questions?' episode right at the end of a lecture. An open-ended offer to take questions can lead to the majority of students with no particular questions feeling that, for them, the lecture is over, and the group gradually dissolves into shuffling and movement. Regularly ending by giving students something to do is a useful ploy; it helps reduce the fidgeting that often occurs when a lecture is about to wind up – closing of books, rustling of papers, shifting of chairs, and so on. When students need to listen carefully so that they know exactly what a task is, such fidgeting is almost completely avoided.[165]

Active learning within lectures aims to move beyond passive information reception by engaging students in various ways. These approaches can be categorised across four key dimensions:

1. When and How Knowledge Is Acquired

The first step involves ensuring students have foundational knowledge before or during the active learning exercise.

Pre-reading: Students are assigned materials (e.g., 4-5 pages) to study before the lecture. The challenge here is that students often do not prepare, expecting the lecturer to provide the information.

Short, focused in-class presentations: Lecturers deliver brief (a few minutes) presentations of central ideas without requiring prior preparation, immediately followed by an active learning exercise that addresses the common issue of students not pre-reading.

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[165] Race Ph. *The Lecturer's Toolkit: A Practical Guide to Assessment, Learning and Teaching.* Fourth edition. London, New York: Routledge, 2015. P. 416.

In-class individual study: Students are given focused texts or online materials (videos, demonstrations, simulations) to study individually during the lecture.

2. Format of Problems Presented

The design of the problems is crucial for successful active learning, aiming to achieve engagement, relevance, and effective knowledge transfer.

Simple Multiple-Choice Questions: These are easy to construct and commonly used with clicker technology. They typically involve factual recall.

Application and Transfer Problems: More engaging problems require students to apply learned concepts to new situations, fostering knowledge transfer.

Open-ended problems are preferred because they rely on recall rather than recognition and do not constrain thinking as much as multiple-choice questions. While harder to assess with clickers, they encourage deeper reasoning.

Variety is Key: Varying problem formats and incorporating real-life scenarios (potentially with internet resources) helps maintain student engagement and promotes the transfer of theoretical knowledge to practical situations.

3. Nature of Learning Activities During the Lecture

These are the core activities students undertake to process information actively.

Small-Group Discussion (Standard Approach): Students think individually for a few minutes, then discuss their solutions in groups of 2-4. The emphasis is on defending one's arguments and listening to others, as the clash of ideas is believed to lead to deeper understanding.

Individual Written Responses: Students write short responses to problems during the lecture.

Short Tests: Teachers can administer brief, scored tests (e.g., 10 items) to check understanding.

Group Defence and Voting: Four students with differing opinions present their solutions to the class, followed by a class vote to determine the best answer.

Competitive Engagement: Using game-like activities, such as true/false questions where wrong answers lead to sitting down until only "winners" remain, can foster pleasant competition and involvement.

Encourage Engagement and Variation: The overarching goal is to encourage student engagement through various methods, as variation helps prevent boredom.

4. Extent of Teacher Feedback

Feedback provided by the teacher is crucial after students have engaged with the problems.

Short and Prepared: Feedback should be concise (a few minutes) and well-prepared.

Utilise Diverse Media: Incorporating external resources, such as excellent internet videos, can enhance feedback.

Opportunity for Elaboration: Since students have already thought and discussed the concepts, the feedback phase offers an ideal opportunity for the lecturer to provide further elaboration, if beneficial, building on the students' prior engagement.

4.3.4 Flipped Classroom and Lecture Method

The inverted or flipped classroom label describes a teaching structure in which students watch pre-recorded lessons at home and complete in-class assignments, rather than attending lectures and doing homework at home.

The idea of the flipped classroom owes a great deal to the work of physics professor Eric Mazur, whose Peer Instruction method, formulated at Harvard in the 1990s, evolved into what is often termed flipped learning. Teachers who implement the flipped classroom model often film their instructional videos, but many also use pre-made videos from online sources. The online lectures should be concise; fifteen to twenty-five minutes is often recommended as a suitable duration. Furthermore, supporting the video lectures will likely include some reading material, such as a book chapter or a journal article. Students may watch the lectures multiple times to maximise their benefit.

Further Reading: Robert Farmer. (2018). The What, the How and the Why of the Flipped Classroom. *Innovative Practice in Higher Education,* Vol. 3(2), 14–31.

Schematically, an approach to the flipped classroom is illustrated in Fig. 4.8.

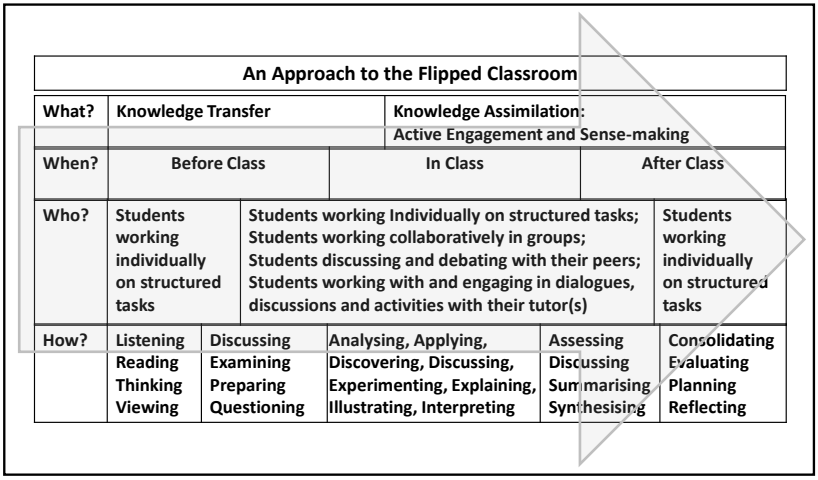


Figure 4.8 An approach to the flipped classroom

Studies have shown that the flipped classroom can provide students with more flexibility for self-paced learning, help promote content retention, and foster students' interest in learning. This model enhances interactive communication in class by allowing learners to watch lecture videos at home. The preferred flipped learning approach can be explained by its primary aim to provide opportunities for students to communicate and cooperate with their peers and teachers during class time.

"In the flipped classroom, lectures in the form of online videos are viewed outside of class time, creating the opportunity for instructors to provide mentorship and guidance during class hours. Instructors may use the flipped classroom approach because of its potential to increase the depth of engagement without sacrificing the amount of content and efficiency of delivery inherent in the lecture-based approach <...>

Negative attitudes toward the flipped classroom have included having to watch long, boring videos, time constraints, and the frustration, disorientation, and confusion of adjusting to a new and unfamiliar approach. However, initial resistance and frustration seem to occur in the first few weeks of a flipped classroom-based course. By the end of the course, many students prefer the flipped classroom over lectures."[166]

A comparison of the flipped classroom procedure and the traditional lecture-based approach is illustrated in Fig. 4.9.

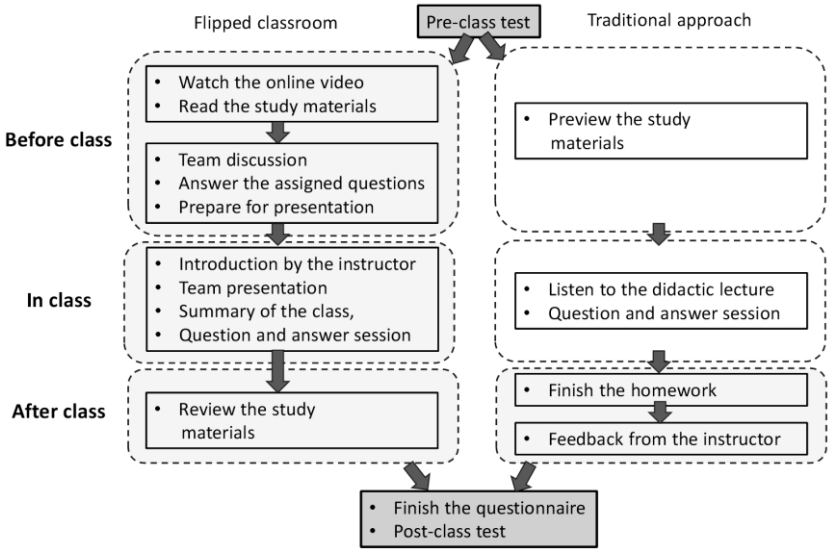


Figure 4.9 The procedure of the flipped classroom vs. the traditional lecture-based approach

The procedure of the flipped classroom:

1. Online lectures were introduced in the previous semester to create the flipped classroom format.

[166] Kay R., MacDonald Th., Di Giuseppe M. (2019). A Comparison of Lecture-based, Active, and Flipped Classroom Teaching Approaches in Higher Education. *Journal of Computing in Higher Education.* 31(3), 450–451.

2. The topic of synaptic transmission was introduced in week three of the course. The instructor recorded a 15-minute lecture.
3. Twenty-four slides were used to explain the content.
5. Students viewed the coloured illustrations, which included a moving pointer and corresponding audio content.
6. One week after the material had been introduced, students were given an announced practice test.
7. A list of terms that had been previously posted. Students were given ten minutes to draw and label the posted terms on a blank sheet of paper.
8. When the time expired, the correct answers were presented, and students were then instructed to access the course blog, the textbook chapter, which was an e-book, or any other online source to view the corrected items.
9. Students then graded their papers and turned them in to the instructor. After viewing the instructor's online video lecture and participating in several practice test sessions, students were asked to record a video of themselves teaching the lecture material to an imaginary class.
10. Class time was spent correcting omissions and reviewing common misunderstandings or misconceptions in the student videos. All students who completed the video assignment received maximum credit for it. The additional feature of having students orally deliver the lecture material to the instructor in their own words relied on the students' ability to upload videos easily.
11. The self-explanation learning method employed higher-level thinking skills because students had to explain, interpret, and summarise the material.

A group of researchers investigated the effectiveness of flipped learning by studying the performance of 95 students, divided into two groups: one that studied using the new method and the other that followed the traditional lecture-based method. They came to the following conclusions:

First, the flipped classroom approach offers personalised study. Students in the flipped classroom group have more freedom and flexibility in self-paced learning, allowing students to use their time more efficiently.

Second, the flipped classroom approach facilitates group study. Compared to the traditional lecture-based classroom, which relies solely on teacher-student interaction, the flipped classroom encourages both teacher-student and student-student interaction. Studying in groups may enhance individual students' mastery of knowledge.

Third, the flipped classroom approach emphasises the output of knowledge from students. The traditional lecture-based classroom focuses on how much knowledge students can absorb through reading and listening (input); however, in the flipped classroom, students are encouraged to verbalise what they have learned and to exchange ideas through discussion or debate (output). The professor and teaching assistants are in the flipped classroom. Compared to the traditional lecture-based classroom, where students typically have an average attention span of 10–20 minutes at the beginning of the lecture, the flipped classroom approach

engages students for a more extended period, which may aid in knowledge retention. Consistent with our findings, previous studies have shown that the flipped classroom approach improves students' performance[167].

4.3.5 The Role of Handouts and Guided Notes in Student Learning

Note-taking is a fundamental skill for academic success. It helps students in higher education recall information, improves retention and comprehension, and enhances academic achievement. The process of taking notes requires listening effectively and organising lecture concepts. It also helps with record-keeping, which aids in understanding, revision, and learning. It is also helpful for professional settings, aiding in decision-making and problem-solving[168].

Despite its apparent benefits, many students do not realise the importance of developing note-taking skills. Research shows that students are often incomplete note-takers, struggling to record important information and sometimes capturing less than 50% of the key points from a lecture[169].

One way to improve note-taking is to give students handouts highlighting key information, providing a scaffold for organising concepts. However, there is a delicate balance to strike. Providing students with full notes can discourage them from actively taking notes and instead turn them into passive listeners.

Empirical research suggests other ways to support students, such as guiding them toward key ideas, encouraging them to connect concepts, and teaching them effective note-taking strategies. Educational research has long supported the idea that note-taking is beneficial and that interventions to help students with the process can significantly improve learning.

Guided notes (GNs) are instructor-prepared handouts that provide all students with background information and standard cues, along with specific spaces to write key facts, concepts, and/or relationships during the lecture. GN requires students to actively respond during lectures, improve the accuracy and efficiency of their note-taking, and increase their retention of course content. GN can help organise and enhance lecture content in any discipline or subject area.

There is considerable discussion about which lecture style is most effective for students. While PowerPoint is a standard tool, not everyone agrees that it is the best for teaching. Some professors still prefer the traditional "chalk-and-talk" method or its modern equivalent, which uses smartboards to write key information

[167] Tang F., Chen Ch, Zhu Y., Zuo Ch., Zhong Y., Wang N., Zhou L., Zou Y., Liang D. (2017). Comparison between flipped classroom and lecture-based classroom in ophthalmology clerkship, *Medical Education Online.* 22(1), 7.

[168] Friedman M.C. Notes on Note-Taking: Review of Research and Insights for Students and Instructors, *Harvard Initiative for Learning and Teaching*, 2014, Harvard University, https://hwpi.harvard.edu/hilt/files/hilt/files/notetaking_0.pdf,

[169] Gayle A. Brazeau. (2006). Handouts in the Classroom: Is Note Taking a Lost Skill? *American Journal of Pharmaceutical Education,* 70, 2–38.

and explain concepts verbally. This approach is believed to enhance communication and help students develop practical note-taking skills.

If the purpose of note-taking and handouts is to capture information, this is no longer necessary with the ease of access to electronic notes. Instead, the focus should be on note-taking as a cognitive activity that facilitates the processing and transformation of knowledge. If this is the goal, these skills should be taught and assessed as explicit learning objectives in courses[170].

Every teaching method has pros and cons, and students have different preferences. The format also changes how students take notes and the speed at which they do so. Regardless of the presentation style, students find it helpful to have handouts to follow along with in class and to use as a reference later on.

Instructors can develop GN for a single lecture, one or more units within a course, or an entire semester-long course.

- GN increases students' active engagement with course content. To complete their GN, students must actively engage with the lecture's content by listening, observing, thinking, and writing.
- Students can more easily identify the most important information. Because GN cues the location and number of key concepts, facts, and/or relationships, students can better determine if they are getting the most important content.
- Students earn higher quiz and exam scores with GN.
- GN can serve as an advanced organiser. Some students have indicated that they benefit from reviewing the lecture topics before attending class.
- Instructors must prepare the lecture carefully. Constructing GN requires instructors to examine the sequence and organisation of lecture content.
- GN helps instructors prioritise and limit lecture content.

Lecturers' ambivalent views on handouts reflected a concern for striking a balance between structure and creativity, as well as between note-taking and note-making. While most lecturers tended to give handouts of their slides to communicate the lecture's key points, many were concerned that students might become overly reliant on their handouts for revision instead of taking notes on their thoughts and ideas about the subject. This concern was exacerbated by the easy access students had to lecture notes and handout material on the university intranet. Students without handouts must work harder to get the same grade as those with them. Whether or not lecture notes are provided depends on several factors, including the lecturer's teaching style, the subject matter, and available resources.

Providing handouts allows students to connect the information they see on a projector with the written text. This method combines listening, seeing, and reading simultaneously, which helps clarify the material and enhances learning. Additionally, offering handouts can foster a more positive relationship between the

[170] Meer J. (2012). Students' Note-taking Challenges in the 21th Century: Considerations for Teachers and Academic Staff Developers, *Teaching in Higher Education*, 17(1), 13–23.

instructor and students, making the learning environment more engaging and effective.

The main question for educators is not whether to give them, but how much information to include. One key debate is whether students learn better by taking notes from a lecture or by having handouts, allowing them to focus on the content being presented. One concern about giving students handouts is that it might lead to lower attendance and a dependency on external aids. Taking notes in one's own words is crucial to the learning process. Research supports this, showing that students who take notes during class perform better on exams and retain more information.

On the other hand, note-taking can be demanding, and students may struggle to accurately record all the important points due to their note-taking skills or the instructor's delivery, such as speaking too quickly. In terms of cognitive load, a student's working memory may struggle to listen, process, and take notes simultaneously, especially when encountering complex or fast-paced material.

Therefore, instructors need to balance the value of active note-taking and cognitive load limitations. A good strategy is to provide students with only an outline of the lecture, which gives them a framework to follow while still requiring them to listen and fill in the details actively. Students given outlines often perform better than those who take notes independently[171].

Some lecturers attempted to make handouts more like worksheets by leaving gaps, which kept students on their toes as they had to fill in the missing information themselves. Additionally, students who missed lectures could not rely solely on the handouts for their revision. Interestingly, students reported that they liked handouts with gaps because they encouraged them to be more attentive in lectures[172].

A worksheet is any printed material on copier paper given to students to complete and write on. Presents short, simple directions along with blank space on a line or in a box where responses are entered. Items appear in functional order. There are plenty of instruction-rich things you can do with a worksheet:

- a graphic organiser is an excellent tool for research, pre-writing, and note-taking,
- as supplements to the textbooks, worksheets can be used to add information for particular classes,
- an excerpt from a primary source can be printed on a worksheet for close study and annotation. Worksheets can be used for analysing data,
- as scaffolds for note-taking,
- as tools for reflection, or as formative assessments,

[171] Stacy E.M. (2015). Note-taking and Handouts in The Digital Age. *American Journal of Pharmaceutical Education*, 79(7).

[172] Revell A., Wainwright E. (2009). What Makes Lectures 'Unmissable'? Insights into Teaching Excellence and Active Learning, *Journal of Geography in Higher Education.* 33(2), 217.

- as recording tools alongside more active experiences, such as lab data sheets and group project planning sheets.

As written materials, worksheets can serve as tools for teachers to direct students' attention and provide opportunities for students to work independently, allowing them to progress at their own pace. It enables the teacher to focus on those students who require additional support. Much of what we learn comes from reading, so if you do not have good science textbooks, worksheets, and handouts can serve the same purpose.

In the worksheets they create, instructors should attend to the amount of text, directions, focus, blank space, font style, font size, and the inclusion of images. Depending on the student's level, a page filled to the brim with English words can be intimidating and overwhelming. An exception would be a reading class, but even then, students should be able to understand what to do quickly, without needing to comprehend and digest large blocks of text before they can begin their task.

A cartoon is a graphic depiction of an experience, using elements of the absurd to push ideas towards extremes and thereby make points more clearly. A good cartoonist can evoke in a group of people images that epitomise their behaviour or the events under discussion. In turn, the cartoon leads to further learning or inspires additional reflection. Cartoons are an effective supplementary educational tool because they combine images and text, aligning with the "dual-coding model of multimedia learning".

This model suggests that learning is enhanced when verbal and visual information is presented. Using symbols, imagery, and emotional engagement in cartoons can captivate learners, aid memorisation, and maintain interest. The provided study shows a significant improvement in class averages for students who were taught with cartoons. Feedback from medical students indicated that they found cartoons helpful for understanding and remembering complex topics[173].

4.4 Understanding Assessment Types in Adult Education

4.4.1 The Types of Assessment

According to the "Glossary of Education Reform," the education system has various assessment forms. In particular, it is proposed to differentiate screening assessments and pre-assessments. However, the main types that determine different stages of the educational process are:

- placement assessment to determine students' performance at the beginning of a new course;
- formative assessment to monitor students' progress while on a course,

[173] Kathiah R, Daya A. P. (2024). Evaluating the Impact of Cartoon-Based Learning on Student Performance and Engagement in Medical Education: An Experimental Study. *Cureus.* 16(2), e54684. DOI 10.7759/cureus.54684

- diagnostic assessment to determine problems persistently occurring in the process of learning to solve them efficiently;
- summative assessment to define if the goals set at the beginning of the course have been achieved[174]

Placement assessments are used to 'place' students into a course, course level, or academic program. For example, an assessment may determine whether a student is ready for Algebra I or a higher-level algebra course, such as an honours-level course. For this reason, placement assessments are administered prior to the start of a course or program. The basic intent is to match students with appropriate learning experiences that address their distinct learning needs[175].

Summative assessment is defined as that which contributes to a grade and the overall calculation of the degree classification. In contrast, formative assessment is defined as that which enables students to see how well they are progressing and gives them feedback.

Summative assessment can have a formative component; indeed, that might be more desirable than much common assessment practice when the assessment (either coursework or an exam) comes at the end of the course. Formative assessments are commonly said to be for learning because educators use the results to modify and improve teaching techniques during an instructional period. Summative assessments are for learning because they evaluate academic achievement at the end of an instructional period. Alternatively, as assessment expert P. Black put it:

> "When the cook tastes the soup, that is formative assessment. When the customer tastes the soup, that is the assessment."[176]

Since the late 1980s, the distinction between summative and formative assessment has shifted from timing to type. Formative assessments began to be not only those that were not formal tests, but rather informal classroom interactions. This perspective was further developed by the UK Assessment Reform Group, which promoted basic principles of formative assessment globally (Fig. 4.10).

The difference between formative and summative

[174] Linn R., Gronlund N. *Measurement and Assessment in Teaching*. Merrill, WI: Merrill Publishing Associates, 2000. P. 41–42.

[175] *The Glossary of Education Reform.* URL: https://www.edglossary.org/

[176] Scriven M. Beyond Formative and Summative Evaluation. In: M.W. McLaughlin and ED.C. Phillips, eds., *Evaluation and Education: A Quarter Century.* Chicago: University of Chicago Press, 1991: P. 169.

Those classroom assessment practices focused much more on what could be seen as classroom teaching practices.

Instead of testing, teachers interacted with students on the fly, in the moment, through questions and feedback to help students move toward the intended learning outcomes established at the beginning of lessons or courses.

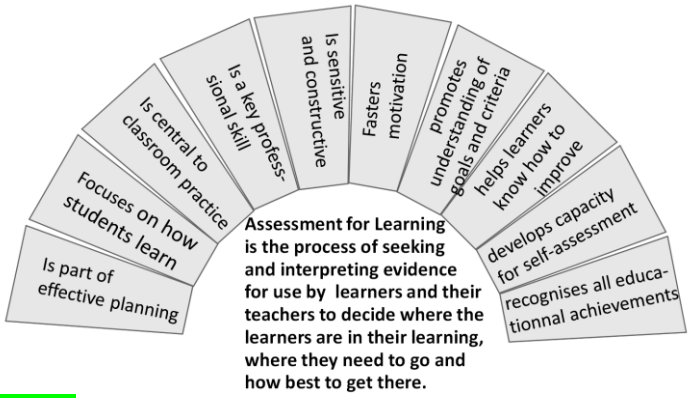


Figure 4.10 Research-based principles of assessment for learning to guide classroom practice assessment for learning[177]

Formative assessment encompasses a range of formal and informal procedures designed to develop writing skills and enhance students' potential as learners. It may take different forms, such as teacher, peer, self-assessment, or a combination of these, and uses various techniques, including classroom observation, portfolios, questionnaires, and interviews.

It assesses cognitive processes and concerns learners' feelings, behaviours, interests, and attitudes.

Teaching in education: Formative assessment

Formative assessment that utilises metacognitive strategies – such as goal setting, self-monitoring, and reflection – can significantly enhance both immediate learning and long-term retention. These methods also help students become better learners overall.

It is a process-focused tool, used for developmental purposes, rather than for comparison or selection. It pays more attention to the change in individual learners, respects learner differences, and gives full play to learner potential.[178]

[177] Assessment Reform Group. *Assessment for Learning: 10 Principles Research-based Principles to Guide Classroom Practice.* Cambridge: Assessment Reform Group. 2002. https://www.hkeaa.edu.hk/doclibrary/sba/hkdse/eng_dvd/doc/afl_principles.pdf

[178] Wei L. (2010). Formative Assessment: Opportunities and Challenges. *Journal of Language Teaching and Research*, 1(6), 838.

There are four core elements of formative assessment:

1) identifying the 'gap,'
2) feedback,
3) student involvement,
4) learning progressions.

Identifying the gap. In a seminal paper published in 1989, D. Royce Sadler established the essential purpose of formative assessment as determining the gap between a student's current status in learning and a desired educational goal. He stressed that this gap would vary from student to student and spelt out the consequences for pedagogy. Educational psychologists refer to this as the 'just right gap,' also known as the Zone of Proximal Development (see Chapter 2). The teacher's task is to identify and build upon immature but maturing structures, and through collaboration and guidance, to facilitate cognitive growth.

Feedback. Formative assessment is designed to provide feedback at multiple levels. First, it provides feedback to the teacher about the current levels of student understanding, which also informs the next steps in the learning process.

Student involvement. Improving learning through formative assessment also depends on students' active involvement in their assessment. In formative assessment, students learn the skills of self- and peer assessment. In doing so, they are using metacognitive processes. They reflect on their learning, monitoring what they know and understand and determining when they need more information. They also develop self-regulation strategies and can adapt their learning tactics to meet their learning needs. Students must also collaborate with their teachers to determine the criteria for success for each step along the learning progression.

Learning progressions. If formative assessment is to guide teachers and students, it must be linked to a learning progression. The learning progression should clearly articulate the subgoals that constitute progress toward the ultimate goal. Most state standards do not provide a clear progression for understanding where students stand in relation to the desired goals. Many state standards do not even provide a clear picture of what learning is expected. Developing learning progress toward standards is a critical element of formative assessment. Learning progressions provide the big picture of what is to be learned. They help teachers locate students' current learning status on the continuum along which students are expected to progress.

The term "feedback" refers to an arrangement in electrical circuits where information about the level of an "output" signal (specifically, the difference between the actual level of the output signal and a defined "reference" level) is fed back into one of the system's inputs. Where the effect of this was to reduce the gap, it was called negative feedback, and where the effect of the feedback was to increase the gap, it was called 'positive feedback.'

Further Reading: *Heritag M. Formative assessment: What do teachers need to know and do? Kappan. Connecting education, policy, and practice. URL: https://kappanonline.org/formative-assessment-heritage/*

In applying this model to the behavioural sciences, we can identify four elements making up the feedback system:

- data on the actual level of some measurable attribute;
- data on the reference level of that attribute;
- a mechanism for comparing the two levels and generating information about the gap between the two levels;
- a mechanism by which the information can be used to alter the gap.[179]

> "Feedback is a process whereby learners obtain information about their work in order to appreciate the similarities and differences between the appropriate standards for any given work, and the qualities of the work itself, in order to generate improvement."[180]

Types of feedback

- **Informal feedback.** Informal feedback can occur at any time, emerging spontaneously in the moment or during an action. Therefore, informal feedback requires building rapport with students to effectively encourage, coach, or guide them in daily management and decision-making for learning. It might occur in the classroom, over the phone, in an online forum, or in a virtual classroom.
- **Formal feedback.** Formal feedback is planned and systematically scheduled into the process. Usually associated with assessment tasks, formal feedback includes marking criteria, competencies, or achievement of standards and is recorded for both the student and organisation as evidence.
- **Formative feedback.** The goal of formative assessment is to *monitor student learning* to provide ongoing feedback that instructors can use to improve their teaching and students can use to improve their learning. Therefore, formative feedback is most effective when given early in the course, before summative assessments. Formative feedback helps students improve and prevents them from repeating the same mistakes. Sometimes, feedback is required before students can progress or feel capable of advancing to the next assessment stage.
- **Summative feedback.** The summative assessment aims to *evaluate student learning* at the end of an instructional unit by comparing it against some standard or benchmark. Therefore, summative feedback consists of detailed comments on specific aspects of their work, clearly explaining how the mark

[179] Black P., Wiliam D. (1998). Assessment and Classroom Learning, *Assessment in Education: Principles, Policy and Practice,* 5(1), 47–48.

[180] The definition from: *Feedback in Higher and Professional Education. Understanding it and Doing It Well.* Ed.D. Boud, E. Molloy. London, New York: Routledge. 2013. P. 6.

was derived from the provided criteria and offering additional constructive comments on how the work could be improved.

- **Student peer feedback.** There is no longer a need for teachers to be the only experts in a course. With basic instruction and ongoing support, students can learn to give quality feedback, which peers highly value. Providing students with regular opportunities to give and receive peer feedback enriches their learning experiences and develops their professional skill set.
- **Student self-feedback.** The ultimate goal of feedback is learning. During the provision of feedback, teachers have the opportunity not only to provide direction for the students but to teach them, through explicit modelling and instruction, the skills of self-assessment and goal setting, leading them to become more independent. To help students reach autonomy, teachers can do the following: explicitly identify, share, and clarify learning goals and success criteria; model the application of criteria using samples; provide guided opportunities for self-feedback; teach students how to use feedback to determine the next steps and set goals; and allow time for self-feedback/reflection.

Feedback processes are complex to carry out effectively in mass higher education. A significant challenge emanates from generally limited student engagement with feedback. A related barrier is modest student feedback literacy, referring to the capacities and dispositions to use feedback productively. For students to engage actively with feedback, they need agency in line with social constructivist approaches to learning. Social constructivist feedback research and practice take the perspective that shared and individual interpretations are developed through dialogue, sense-making, and co-construction. Feedback predominantly in the form of teacher transmission of information to students is insufficient to promote complex learning.

D.R. Sadler builds on this thinking by identifying three conditions for effective feedback:

- learners need to possess a concept of the standard being aimed for,
- compare the current level of performance with the standard,
- engage in appropriate action, which leads to some closure of the gap between the two.

When information is passed to a learner who lacks the opportunity or knowledge to act, the control loop cannot be closed, and dangling data – i.e., unclosed loops – result[181].

Student response to feedback is influenced by the level at which the feedback operates:

- Task-level feedback denotes how well tasks are performed,
- process-level feedback focuses on how to perform tasks,

[181] Sadler D. R. (1989). Formative Assessment and the Design of Instructional Systems. *Instructional Science.* 18(2), 119–44.

- feedback at the self-regulation level focuses on learners' self-monitoring of their actions,
- personal feedback at the self-level evaluates the learner and frequently involves praise.

D. Carless proposes a model of long-term student engagement with feedback (Fig. 4.11). Inputs from teachers, peers, or learners themselves, as well as the processes of student sense-making, are shown on the left-hand side of the figure. They represent factors influencing different outcomes, as shown in the central core of the figure. The arrow from single to double-loop feedback processes suggests a possible interplay between the two. Unresolved learning puzzles are represented as a separate element at the bottom of the figure. Single-loop feedback processes are used for short-term problem-solving or troubleshooting. Double-loop feedback processes occur when learners re-examine the foundations of their actions and modify their learning strategies over the medium to longer term.[182]

Therefore, feedback is a significant component of students' educational process and self-improvement, as well as an urgent scientific problem, the research of which aims to identify feedback patterns and ways to improve the effectiveness of teachers' activities for its strengthening.

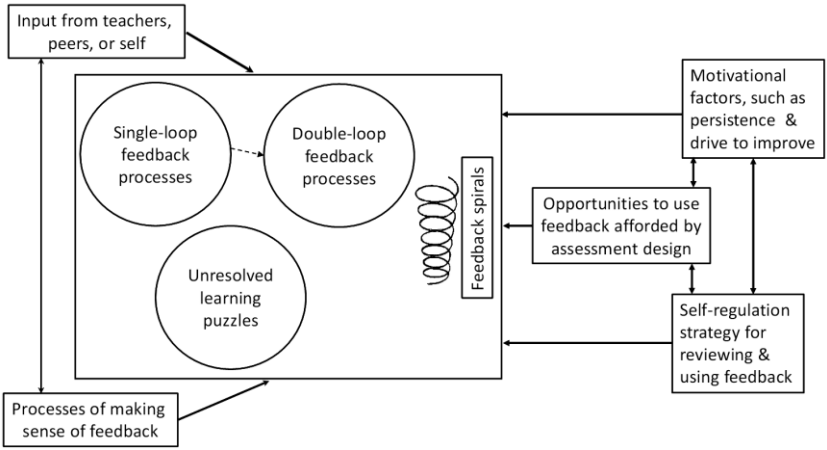


Figure 4.11 D. Carless's model of long-term student engagement with feedback

Summarising these searches, the researchers singled out several features of 'good feedback practice'**:**

- helps clarify what good performance is (goals, criteria, expected standards);
- facilitates the development of self-assessment (reflection) in learning;
- delivers high-quality information to students about their learning;

[182] Carless D. (2019). Feedback Loops and the Longer-term: Towards Feedback Spirals, *Assessment & Evaluation in Higher Education*. 44(5), 705–714.

- encourages teacher and peer dialogue around learning;
- encourages positive motivational beliefs and self-esteem;
- provides opportunities to close the gap between current and desired performance;
- provides teachers with information that can help shape their teaching.

Further Reading: Nicol J. D., Macfarlane-Dick D. (2006). Formative Assessment and Self-regulated Learning: a Model and Seven Principles of Good Feedback Practice, *Studies in Higher Education,* 31(2), 199–218.

4.4.2 Assessment in Adult Education: Principles and Practice

While often used interchangeably, assessment and evaluation have distinct meanings in the context of education.

- Assessment is a broad term that refers to the methods educators use to measure a learner's progress, skills, and needs. It operates at a micro-level, focusing on the measurement of student learning.
- Evaluation is a more formal, macro-level process that systematically determines the worth or value of a learning event or program. It takes into account the broader context and uses assessment data as one of its elements.

The primary point of difference is that assessment focuses on efficiency, while evaluation is based on values (Fig. 4.12).


Assessment

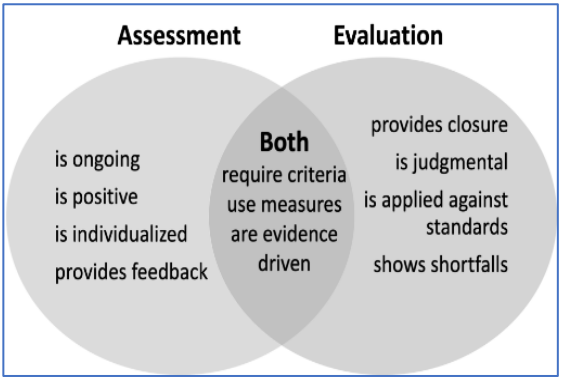


Figure 4.12 The difference between assessment and evaluation

In educational programs, both assessment and evaluation are used to measure the value of certain aspects of learning. While they are related, they serve different purposes (Table 4.6). Both require clarity on what is being measured and involve collecting evidence to support the findings.

Evaluation is a formal process that determines the worth or value of an object or concept. It is often linked to major decisions, such as funding, accountability, and program quality. In adult education, evaluations are used to measure learner outcomes and can influence public and private decisions.

- Formative Evaluation: This type of evaluation happens during a course. Its purpose is to provide feedback to both educators and learners while the program is still active, allowing for modifications and improvements. It is an "assessment for learning".
- Summative Evaluation: This evaluation is conducted after a course is completed. It looks back to judge the program's overall quality and demonstrate learner achievement. It is an "assessment of learning".

Evaluation is a systematic measure used to judge the quality of an outcome against a set of objectives or standards. It is often the final phase where grades or mastery are determined.

Table 4.6

A Comparative table of assessment and evaluation[183]

Feature	Assessment	Evaluation
Primary Purpose	To gather data for improving current and future performance.	To make a judgment using standardised criteria to assign a score or grade.
Nature	Investigative and diagnostic, it identifies weak areas for improvement.	Judgmental; it provides an overall score.
Function	Serves as feedback to enhance performance during the process.	Determines if the criteria are fulfilled at the end.
Timing	Formative ("assessment for learning"), happening during the program.	Summative ("assessment of learning"), happening after the program is complete.
Target	The learning process.	The outcome.
Feedback Basis	Relies on reflection about strengths and weaknesses.	Depends on the level of the outcome against predetermined criteria.
Relationship	Student-centred and collaborative, standards are often jointly defined.	Evaluator-centred; the evaluator judges against predefined measures.

In contrast, assessment is a continuous process. It is a systematic way to measure, monitor, and improve learning and achievements over time. The key purpose of assessment is to track a learner's progress, identify their strengths and weaknesses, and provide support.

Assessment is an ongoing, active process that involves both the assessor (the educator) and the assessee (the learner). The educator continuously monitors the learner's growth against predetermined criteria to understand their learning efficiency and identify areas for improvement. The data and evidence gathered

[183] Yambi T., Yambi C. Assessment and Evaluation in Education. University Federal do Rio de Janeiro, Brazil. 2018.

through assessment provide academic support, enhancing the learner's knowledge and skills.

Traditional assessment methods in higher education often fail to meet the needs of adult learners. Adults thrive in learning environments that respect their past experiences, encourage active participation, and help them make personal meaning from the content. As such, learning should be a collaborative process where both teachers and learners contribute to decision-making.

Assessment is a vital part of any adult education program. For educators, assessment provides an opportunity to evaluate their teaching methods based on learner performance. For the learner, it allows them to track their progress toward achieving learning goals. Assessment is defined as any activity that measures how well learners have acquired desired knowledge, skills, and attitudes. It helps both parties determine if stated learning outcomes have been met, making it an essential component of any educational program.

In adult education, where learners seek knowledge and skills for immediate application, mechanisms must be in place to confirm that learning has occurred. To achieve this, assessments must be both regular and standardised.

- Regularity means that assessment is an ongoing process, occurring as frequently as possible to enhance the chances of achieving learning outcomes. For example, an educator can assess learners during and after lessons to help them understand their learning.
- Standardisation means applying the same assessment criteria and tools to all learners, which helps ensure the reliability and consistency of the results.

Assessment vs. Evaluation in Adult Learning:

- New Trends and Demands in Adult Learner Evaluation
- The rapid growth of adult learners, particularly in diverse and non-traditional settings like online courses and workplaces, has led to new trends in evaluation. The key shifts are:
- Focus on Quality: There is a growing emphasis on using evaluation to ensure the quality of adult education programs, especially learners' work-related goals.
- Learner-Centred Approach: A critical trend is to involve learners in the evaluation process, which means prioritising their needs, experiences, and expectations.
- Reflective and Immediate Feedback: Adult learners value immediate feedback and respect. The best approach is a student-centred model that encourages reflection on their own experiences and understanding.
- Evaluation of New Skills: The need to assess more abstract qualities, such as intelligence and creativity, is growing, but this requires clearly defined measures.

- Usability in E-Learning: For online programs, a significant focus is on evaluating a platform's usability to prevent learner dropout, considering that the technical abilities of adult learners can vary widely.[184]

Ultimately, assessment in adult learning serves two purposes: instructional (guiding the teaching process) and diagnostic (identifying difficulties) (Fig. 4.13).

This model aligns with the constructivist view that learning is about meaning-making rather than simply receiving information. Knowledge is not just transmitted; it is actively constructed through hands-on activities and personal experience. For assessment to be authentic, it must involve real-life problem-solving with complex goals, require students to identify relevant information, and allow for active engagement and collaboration.

Therefore, an adult learning assessment should uncover a learner's ability to construct meaning from various situations. The focus should not be on judging performance but on enabling learners to reflect on their knowledge and beliefs in light of the new subject matter[185]. According to D. Addae, a truly effective adult assessment strategy follows several key principles:

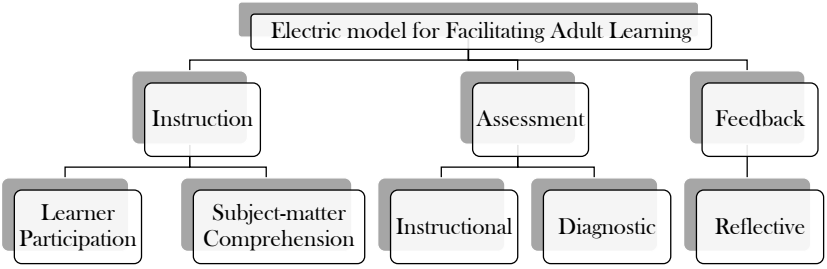


Figure 4.13 Model for facilitating adult learning

- Learners should be partners in planning the assessments.
- Assessment should occur concurrently with instruction, allowing for instant adjustments.
- Questioning should be used to promote self-reflection.
- The ability to articulate one's learning is a key indicator of success.
- Formal assessments should be application-based projects requiring learners to solve real-world problems collaboratively.
- Instructional assessment is a continuous process that occurs during a lesson. Its primary purpose is to help educators adjust their teaching in real-time to meet learners' needs better.
- Informal assessments are quick checks, like asking questions during lessons or reviewing in-class work.

[184] Bin M. H. F. (2020). New Trends in Formative-Summative Evaluations for Adult Education. *SAGE Open*, 10(3). https://doi.org/10.1177/2158244020941006

[185] Addae D. (2016). Promoting Effective Teaching and Learning in Adult Education: a Model-Based Approach. *Turkish Journal of Education TURJE.* Vol. 5., 184–192.

- Formal assessments, such as a pre-test before a new topic, are more structured. The results from this pre-test help the educator understand what students already know and what needs to be taught.

In adult education, this type of assessment plays a crucial role in reflective teaching and learning, enabling educators to evaluate the effectiveness of their methods based on learner performance. If a lesson is not achieving its goals, the instructional assessment provides the necessary feedback to quickly adjust the teaching approach and get learning back on track.

Diagnostic assessment is used to identify specific challenges learners face with a subject or course. The ultimate goal of any learning program is for learners to acquire the necessary knowledge, skills, and attitudes that are essential for their success. When they struggle, diagnostic assessment helps pinpoint precisely where the difficulty lies.

By incorporating ongoing assessment into the teaching and learning process, educators can gather information about these difficulties and create targeted solutions. By identifying and addressing learning gaps, diagnostic assessment ensures that learners can successfully achieve the desired learning outcomes. Ultimately, its purpose is not to grade learners but to uncover and resolve learning difficulties.

For adult learners, feedback is crucial for understanding their progress and maintaining motivation. However, the way feedback is delivered is crucial. Inappropriate or poorly given feedback can be discouraging and even cause a learner to drop out. Giving feedback to adults can be challenging because the educator is "criticising" an equal. Therefore, feedback for adult learners should be designed to motivate them. It should give them information that helps them overcome any difficulties with the course content. This approach supports the idea that feedback should help learners properly reflect on how they are making sense of the information.

In adult education, feedback should be reflective rather than corrective. Unlike in other learning environments, the goal is not just fixing mistakes but encouraging learners to think critically about their understanding. Since different people interpret the same information differently, feedback should be based on each learner's unique "meaning-making processes".

From a constructivist perspective, learning is an active process in which learners build their knowledge. Accurate understanding happens when learners reflect on new information by comparing it to what they already know.

Adult learners bring a wealth of life experiences and established beliefs to the classroom, enriching the learning environment. A good educator creates an environment where learners can reflect on new ideas in light of their personal experiences and perspectives. When giving feedback, the educator should focus on how well learners are making sense of a situation and how that understanding aligns with their worldview.

Instead of just telling a learner they are wrong, reflective feedback involves asking questions that prompt them to examine their thought processes and

assumptions. This approach helps learners reflect on their answers and strengthens their critical thinking abilities, rather than just providing a simple correction.

Peer assessment is a process in which students provide each other with formative or summative feedback on their work or performance, using specific criteria and standards. It is considered an important teaching and learning strategy beyond simply grading. It is a supportive, reciprocal process that allows learners to critically reflect on their peers' work, which in turn helps them increase their understanding and reflect on their performance, which can take various forms, from informal one-to-one feedback to formal many-to-many grading within a group setting[186].

Two main types of peer assessment: formative and summative.

- Formative Peer Assessment is about providing feedback to help learners improve their performance. The goal is to close the gap between a learner's current skill level and their desired level. This type of assessment focuses on the learner's needs and happens during the learning process. It enables instructors to identify and address issues that hinder a student's progress.
- Summative Peer Assessment is focused on the outcome or result. Its purpose is to evaluate the results of schooling in terms of meeting societal needs. This type of assessment focuses on grades and final scores rather than the learning process itself.

While they have different goals, the text notes that these two peer assessment types often overlap in practice. The key distinction lies in the focus: formative assessment is concerned with the process and the learner's needs, while summative assessment is concerned with the final result.

Metacognition is a learner's awareness of their knowledge and the task at hand, which helps them become active, strategic, and co-responsible learners. Alternative assessment methods, such as self-assessment and peer-assessment, are key to developing metacognitive skills. The focus shifts from traditional summative assessment (evaluating the outcome) to formative assessment (improving the process). The ultimate goal of assessment, as suggested by its Latin root meaning "to sit next to someone to help", is to help students become better learners.

The consistent practice of self- and peer-assessment transforms feedback into a powerful metacognitive tool. This feedback aims not to help students achieve better grades, but to help them learn more effectively and improve their skills. A key challenge, especially in adult language courses, is that the limited program duration may not allow learners and teachers sufficient time to engage in these assessment-for-learning strategies fully. However, even with time limits, metacognitive strategies have increased learners' self-confidence, motivation, and sense of responsibility. Ultimately, using self- and peer assessment as metacognitive tools, learners develop their competencies and build their knowledge.

[186] Chin P. (2007). Peer assessment. *New Directions in the Teaching of Physical Sciences*, 3, 13–18.

Peer assessment is a dynamic social process where learners give and receive feedback from one another to improve their performance. The primary goal is not just to critique, but to enhance learning and encourage active participation. This method is particularly effective in adult education, as it can cater to the diverse needs and experiences of a heterogeneous group of learners.

One of the primary advantages of peer assessment is its ability to foster collaborative knowledge building. By interacting and sharing ideas, learners can construct a deeper understanding of the subject matter. When students are tasked with providing feedback, they are compelled to think critically about the material, thereby strengthening their comprehension. This process also fosters self-assessment as students learn to identify strengths and weaknesses in their peers' work, a skill they can apply to their own. Additionally, peer assessment enhances social skills and provides feedback in a more accessible language since it comes from a peer who faces similar challenges.

For peer assessment to be effective, it must be an interpersonal and reciprocal process. The most successful implementations involve students giving and receiving feedback, making it a two-way street where everyone benefits. Feedback can be delivered in various forms, including written comments and verbal discussions. While verbal communication allows for immediate clarification and highlights the social aspects of learning, written feedback often offers more detailed and reflective comments. The most effective feedback focuses on improvement, providing constructive suggestions rather than just criticism. For face-to-face feedback, it is recommended to include a verbal explanation, analysis, and concrete suggestions for revision.

Peer assessment can evaluate more than just the final product, such as an essay or presentation; it also considers the learner's behaviour and the process that led to the learning. Its effectiveness can be influenced by interpersonal variables, such as psychological safety, trust, and communication skills, within the group.

A strong feedback system can also help learners regulate their learning by improving their cognitive and emotional responses to feedback. However, it is important to acknowledge that peer feedback may not always be as accurate or "correct" as feedback from an instructor. Despite its many benefits, the text notes a significant lack of research on peer assessment, specifically within the field of adult education, suggesting that it is a crucial but under-examined area[187].

Empowering Students to Own the Assessment Process

[187] Jurāne-Brēmane A. (2019). Peer Assessment in Adult Education: Challenges and Opportunities. *Society. Integration. Education.* Proceedings of the International Scientific Conference. Vol. 5, 148–158.

4.5 Self-assessment Questions

1. What are the three key pillars upon which digital andragogy is built?
2. What are some benefits of AI-driven tools for adult learners, according to Knowles's principles?
3. Describe the differences between asynchronous, synchronous, and mixed modes of distance learning.
4. According to Zimmerman, what key characteristics describe a successful self-regulated learner?
5. What is the fundamental principle of Inquiry-Based Learning (IBL)?
6. Define Project-Based Learning (PjBL) and explain how it differs from traditional teaching methods.
7. Define evaluation and explain its function and the level at which it operates.
8. What is the primary purpose of formative evaluation, and what is it also known as?
9. How does reflective feedback align with the constructivist perspective on learning?
10. List at least three new trends and demands in the evaluation of adult learners.

4.6 Practice Exercises

1. Develop a detailed mind map that visually connects all the key concepts, models, periods, and definitions from the text (e.g., deep vs. hyper attention, TPACK, digital andragogy, distance learning, blended learning, webinars). Use branches to show relationships and sub-points.
2. Based on the principles of Critical Digital Andragogy, create a set of practical guidelines (5-7 points) for educators to ensure their online learning environments are inclusive, equitable, and foster learner agency for diverse adult learners.
3. Write a brief reflection (250-350 words) on how Malcolm Knowles's adult learning principles could be applied to effectively teach adults about the responsible and efficient use of Generative AI tools in their professional lives. Include both the opportunities and the necessary cautions.
4. Reflect on your learning habits. Identify a recent learning goal or project you undertook. Describe how you applied (or could have applied) Zimmerman's three cyclical phases (forethought, performance, self-reflection) and at least three of his suggested SRL strategies.
5. Design a brief peer assessment activity for a group project in an adult education setting (e.g., a presentation, a collaborative report). Will it be formative or summative (or both)? What criteria will peers use to assess each other? How will you ensure it is an "interpersonal and reciprocal process" that builds knowledge collaboratively?
6. Lecture planning and organisation for interactive teaching and learning

Structure the content and the key terms.

Lectures across different categories work together. Thus, an instructor may give a semiformal, problem-solving, chalk-and-talk lecture, while another may offer a lecture-discussion, point-by-point, multimedia lecture.

Define the type of your lecture. Add some activities for the lecture. Design the lecture organiser.

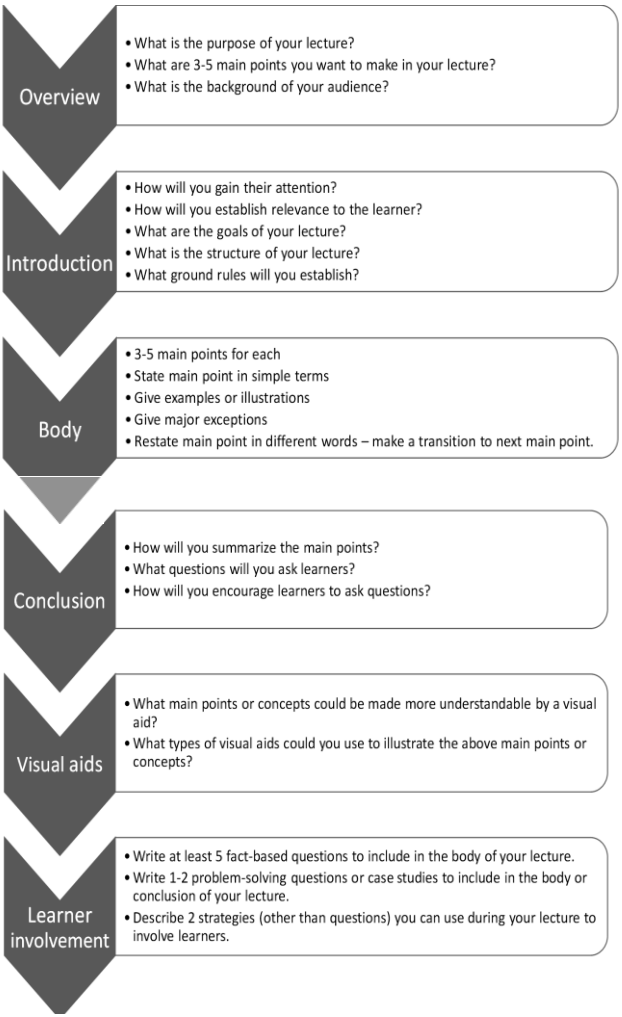


Figure 4.14 Lecture organiser

Effective lecture handouts. Guidelines for Constructing and Using Guided Notes

- Examine existing lecture outlines (or create them as necessary) to identify the most important course content students must learn and retain via lecture. Student learning is enhanced by lectures that are supported by fewer points, supplemented with additional examples, and provide opportunities for students to respond to questions or scenarios.
- Delete the lecture outline's key facts, concepts, and relationships, leaving the remaining information to provide structure and context for students' note-taking.
- Insert formatting cues such as asterisks, lines, and bullets to show students where, when, and how many facts or concepts to write.
- Visually projecting the key facts, definitions, concepts, relationships, etc., that students must write in their GN helps ensure that all students access the most critical content and improves the pace of the lecture.
- Leave a space for students to write. Providing about three to four times the space needed to type the content will generally leave enough room for students' handwriting.
- Do not require students to write too much. Using GN should not unduly slow down the pace of the lecture.
- Enhance GN with supporting information, resources, and additional response opportunities. Consider inserting diagrams, illustrations, photos, highlighted statements, or important concepts.

Design Of Handouts

Selection:

1. Select materials that are relevant to the lecture's content.
2. Use materials that enhance the speaker's presentation, and/or if the speaker makes specific reference to them.

Designing Handouts

1. Outline important points to be covered. Carefully structure the outline in terms of main topics and subtopics. Organise the contents carefully and use a logical sequence.
2. Avoid lengthy written explanations.
3. The most useful handouts have partial information (an outline with key tables and figures) and space for taking notes (encourage note-taking).
4. Use more than one handout, if possible, rather than a lengthy one, if there is a logical way to divide the content.

Content features:

- Checked the learning outcomes to establish what was needed.
- Checked that the information is not readily available elsewhere.
- Applied for permission to reproduce copyrighted material.
- Organised the information in a logical order for learning.
- Clearly stated the topic and purpose of each handout.

- Make it clear whether students are to put their names on the handouts or if they are to return them.
- Included instructions for any test questions or procedures.
- Included all necessary steps in procedures and instructions.
- Included safety cautions for all dangerous or difficult procedural steps.

Graphic features:

- Chosen graphics that illustrate the topic clearly and add to the text.
- Labelled all important parts of each graphic.
- Utilised graphics to illustrate complex procedural steps.
- Placed graphics close to the written material they illustrate.

See the example (Appendices to Chapter 4).

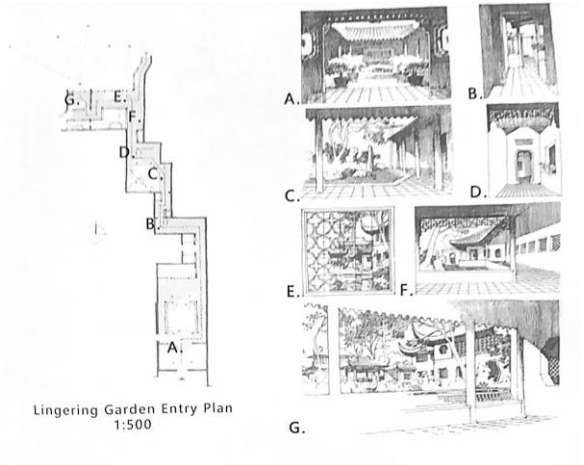
Creating worksheets for visual thinkers

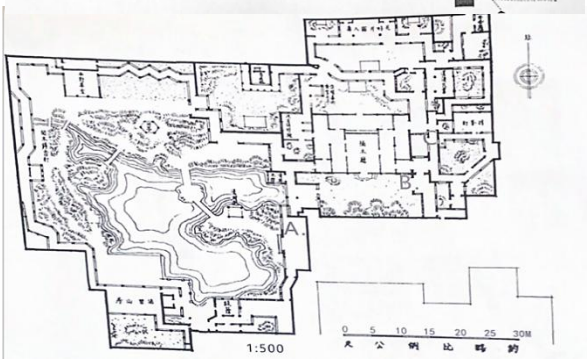
- Information found in long blocks of text can easily get lost for visual learners. Use drawings to break up blocks of text and encourage students to review and recap what they have learned. It will make the information easier for your students to digest.
- If your worksheet has three important takeaways, you can draw a star, arrow, or key (as in 'key concept') by each one to give your student a visual cue.
- If you are introducing a new idea, you could draw a lightbulb, or if you are asking them to ruminate on a question, you could draw a question mark in a thought bubble.
- In addition to creating visual breaks within the page, you can engage students by creating a post-lesson visual review page.

Appendices to Chapter 4

Example 1. Lecture Handout

Appreciation of Classical Chinese Garden Spaces:
A Case Study of the Lingering Garden





Example 2. Handout for Reader

Designing Rural Visual Identity: Shaping the New Face of the Countryside

1. Introduction: Purpose & Significance

Objective:

Establish goals for rural visual identity design to enhance tourism,strengthen cultural identity, and drive economic growth.

Design Value:

- Economic Impact: Attract tourists/investors through cohesive branding.
- Cultural Preservation: Revitalize traditional heritage via modern design.
- Social Revitalization: Foster community pride and sustainable development.

Why It Matters:

Visual identity is a strategic tool in rural revitalization, transforming perception while honoring roots.

2. Design Process & Methods

Key Stages:

1.Research & Analysis

- Conduct field studies to document local history, culture, and ecology.
- Example: Interview villagers, map cultural landmarks.

2.Conceptual Design

- Translate research into mood boards and logo/color palette proposals.
- Example: Sketch symbols merging "agricultural tools + modern minimalism".

Design Methods:

- Creative Thinking: Blend rural motifs (e.g., crops, textiles) with contemporary aesthetics.
- Technical Application: Use tools like Adobe Suite to prototype logos, signage, and digital assets.

3. Key Challenges & Solutions

Challenge	Solution
Cultural Preservation vs. Innovation	Modernize traditions without over-commercialization (e.g., abstract art inspired by folk patterns).
Resource Limitations	Maximize local materials (wood, natural dyes) + low-cost digital tools (Canva, free vector software).
Technical Skill Gaps	Partner with urban designers + train youth via workshops.

4. Interactive Activities

Students Discussion:

- Q1: "*What shape comes to mind first when it comes to rural areas?*"
- Q2: "*What color comes to mind first when it comes to rural areas?*"

Group Discussion:

- Q1: "*Which shape best represents rural vitality? (e.g., wheat sheaf, mountain, river).*"
- Q2: "*What 3 colors evoke 'authentic countryside' to you? Why?*"

Case Studies:

- Traditional Revival: "Warm Yellow" branding for farmstay tourism (using hand-drawn illustrations).
- Modern Fusion: Geometric patterns + vibrant typography for rural craft markets.

5. Key Takeaways & Future Steps

Summary:

Rural visual identity must balance cultural integrity with innovative appeal to drive sustainable growth.

Call to Action:

- Continuous Learning: Study global case studies (e.g., Japan's satoyama branding).
- Practical Application: Join rural design contests or local revitalization projects.
- Future Trends: Explore AR/VR for immersive cultural storytelling.

"Design isn't just aesthetics—it's the soul of the countryside reimagined."

Example 3. Perception Quiz

Rural Visual Identity Perception Quiz

***Name*:** _____
***Group*:** _____

Section 1: Instant Associations (Individual | 3 mins)

1.Shapes of the Countryside

"What shape comes to mind **first** *when you think of rural areas?"*

□ Mountain □ River □ Wheat sheaf □ Farmhouse □ Tree □ Sun

□ Other: _____

2.Colors of Authenticity

"What **single color** *best captures the essence of the countryside to you?"*

□ Green (fields/forests) □ Gold/Yellow (harvest/sun) □ Blue (sky/water)

□ Brown (earth/wood) □ Red (traditional crafts) □ Other: _____

Section 2: Group Debate (Team | 7 mins)

Symbolizing Rural Vitality

"Which shape ***best represents rural vitality****? Rank your top 3 (1=most vital). Explain one choice briefly."*

Shape	Rank	Reason (e.g., cultural/ecological significance)
Wheat sheaf		
Mountain		
River		
Oak tree		

Color Palette Storytelling

"Choose **3 colors** *that together evoke 'authentic countryside.' Assign each a role:"*

Color	Role (*e.g., "Gold: energy of harvest"*)	Why this combination?

Section 3: Design Reflection (Individual | 3 mins)

"Based on today's lecture, how would you **balance tradition and modernity** *in a rural logo? (e.g., 'Use a mountain shape with minimalist lines')"*

_____
_____
_____
_____

Index

Bibliography

The following saurces, listed alphabetically, were used in the course of preparation for the current edition:

1. A Handbook for Teaching and Learning in Higher Education: Enhancing Academic Practice. 3rd edition. Ed. Heather Fry. New York, London: Routledge, 2008.
2. Amelina O.S., Tsurkan O.V. Distance, and Blended Learning. Experience, Advice, Tools. Kharkiv: Osnova, 2022.
3. Anderson L.W., Krathwohl D.R. A Taxonomy for Learning, Teaching, and Assessing. A Revision of Bloom's Taxonomy of Educational Objectives. Abridged edition. Boston: Allyn & Bacon, 2001.
4. Bandura A. Social Cognitive Theory of Social Referencing. In: Social Referencing and the Social Construction of Reality in Infancy. Ed. S. Feinman. Boston, MA: Springer, 1992. P. 175–208.
5. Bates A.W. Teaching in a Digital Age. 2nd Edition. British Columbia Pressbook, 2019.
6. Bélanger P. Theories in Adult Learning and Education. Opladen; Farmington Hills, MI; Barbara Budrich Publishers, 2011.
7. Biggs J., Tan C. Teaching for Quality Learning at University: What the Student Does. 4th edition. New York: Open University Press, 2011.
8. Blackley S., Sheffield R. Digital Andragogy: A Richer Blend of Initial Teacher Education in the 21st Century. Issues in Educational Research, 2015, 25(4), pp. 397-414.
9. Curriculum and Assessment. Eds. D. Scott. Westport, Connecticut, London: Ablex Publishing, 2001.
10. Deng Z. Brining Content Back in Rethinking Teaching and Teachers. Didactic and Curriculum in Ongoing Dialogue. Eds. E. Krogh, A. Qvortrup, S. T. Graf. New York, London. Routledge. 2021.
11. Fink L. D. Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses, 2nd Ed. San Francisco, CA: Jossey-Bass, 2013.
12. Grasha A.F. A Matter of Style: The Teacher as Expert, Formal Authority, Personal Model, Facilitator, and Delegator College Teaching, Vol. 42, No. 4 (Fall, 1994). P. 142–149.
13. Knowing What Students Know: The Science and Design of Educational Assessments. Eds. J. W. Pellegrino, N. Chudowsky, R. Glaser. Washington, DC: National Academy Press, 2001.
14. Knowles M. et al. The Adult Learner. 5th edition. Houston: Gulf Publishing Company, 1998.
15. Kolb D.A. Experiential Learning: Experience as the Source of Learning and Development. Englewood Cliffs. New York: Prentice Hall, 1984.
16. Kridel C. Encyclopaedia of curriculum studies. California: Sage, 2010.

17. Major C.H., Harris M.S., Zakrajsek T. Teaching for Learning: 101 Intentionally Designed Educational Activities to Put Students on the Path to Success. Routledge, 2014.
18. McKeachie W., Svinicki M. McKeachie's Teaching Tips: Strategies, Research and Theory for College and University Teachers. Boston, New York: Houghton Mifflin, 2006.
19. Mezirow J. Transformative Dimensions of Adult Learning. San Francisco. Jossey-Bass, 1991.
20. Nicol J.D. Macfarlane-Dick D. Formative Assessment and Self-regulated Learning: a Model and Seven Principles of Good Feedback Practice, Studies in Higher Education, 2006. Vol 31, No 2. P. 199–218.
21. Perry T., Lea R., Jorgensen C.R., Cordingley P., Shapiro K., & Youdell D. Cognitive Science in the Classroom. London: Education Endowment Foundation (EEF). 2021.
22. Skelton A. Understanding teaching excellence in higher education: Towards a critical approach. London; New York: Routledge, 2005.
23. Skinner B.F. Science and Human Behaviour. New York: The Free Press, 1965.
24. The Glossary of Education Reform. URL: https://www.edglossary.org/
25. The European Higher Education Area. Between Critical Reflections and Future Policies. Eds. A. Curaj, L. Matei, R. Pricopie, J. Salmi, P. Scott. Berlin: Springer, 2015.
26. Teaching about Teaching: Purpose, Passion, and Pedagogy in Teacher Education. Eds. J. Loughran, T. Russell. London, Washington, D.C: The Falmer Press, 2003.
27. Vygotsky L.S. Mind in Society: The Development of Higher Psychological Processes. Cambridge, Mass.: MIT Press, 1978.
28. Wiliam D. An Overview of the Relationship between Assessment and the Curriculum. In: Curriculum and Assessment, edited by D. Scott. Westport, Connecticut, and London: Greenwood Publishing Group, Inc., 2001.

Навчальний посібник викладає основи базового освітнього курсу «Педагогічна майстерність у вищих навчальних закладах» для здобувачів вищої освіти на академічному та науковому рівні «доктор філософії». Він систематизує знання аспірантів з педагогічно-психологічного циклу, допомагаючи інтегрувати їх зі знаннями, отриманими під час вивчення фахових дисциплін. Зміст цього видання структуровано відповідно до навчальної програми дисципліни. Він містить теоретичний матеріал та практичні завдання, спрямовані на опанування сутності професійної діяльності викладача вищої школи, а також технологій розвитку та саморозвитку особистісних та професійних якостей, особливостей педагогічного спілкування, педагогічної естетики, етики та культури викладача. Посібник включає аналіз різних педагогічних ситуацій та приклади вирішення педагогічних проблем. Він призначений для аспірантів та викладачів вищих навчальних закладів.

О. В. Юферева, Т. М. Деркач

Сучасна педагогіка та андрагогіка: Посібник для аспірантів

Рекомендовано Вченою радою
Київського національного університету технологій та дизайну
як навчальний посібник для здобувачів вищої освіти
освітньо-наукового рівня «доктор філософії»

Видавець ФОП Ланковська Г. Г.
Свідоцтво про внесення суб'єкта видавничої справи до Реєстру видавців, виготівників, розповсюджувачів видавничої продукції серія ДК № 7740 від 28.02.2023

Друк ФОП Ланковська Г. Г.
Свідоцтво № 20670000000177341 від 13.11.2019
www.enterprint.com.ua

Підписано до друку 28.11.2025
Формат 60x84/16. Тираж 30 прим. Зам. № 25/11-19