AGILE TEACHING METHODOLOGY

- manual

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Funded by the
Erasmus+ Programme
of the European Union

BioEra+: Bioeconomy in University Agile Teaching with Erasmus +

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Composition and graphic design:

Łukasz Paluch

Published by:

Universidad de La Laguna

Molinos de Agua, s/n, 38270 La Laguna, Tenerife, Spain

1st edition.: January 2024

144 pp.;24 cm.

ISBN: 978-84-09-56904-5

Legal deposit: TF 1053-2023

DOI: https://doi.org/10.25145/b.2023.13

The correct reference for this book is as follows:

Gorczyca, A., Klimek-Kopyra, A., Kiełbasa, B., Pink, M., Redlichová, R., Wieczorek-Przybyło, M., Piecuch, K., Pereira, F., Raposo, A., Saude, S., Durão, A., Chaves, H., Barbosa, E., Rodrigues, A.I., Santamarta, J.C., Cruz-Pérez, N., Rodríguez-Alcántara, J.S., (2024). *Agile Teaching Methodology.* Tenerife. Universidad de La Laguna, doi: https://doi.org/10.25145/b.2023.13

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Introduction

The approach to teaching defined as Agile Teaching/Learning (ATML) was developed by transferring concepts related to computer programming to didactics. It was noted that it is *agility* in teaching, i.e. the ability of a teacher to quickly change the type, pace or structure of a course to fit the needs and abilities of individual students, that is an important challenge in modern education. Initially, ATML was associated with computer-based learning. Teachers/trainers of such courses were highly knowledgeable and skilled in programming and the use of computers and media. For some time now, ATML has begun to be implemented in other courses in higher education, including courses whose lecturers are not specialists in computer sciences. The implementation of ATML is highly beneficial from the point of view of quality and the results obtained, but it requires more attention to the needs of teachers so that they are able to cope with the challenges of being *agile* in the teaching process.

The primary purpose of this guide is to introduce teachers of non-computer science courses to the specifics of ATML. This handbook presents an approach slightly modified from the original ATML to make it more useful for teaching courses related to the bioeconomy, that is, courses that are interdisciplinary in nature. Interdisciplinary teaching poses a major challenge for the teacher in itself. An approach to didactics modeled on ATML can be very useful and can enhance the results obtained in interdisciplinary teaching. This introduction explains why a modern teacher should use ATML and briefly discusses contemporary conditions, as well as the challenges faced by university teachers. The adaptation of the teaching process to modern needs results from external social conditions beyond the control of university staff, and from internal conditions, i.e. the commitment of the involved university teachers to the quality of teaching. Understanding these determinants will result in better outcomes, better evaluation of classes by students, which will ultimately affect the teacher's job satisfaction.

The evolution of teaching methods at universities has gained particular momentum since the prevalence and popularization of digital techniques and the large-scale introduction of electronic infrastructure, i.e. digitization. An era of e-learning and blending (blending) of teaching methods, techniques and approaches has begun. Face-to-face formats began to be replaced by online modes, or a combination of both, with a greater or lesser share of each. A variety of methods supported with electronic devices have also begun to be used in stationary classes. Virtual teach-

ing, consisting only in digitizing learning materials and posting them online so that both students and instructors can perform the educational process, is not fully satisfactory in many assessments and does not produce the desired results. This form has some limitations, where the main ones, based on the analyses carried out, are indicated as insufficient management of the process and lack of proper supervision of the effect, which is due to limited contact and interaction between the student and the teacher (Adel and Dayan, 2021). Many years of practice of online teaching already allows us to conclude that the most effective approach is blending online classes with face-to-face classes supported by new teaching methods, especially those that use computer techniques (Thompson et al., 2019).

The digital transformation in teaching, as in many other areas of our lives, has been significantly accelerated by the pandemic. Lockdown has definitively driven many proponents of traditional teaching to use digital techniques, and the concept of keeping teaching students in the unchanged, traditional manner, has globally become a thing of the past (Buck and Tyrrell, 2022). The rapidly advancing digitization has primarily contributed to the dynamic transition from traditional to modern education, which can be considered one of the most important benefits. It has been indicated that modern education, unlike traditional education, promotes the development of such desirable qualities in the student as critical thinking, life skills, analytical and decision-making skills, while paying attention to diversified values. The main differences between traditional and modern education are shown in figure 1. Here, the difference in who is actually at the center of the activity comes to the fore– the teacher (traditional education) or the student (modern education). In addition, university teachers who use teaching methods into which the latest technologies are implemented, such as mobile apps, audio and video forums, YouTube, podcasts, e-books, videos, etc., have made the learning process more attractive to the student and more interactive.

The learning outcomes achieved in modern education are mainly the practical skills necessary for graduates, supported by theoretical knowledge, which in traditional education were acquired only after the graduate started working. Analysing the transformation of traditional education into modern education, it is clear that ATML meets all the requirements of the modern approach as it is focused on the individual needs of the student. ATML, according to the proposed definitions, is based on 4 main pillars: (1) individuals and interactions over processes and tools, (2) meaningful learning over the measurement of learning, (3) stakeholder collaboration over constant negotiation (4) responding to change over following a plan (*https://kanbanzone.com/2021/4-pillars-of-agile-in-education/,* 2023) and this is in line with the modern approach to the teaching process.

The transformation of teaching methods that has occurred as a result of digitization is also part of the transition from so-called *classical literacy* (studying for social and personal satisfaction) to "folk literacy" (career and skill orientation). This is of great importance given the motivations of today's youth to pursue higher education. The longing of the older generation of academics to convey in their classes concepts that relate to culture, traditions and customs, common in traditional education, may lead students to consider such classes unnecessary and unattractive. The modern student devotes time to study in order to develop knowledge, but to a larger extent he is motivated by acquiring skills he can use in his future career, which should be taken into account by the teacher when planning the teaching process. The skills required for employment in the 21st century are not only theoretical and practical knowledge in a particular field. Today's employers require from their executives, i.e. university graduates, numerous non-occupational skills that affect the quality of work of entire teams, namely the so-called 4 Cs (critical thinking, creativity, collaboration, communication), information skills, media literacy, technological skills, flexibility, leadership, initiative, productivity and social skills. The selection of teaching methods is an important aspect of shaping the above-mentioned skills, and academic staff should take this into account when creating course syllabuses.

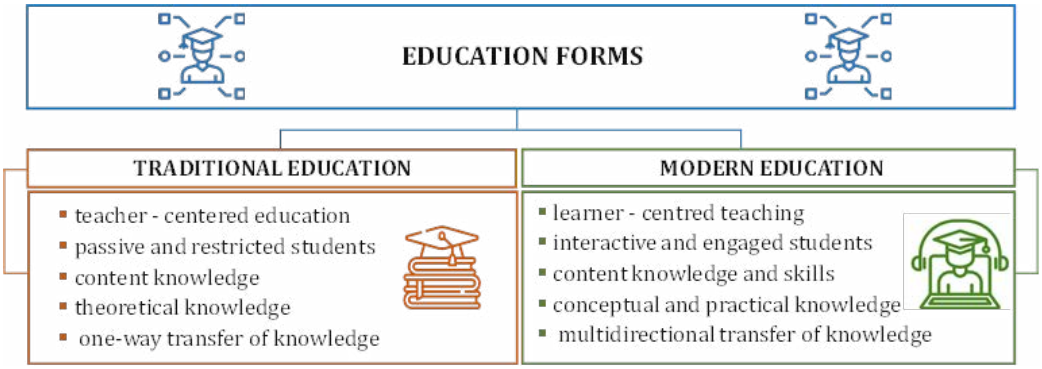

Figure 1. Modern versus traditional education

A general classification of thinking skills is shown in figure 2, and higher-order skills are now more desirable than those rated as lower-order skills. This should affect how universities teach. Generation Z, also known as the *multitasking generation*, the *silent generation*, the *@ generation*, *generation V* or *generation C* is currently studying at universities. Generation Z has been in constant connection to the digital world from an early age. These are young people for whom technology serves as the primary means to expand their knowledge. Unlike *generation Y*, which gradually entered the digital world, for Generation Z, the digital world has always existed. They belong to a generation already growing up in the world of modern technology.

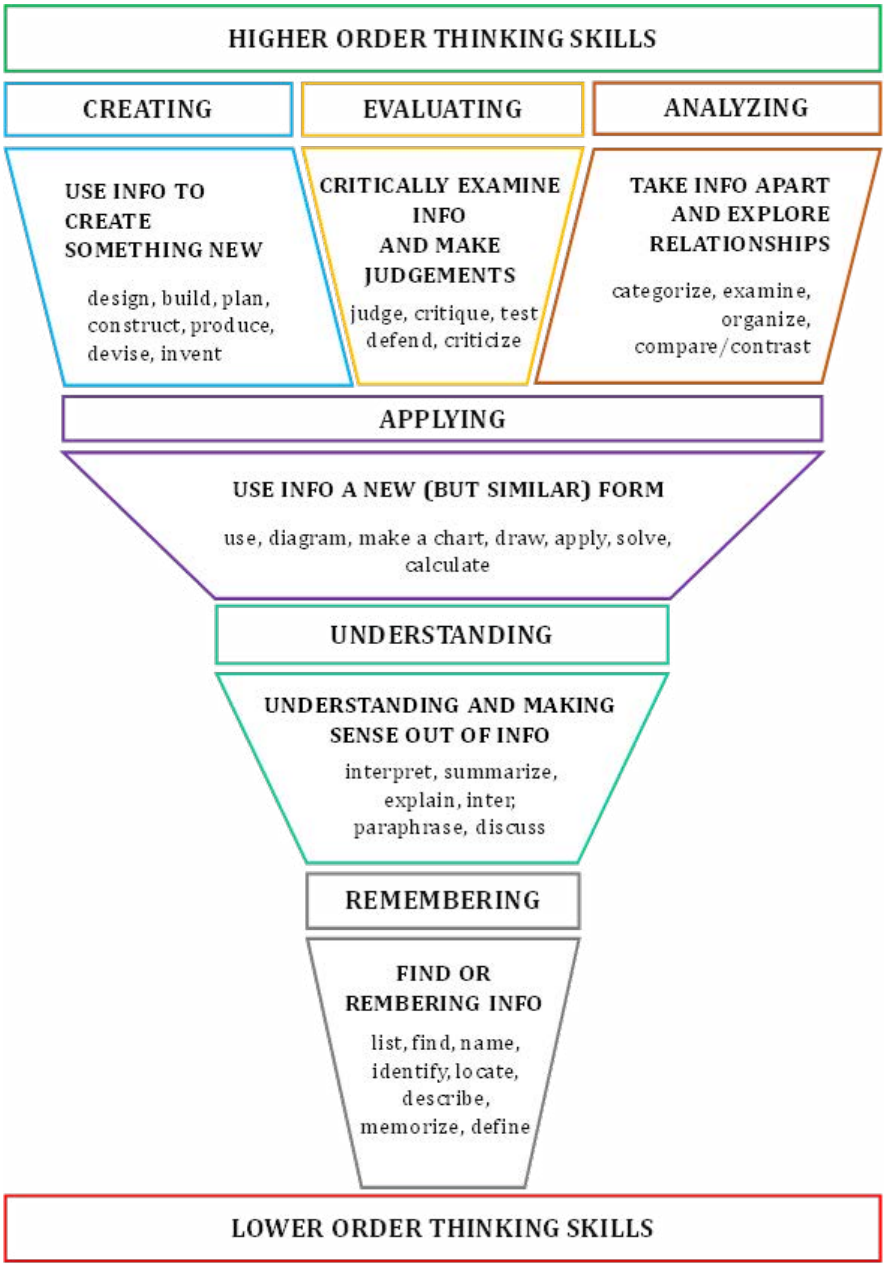

Figure 2. Classification of thinking skills

Generation Z is considered to spend little time in the *real* world. These young people have grand plans for the future, they have created their own vocabulary (through technology), they are entrepreneurial, they get their knowledge from the

Internet and are geared to find information quickly. They don't know a world without technology. They are keen to share their knowledge on the Internet. They are open and direct. They are well aware of the dangers lurking on the Internet. They do not like handwriting. Sharing information through social media is important to them. Building social relationships is of utmost importance to them. Preparing to teach Generation Z poses a huge challenge for teachers of earlier generations. This can only be met by using methods of modern education based on information technology.

Note that Generation Z is followed by the Alpha cohort–the younger siblings of the Zetas. The oldest Alphas were born in 2010, at a time when the iPhone 4 premiered, Facebook already had more than 600 million users, and the first posts were appearing on Instagram. Alphas are growing up in the times when TikTok and streaming services are breaking popularity records, they navigate the web perfectly, jumping seamlessly between apps and screens, are active content creators and appreciate the social dimension of the Internet. They prefer e-books to books, podcasts to radio, streaming to TV, dictating or photographing content to writing, and so on. Alphas will enter universities in the late 20s of the current century, setting the bar for digitization of teaching methods much higher than Generation Z. The tools commonly used by Generation Alpha are shown in figure 3.

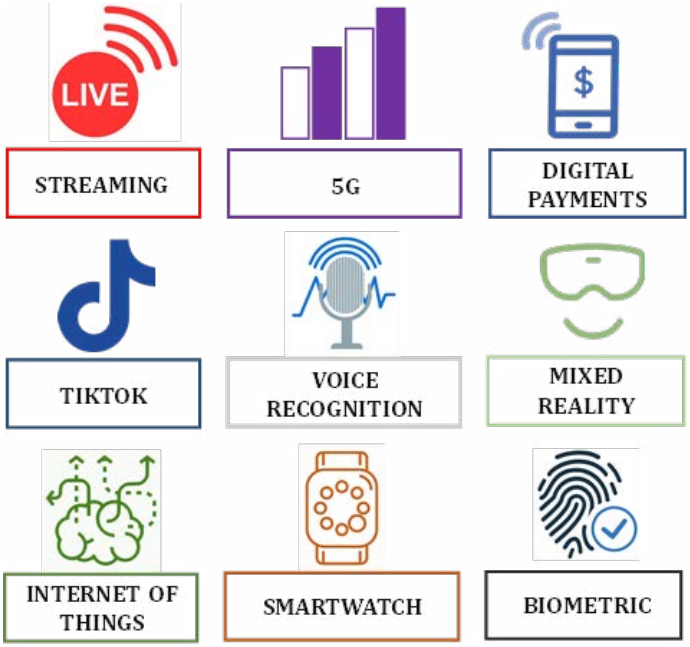

Figure 3. Tools used by Generation Alpha

Another argument for adapting teaching methods to the needs of the modern student in terms of digitisation is the already widely stated and increasing nomophobia (no mobile phone phobia) recognised as a civilisation disease (neurotic disorder) of the 21st century (Rodríguez-García et al., 2021). When one considers what can 'detach' the modern student from the phone, it is difficult to give an example other than another electronic device (computer, tablet). The teacher is unable to change the reality and is forced, while accepting the phenomenon of nomophobia prevalent in young people, to change his/her methods in the classroom. The lists of skills that the modern teacher needs (figure 4) highlight in particular the need to keep up with new technologies. We live in very advanced times, and teachers can no longer afford to be technologically ignorant. In addition, the teacher should be creative and imaginative in operating digital tools and programmes, mixing them with standard teaching methods in order to achieve the best possible result, i.e. lessons that deliver knowledge in a way that is attractive and comprehensible to the student.

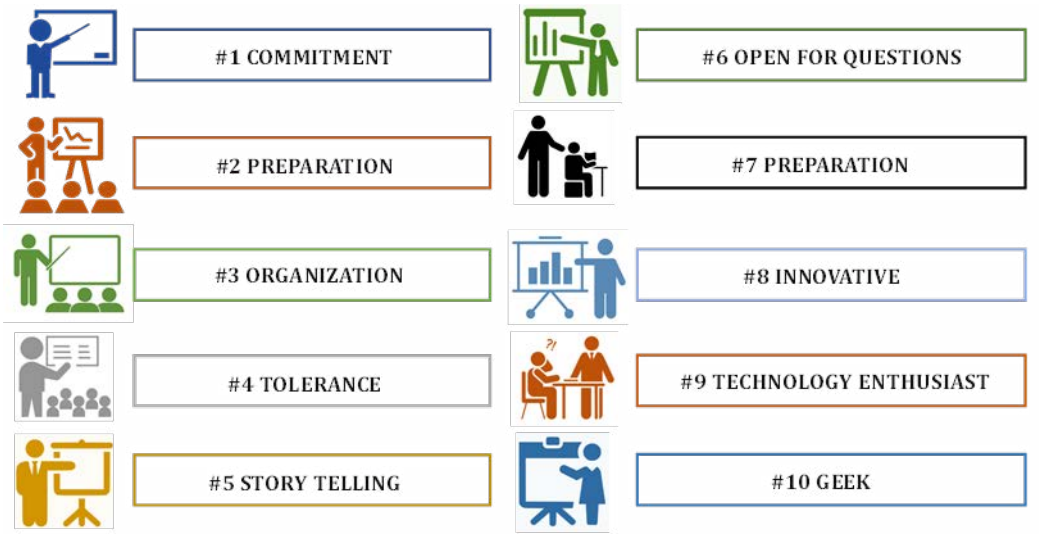

Figure 4. Skills necessary for the modern teacher

The change in perception occurring in young people due to the digitalisation of life is another external determinant. Young people prefer to watch and listen rather than to read. The loss of the ability to read long texts is reported as one of the major threats in education. As the processes of indepth reading are tedious and cognitively demanding, it is indicated that they are increasingly being discarded, especially by young people who opt for the fast, direct, highly stimulating communication and large amounts of diverse information characteristic of digital media (Wolf, 2018). In the future, this will be a significant obstacle in the transfer of knowledge, but it

is already important to be aware of this at present. The use of teaching strategies based solely on lengthy, elaborative texts may fail to produce results or discourage students, particularly those most heavily entangled in digital media from a young age. In this regard, it is imperative to acknowledge that the mindset of young individuals is inadequately geared towards memorizing read material. This is due to the awareness that they can find all the information they need in the media.

The next external factor that has a great impact on higher education is globalization. The ever increasing interdependence and integration of nations, societies, economies, and cultures, resulting in the creation of a global society, is altering the demands placed on education, necessitating that teaching methods be adapted to meet these new requirements. As a result of globalization and digitalisation, knowledge is increasing steadily and rapidly, and isolation is disappearing. The global exchange of information is becoming an everyday reality. This has also resulted in an enhancement of the human capacity to adapt to and assimilate global knowledge. This can be achieved through new teaching strategies and techniques, which will make education more holistic. The second condition identified at the beginning of the chapter as being internal, i.e. care for the quality of teaching, is entirely dependent on the teacher. If the teacher is committed, they are constantly looking for ways of self-improvement. The authors of this handbook hope that the issues discussed in it, relating to the modern approach to university education, will constitute a set of useful guidelines for the development and acquisition of agile skills, which will in turn benefit the student.

Chapter 1

Agile teaching tools and methods

Modern teaching methods should not only serve to educate directly, but also to inspire and ignite the curiosity of students, so that the potential of the numerous opportunities to expand knowledge outside the classroom is fully exploited. Digitization and globalization have made these opportunities enormous, and the teacher's task is to guide the student to use the right sources and to point out that much information in the networks and media may be untrue. This is a crucial task of contemporary education, which may be important not only for the quality of expanding knowledge at the university stage, but also throughout the future life of the graduate (Areces et al., 2016). New teaching methods should be illustrative, explanatory and practical, with a focus on developing thinking and cognitive skills as much as possible. The teacher should act primarily as a facilitator, paving the student's learning path, guiding, providing the necessary resources and support. In addition, the student must feel that the teacher is an authority in the field of knowledge being transferred, since only then will they follow the path indicated by the teacher in their independent work.

The fundamental innovation of contemporary education, that is already widely adopted, is the transition from memorizing and reciting to acquiring knowledge through interaction, cooperation and active involvement in engaging activities (Chi, 2009). The student is then at the center of the class and plays the most important role in interactions. The teacher's task is to choose teaching methods that encourage students to cooperate and appreciate the work of other students cooperating with them. This methodology guarantees better educational outcomes and enhances the capacity to collaborate effectively in a team, which is a highly desirable attribute on the labor market today. Another need is the integration of knowledge, i.e. the synthesis of understanding a given topic from diverse perspectives (Bodemer et al. 2004). The knowledge imparted by the teacher and acquired by the student ought to be of an integrative nature, i.e. the teaching should incorporate topics complementary to the primary topic or direct the student to acquire supplementary knowledge. The shift from specialization to integration of knowledge is a prominent contemporary trend in science (Lehmann 2022). It has been determined that only the integration of knowledge is able to ensure the further advancement of science, and thus it is imperative to incorporate it into education.

Modern research teams are composed of experts from a variety of different, often distant, fields, which results in numerous advantages for research and improvement. It has been found that students at the lower stages of education already have difficulty with the integration of knowledge. A large amount of, often contradictory, information and concepts is not conducive to understanding. Knowledge integration has been found to stimulate the learning process. Research on knowledge integration (Linn 2006) suggests that four successive processes are important here: anticipation, interaction, comparison and explanation (figure 5). Anticipation stimulates the student's thinking, and interaction with other students, the teacher or materials adds ideas. Comparing concepts helps to point out differences critically, and explaining leads to the integration of ideas so that they ultimately form an integrated whole. The integration of knowledge enables all learners to extract, add, distinguish and highlight key ideas about the learning content.

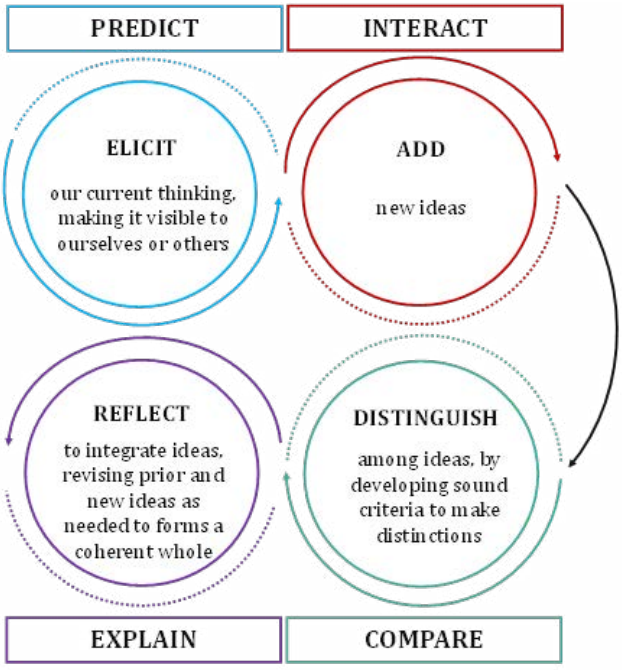

Figure 5. Knowledge integration process

Another important feature of modern teaching methods is that teaching should be interactive in nature (Arsenijević et al. 2020). This requires and shapes students' personality traits such as orientation on practice, ability to work in a variety of contexts, self-regulation and self-esteem. Furthermore, during interactive classes, the student is taught to make decisions and solve problems. This shapes the currently

desired professional competences. Therefore, in addition to self-learning in modern education, a variety of experimental and practical training in which students have a choice of activities and can show initiative is also important. The curricula of such classes should be flexible enough to allow students to decide about their course to a greater extent, and the teacher should only play a supervisory role. Interactive teaching methods hold great significance in modern higher education as they foster a keen interest in practice and the acquisition of skills related to the future profession; they facilitate efficient search for materials; they establish appropriate patterns of conduct; they foster high motivation, strength, knowledge, team spirit, and freedom of expression; and, most importantly, they contribute to the comprehensive competences of future professionals.

1.1. Categorisation of teaching methods

Achieving the intended educational effect in higher education largely depends on the selection of teaching methods. In contemporary pedagogical literature, *the method of teaching is defined as: a deliberately and systematically applied method of the teacher's work with the student, enabling students to master knowledge together with the ability to use it in practice, while also developing their abilities and interests.* The fundamental functions of the teaching methods employed should be to familiarise students with the knowledge contained in the syllabus of the subject; to consolidate the acquired knowledge as well as to control and assess the degree of mastery of the student's knowledge against the group, taking into account the achievement of all learning outcomes. In general, teaching methods at all levels of education can be divided into:

- the administering (giving) method (learning by assimilation) is the transfer of ready-made knowledge in order for students to assimilate and remember it. It is a time-efficient method, it shapes the ability to understand, follow the chain of reasoning, thereby improving productive thinking. It trains the memory, develops the ability to concentrate for a longer period of time and, if necessary, to take notes of the text being listened to or read;
- the expository method (learning by experiencing) serves to evoke an emotional experience in the learner and to expose the values that guide their assessment and views;
- the exploratory method involves teaching through discovery. The heuristic and problem-solving approaches can be distinguished here. The heuristic approach involves guiding students' thinking and activities through successive tasks. The problem-solving method enhances the efficacy of productive thinking, fosters

criticism, research attitude, independence, instills motivation for learning, and aids in the consolidation of knowledge, as it is widely recognized that knowledge acquired independently is more durable than knowledge given and assimilated. The heuristic method develops thinking skills to a greater extent than the giving method and to a lesser extent than the problem-solving one. Teacher's questions activate students, forcing them to formulate answers either silently or aloud. The heuristic method is more time-efficient than the problem-based method;

- the practical method is based on the practical activity of students. It involves combining theory and practice, which means applying knowledge to solve practical problems. The practical approach also involves acquiring knowledge through direct experience, which facilitates direct comprehension of reality and fosters practical skills that are useful in everyday life;
- the viewing method is based on observation, which is the opposite of verbalism.

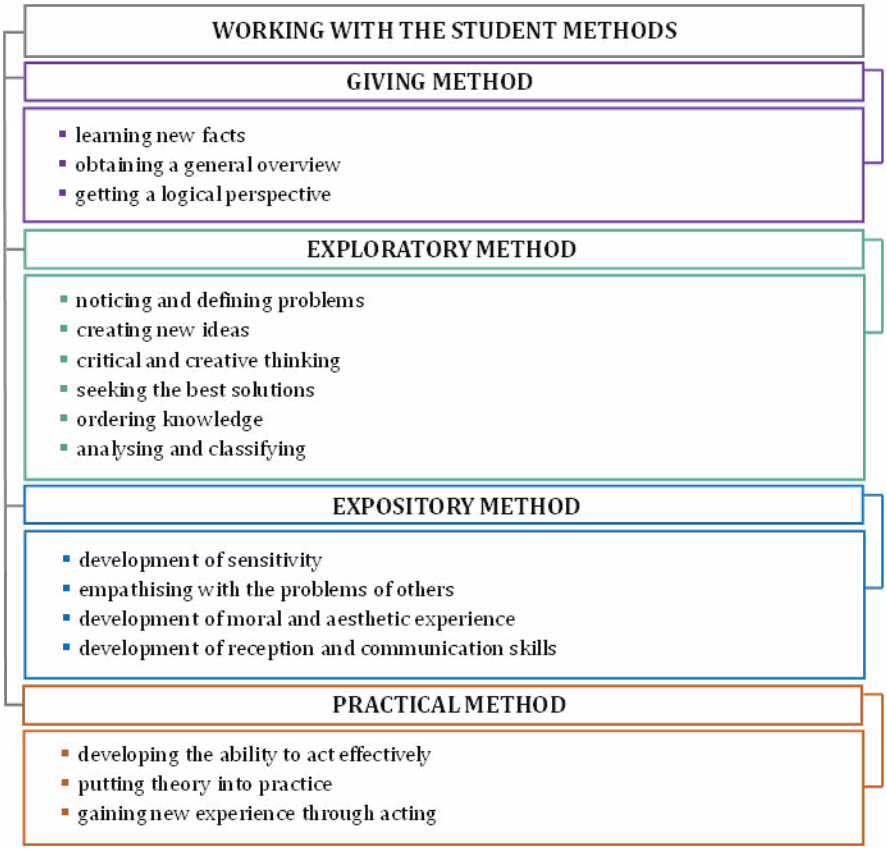

Figure 6. Expected outcomes of working with the student using particular methods

When choosing teaching methods, the teacher should take into account:

- the expected teaching outcome,
- the expected level of student engagement,
- the expected result other than the transfer of knowledge (social competence),
- the existing possibilities (conditions) for conducting classes.

The methods used in teaching require varying amounts of work on the part of the teacher, they have different levels of student activation, and require different amounts of the student's own work. In modern education, the most beneficial methods are those that strongly engage students during classes which in turn yields the best results. The effectiveness of teaching is related to the so-called Edgar Dale pyramid (Dale, 1969), which shows how student involvement in class affects memorization. The principle is simple–when engagement increases and is active, the student is able to remember the most. Therefore, engaging methods are most conducive to remembering the acquired knowledge. This is shown in figure 7.

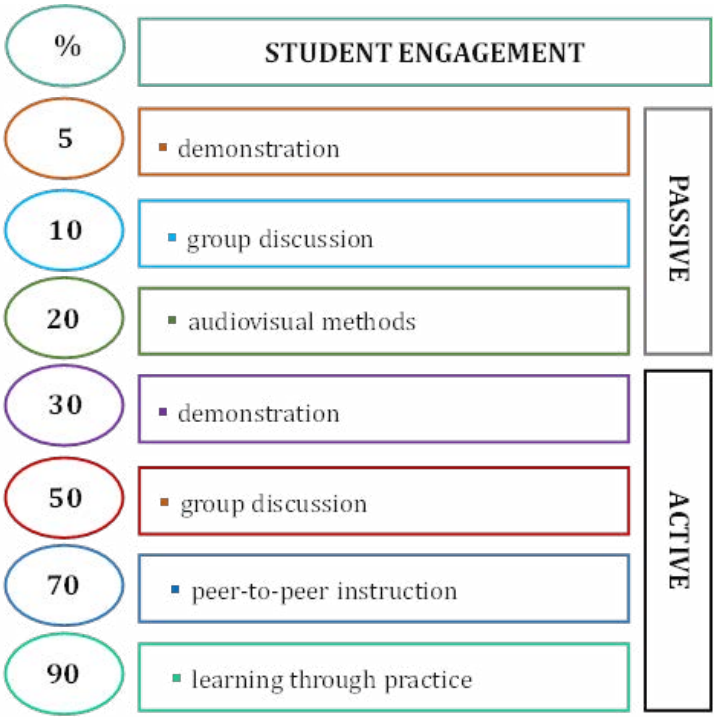

Figure 7. Level of student engagement during classes conducted using different teaching methods vs. effect achieved

Table 1 provides a summary that makes it easier to identify the methods and the level of student activation in classes conducted with a particular method, as well as the level of teacher and student workload outside of class. The summary also shows whether a particular method can be implemented online. The best teaching results can be expected when the teacher uses the greatest possible variety of methods in a single course, with particular emphasis on methods that activate the student.

Table 1. Classification of teaching methods used in higher education (*valuation compared to the basic method which is the informative lecture)

FORM OF THE METHOD / POSSIBLE WAY OF IMPLEMENTATION (ICONS)	BRIEF DEFINITION AND OBJECTIVE	METHOD TYPE	TEACHER WORKLOAD* / LEVEL OF STUDENT ACTIVATION / STUDENT'S OWN WORK OUTSIDE OFCLASSROOM	TEACHING AIDS
INFORMATIVE LECTURE 	▪ logical transfer of appropriately selected content with key concepts highlighted	giving	0 ↓ ↓	presentation
PROBLEM LECTURE 	▪ lecture based on posing a problem and showing the ways to solve it	exploratory heuristic	↑ ↓ ↓	presentation
CONVERSATIONAL LECTURE 	▪ similar to a problem lecture, interspersed with students' statements or performance of relevant theoretical or practical tasks	exploratory heuristic	↑ ↑ ↓	presentation materials for students thematic aids for practical tasks
CHAT 	▪ a conversation between the teacher and the students on the topic given by the teacher ▪ the subject of the conversation are issues taken from the textbook, observation, experiment, trip, story, description, lecture, etc., as well as from the student's extracurricular experience	giving	↓ ↑ ↓	materials for students textbooks

DESCRIPTION 	▪ providing information about a given object along with an explanation of its properties ▪ this allows the student to understand, for example, the operation of a device or the course of a phenomenon	giving	↑ ↓ ↓	presentation
READING 	▪ written material prepared by the teacher forms the content of the class, and is followed by literal reading of this content ▪ possibility to transfer a large amount of information	giving	↓ ↓ ↓	materials for students
SHORT LECTURE 	▪ a variation of a reading on a popular science topic ▪ presented issues can be understood by all, even the unprepared ▪ it cannot last too long and must develop into a discussion ▪ the speaker (teacher) must be very well prepared for the lecture	giving	↑ ↓ ↓	presentation
CLASSICAL PROBLEM METHOD 	▪ posing a problem question, formulating hypotheses related to the phenomenon and the question asked by the teacher; verifying the hypothesis (group work), presenting the effects of the action. ▪ students themselves formulate conclusions leading to the solution of the problem posed at the beginning ▪ an important element is the discussion of practical applications of the phenomenon ▪ the result should be an algorithm of the correct, logical and clearly defined way of solving a given problem	exploratory problem -search	↑ ↑ ↓↑	materials for students case description (no conclusion)

CASE METHOD 	▪ it consists in analysing an event or case by students, and then discussing it and drawing conclusions ▪ case topics can be prepared by the teacher ▪ solving the problem should make it possible to find several solutions, which can then become the subject of plenary discussion followed by the adoption of the optimal solution	exploratory problem -search activating	↑ ↑ ↓	materials for students case description (no conclusion)
GUIDING TEXT METHOD 	▪ he student works on the basis of the shared text, which can be prepared by the teacher or the students acquire materials themselves	practical	↓ ↑ ↑	materials for students
SITUATIONAL METHOD 	▪ proceedings as in the case method, but the event or case is presented to the students some time in advance and ends with discussion and decision making ▪ it consists in introducing students to some complex situation, for which one or another solution is supported by some reasons "for" or "against„ ▪ the students' task is to understand the situation and decide on a solution, and then predict the consequences of this decision and other possible decisions ▪ it serves to develop students' ability to make a comprehensive analysis of the problems that make up the so-called difficult situation and to make appropriate decisions based on this	exploratory problem -search activating	↑ ↑ ↑	materials for students description of the incident or case
STAGING 	▪ requires writing a script, assigning specific roles to students, preparing props and "acting out" a scene ▪ it is suitable for use in classes related to the discussion of certain activities or procedures	exploratory problem -search activating	↑ ↑ ↑	plan props

DIDACTIC GAMES 	▪ didactic games are purposeful, organized situations, most often taking the form of play, in which students compete with each other within the framework of specific rules ▪ division of games: decision-making, including the skills of decision-making and behaviour modelling; simulation, consisting in reconstructing by learners problem situations from the past and comparing student solutions with real solutions; psychological, for social and personal development and concentration	exploratory problem -search activating	↑ ↑ ↑	game scenario, props
SEMINAR 	▪ participants are prepared for the topic by prior familiarization with the relevant literature and their own works and papers	exploratory problem -search activating	↑ ↑ ↑	materials for students

DIDACTIC DISCUSSION 	▪ the method of transferring knowledge in the teacher-student-teacher and student-student relationship, based on the word ▪ the main task is the collective solution of complex problems, as well as getting to know the views of its participants, reviewing various solutions to the problem and evaluating positions and views. It consists of an opening (formulation of the problem in order to provoke discussion), proper discussion (including participants' statements) and a summary (by the teacher) ▪ types of discussions: related to the lecture; brainstorming; metaplan (graphic record of the course of the discussion); panel (discussion of several students selected in advance and properly prepared, presenting extremely different opinions, in front of a wider group, which initially only listens, then joins in the discussion); round table (informal, free exchange of opinions) ▪ students should be prepared for discussion and represent the necessary level of expertise ▪ this method shapes: effective communication in various situations, the ability to present one's own point of view, taking into account the views of other people, working in a group, creative problem solving	exploratory problem -search activating	↑ ↑ ↑	materials for students

SUBJECT - SPECIFIC CLASSES 	▪ the activities performed have been supported and discussed in theory classes beforehand ▪ basic groups: activities to develop the ability to apply the knowledge acquired, exercises to develop the ability to use the knowledge creatively in practice, activities of an exploratory nature	practical	↑ ↑ ↓	materials for students
LABORATORY CLASSES 	▪ students cause specific phenomena on their own, investigate their causes, course and effects ▪ they require vigilant care and efficient management from the teacher	practical	↑ ↑ ↓	necessary tools instruments materials instructions
FIELD CLASSES 	▪ activities that take place outside the classroom to familiarize the student with a specific phenomenon, problem or technique in the place where it occurs or is performed	practical	↑ ↑ ↓	necessary tools instruments materials instructions

PROJECT METHOD 	▪ it consists in performing tasks by students covering a larger part of the material, by searching for a solution on their own under the discreet supervision of the teacher ▪ the teacher must leave a lot of freedom to the students both in the choice of the topic of the project, as well as in the way it is solved ▪ at the same time, he/she should watch over the correct implementation of the curriculum ▪ the project may include a theoretical solution to a problem, as well as a practical implementation of a model or device ▪ in each case, the work of a student or group of students results in a written report ▪ the report contains a description of the solution to the given problem, including justification for the choice of solution, calculations (if necessary), description of laboratory tests (if they occurred during the project), description of the technology for making the model or device, and organizational information, such as a table of contents and a list of references	practical	↑ ↑ ↑	materials for students

Polymethodology, i.e. diversifying the methods used in the implementation of the cycle of classes, contributes to the full development of the student, additionally stimulates his own activity, facilitates better remembering and understanding of even the most difficult content and equips the graduate with practical knowledge on the topics covered. The choice of teaching methods used in the classroom depends to a large extent on the teacher's workshop, but it is also significantly influenced by the learning objectives, teaching content, teacher's experience and didactic base. It should be emphasized, however, that the final decision-maker in this regard is the teacher himself.

In universities, the lecture is still the primary method of teaching. The lecture method consists in one way transfer of information. A lecture is not an activating method per se, but interspersing the lecture with an additional method can affect the quality of education and it is already used by numerous lecturers through incorporating games, a short problem discussion or other activating methods in a standard lecture. According to methodological textbooks, it is also important to plan the so- called leisure content in the lecture so as not to tire the listeners. Examples of such content can be digressions, examples or anecdotes. The lecture will also be more effective if the teacher uses various teaching aids and pays attention to the so-called feedback, i.e. a two way flow of information. It can, therefore, be said that in modern education, it is necessary to move away from using a single method for conducting a course, or even individual classes. This requires the teacher to constantly work on their own skills, and to be creative at the same time. Below are, in more detail, examples of methods that activate students during classes.

1.2. Preliminary questions

The main idea behind the method is to raise students' curiosity. The preliminary questions method can be very effective in so-called warm up activities, i.e. exercises introductory to the topic of the class. The first stage of the activity is to briefly introduce the topic to the students. After the introduction, the teacher asks the students to write down questions they are likely to get answers to during the lesson. Then, the teacher selects the most pertinent and interesting ones out of the list of questions. The questions should be written down. The next step is to answer the questions posed. The further steps can be:

- a detailed discussion of the topic by the teacher during which students catch the answers to the questions posed and note them down,
- students find answers to the questions on their own, e.g. in provided literature,
- forming groups of students and assigning a question to a group asking them to find the answer with the help of provided materials.

1.3. Osborn's Brainstorming Method

The method can also be called an idea factory, idea exchange or mental warm-up. The method engages all participants intensively, giving everyone the opportunity to speak freely and generate even unrealistic solutions to a problem. It is used so

that the student does not succumb to the suggestions of others, everyone works creatively at the same time, so that a lot of different information and ideas are gathered quickly. This method allows the teacher to assess what knowledge the students have, what needs to be expanded, what needs to be consolidated and what is still completely unknown. Example:

- a keyword/theme/problem is stated,
- the students' task is to write down as many associations with the given topic as possible,
- selected students read out their associations,
- the other students check whether they have the same or different associations.
- students can be asked to write down only the three most important associations on separate sticky notes which are then placed on a larger sheet of paper, the selected associations can be grouped. The activity should end with a constructive discussion.

Brainstorming can be organized in many other ways while preserving the basic concept–to gather information quickly, independently, and then work to organize and analyze it. Evaluation of ideas can be postponed, but during the session itself, ideas cannot be criticized, evaluated or commented on by anyone. An additional advantage of the method is that it can be used at any time during the class and requires little time and effort to prepare.

1.4. Portfolio

A portfolio, or folder, is a simple and versatile method which can later serve as an aid to the student's self-study, e.g. for an exam. The portfolio may include source materials: notes and articles on the analyzed issue, graphic representations of problems, photographs, drawings, notes on readings, important thoughts, fragments of legal acts, an essay written by the student presenting the sources of the analyzed problem, a bibliography containing a list of all sources. The portfolio should have an index of all materials with brief justifications for their selection. The portfolio can be an idea for an individual or group project. The portfolio can be dedicated to one class only or to the whole course. The portfolio can be presented to the teacher by the author(s) with a discussion of its contents. The teacher evaluates the portfolio and gives his/her reasons for the evaluation.

1.5. Analysis of source material

The primary aim of the method is to develop the ability to read comprehensively difficult/specialized texts related to the subject of the course and to develop the ability to search for information independently. Using scientific articles or looking at statistical data, students practice the skills of searching for and selecting information and critically analyzing it. They also learn how to assess information reliability. When reading historical sources, they analyze the historical context and can compare it with contemporary knowledge/situation. Doing the analysis in a group develops the ability to cooperate and leads to the integration of the class participants, which is more beneficial than an analysis done by the student alone.

1.6. Case study

The method involves analyzing specific / real events, making it easier to understand all phenomena similar to the one analyzed. Its main advantage is to enable students to make decisions on the basis of critical analysis of data. They have the opportunity to look at real life examples and draw conclusions relevant to them. The case study shapes skills such as critical analysis of information, presentation of own opinions, and teamwork. Each case study should include:

- diagnosis of the situation,
- searching for solutions,
- anticipating the implications,
- discussing proposed solutions,
- transfer of conclusions to real world situations.

1.7. Snowball (Pyramid Discussion)

A method often used to define concepts. It allows you to specify and present your own opinion (definition, position), get to know the opinion of others, gives you the opportunity to discuss a given concept, clarify its understanding, and leads to negotiating the record. It is characterized by the fact that the students first work out the problem on their own, then the solution is worked on by increasingly larger groups (a possible workflow is shown in figure 8 and the final decision, as part of the summary of the discussion, is made by the whole group participating in the class.

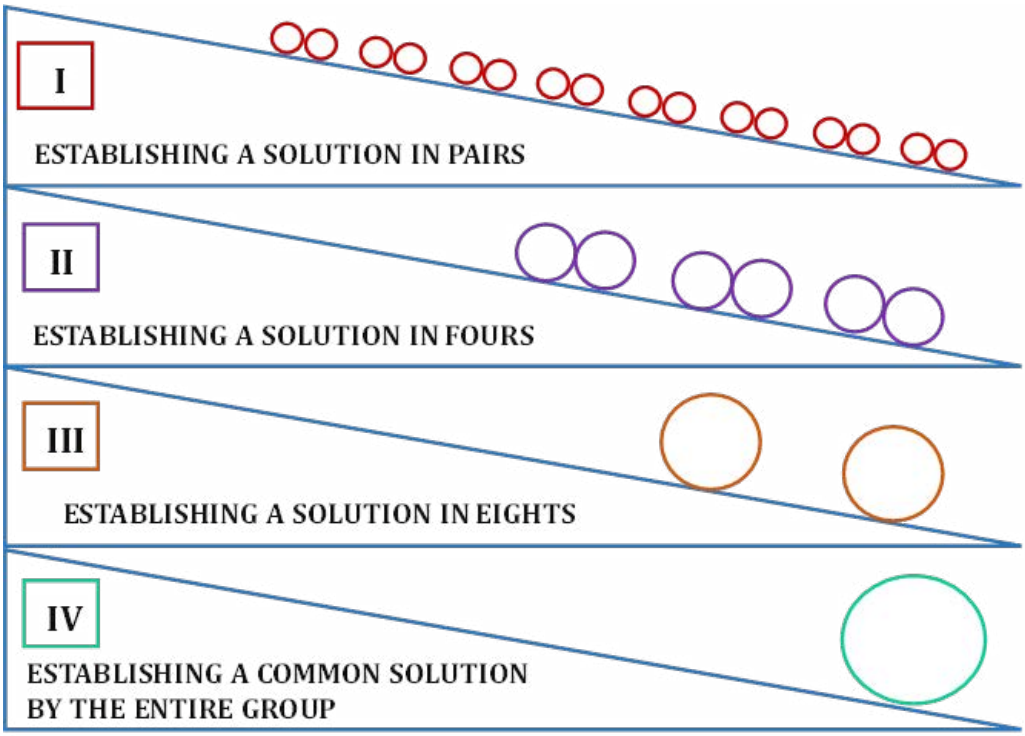

Figure 8. Flow chart for the "Snowball" method (pyramid discussion)

Example of the implementation of the method:

- the teacher states the topic of a discussion, draws a circle on the board or a large sheet of paper, and distributes coloured cards to the students. Students find their own solutions to the problem and write them on cards which they attach to the circumference of the circle,
- students then pair up and find a solution to the problem, which they write down on differently coloured pieces of paper, they attach these cards to the circumference of the circle, but closer to the center, after this, groups of eight should be established and the procedure is repeated, the solution cards are attached closer to the center of the circle,
- the discussion ends with the whole team reaching a joint decision, the written solution is placed in the center.

1.8. Decision tree

It is a graphic record of the decision-making process in difficult and ambiguous situations. The method is used to analyze and fully understand the motives, helps

to bring controversial figures closer, and allows you to summarize the news in an attractive form. By applying it, it is possible to find different solutions to a problem and to see the links between these solutions. It also allows you to see the consequences of the solution adopted. It is very important to identify the values that the person making the decision recognises. It is a method for effective teamwork and group work, for building interpersonal relationships, and for making individual and group decisions. The aim of the method is to develop the ability to make choices and decisions. The method teaches cause-and-effect thinking. It should be used in classes where students are expected to learn to look for/notice the relationships between different solutions to a problem and the consequences of these solutions (figure 9).

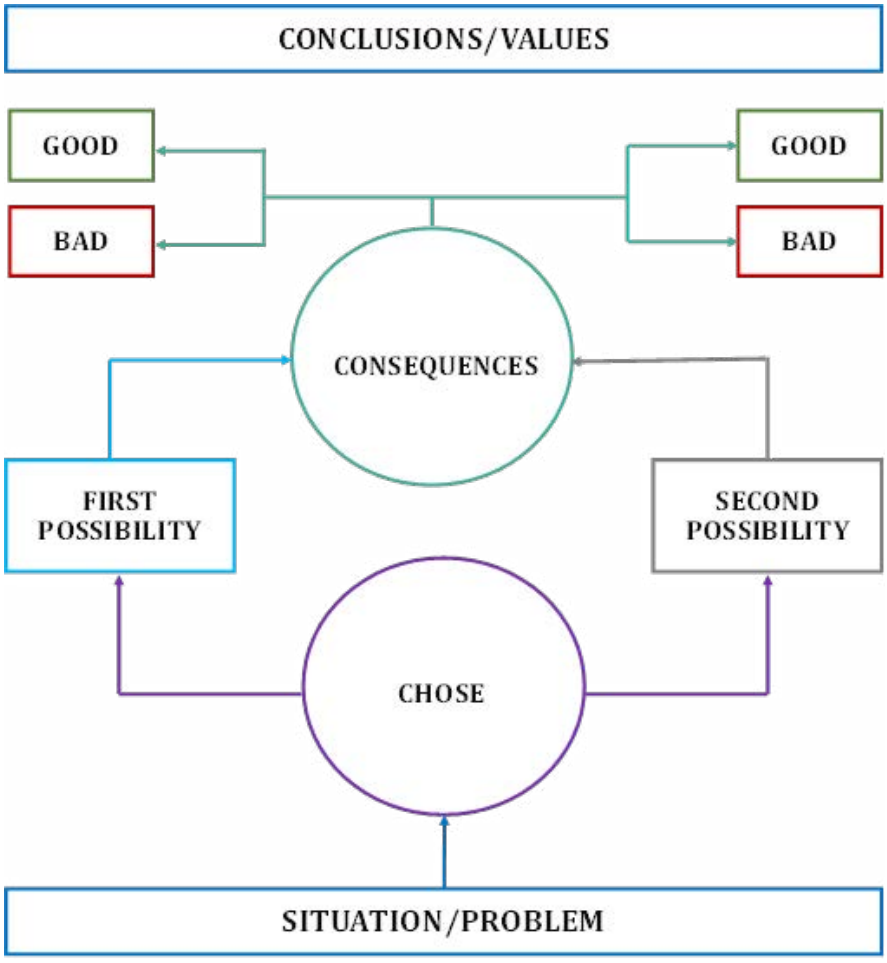

Figure 9. Example of a decision tree diagram to be completed in class

Example of implementation:

- formulation of a problem, which is written in the trunk of a tree (whiteboard, large sheet of paper or individual worksheets).
- joint discussion on the situation / problem.
- division into groups of 5-6 people.
- identification of the goals and values most relevant to the decision maker and writing them in the trunk of the tree as shown in figure 9.

1.9. Edward de Bono's "Six Thinking Hats" method

The method provides a way to organize your thinking process. The original name comes from the six metaphorical "hats" of different colours, which symbolize the different approaches to a particular phenomenon or problem we are analyzing. It allows you to avoid chaotic discussions and schematic arguments. The thinking hat serves as an ordering prop, and can be replaced with another graphic distinguishing feature. Using a hat means considering a chosen point of view, not necessarily in line with one's own views. The point is to take a specific mental role and create a mental map of the situation (figure 10). Division into hats during the implementation of the method in the classroom:

- white thinking hat–logic/facts (it symbolizes a logical approach to analyzing problems, this is where hard data counts–facts, figures, lists),
- red thinking hat–feelings/emotions (it is associated with feelings, intuition and impressions, here, the problem to be analyzed should be looked at subjectively, and consideration should be given to what emotions the problem or its solutions evoke, or what intuition suggests about the causes and possible solutions to the situation),
- black thinking hat – pessimism/bad points (the aim is to critically evaluate the problem being analyzed and the ideas for solving it),
- yellow thinking hat – optimism/good points (incorporating the joy of discovery and action, as well as curiosity; identifying who/what/how will benefit from solving the problem).
- green thinking hat – possibilities, ideas (activating layers of creativity, searching for new solutions to the problem under analysis, there is no need to give logical arguments–the creation of new paths is sufficient, this is the most creative element of the Six Thinking Hats method).

- blue thinking hat – organization (it symbolizes organizing, ordering what you have come up with, and then deriving a list of priorities from this, guiding the way to the goal, i.e. solving the problem, here, it is also useful to reflect on which hat caused the most difficulty and where the analysis carried out with them led.

Figure 10. A breakdown of the colour-related problem analysis in Edward de Bono's 'Six Thinking Hats' method.

Thus, each colour of hat in the Six Thinking Hats method represents a different perspective on the problem, as well as different perspectives for evaluating it. In class, you can form teams assigned to the hats or individuals can change the colours of the hats to analyze the problem with the respective colour and its corresponding function

1.10. SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats)

The method involves team or individual analysis and evaluation of a specific problem/issue. It is a type of analytical technique which, as an activation method, is ideal for use in classes on any subject. It allows you to reflect on a specific problem/ issue presented in detail. It has a structuring function and points to possible solutions to problems. Choosing this method to work with students helps to encourage them to define strengths and weaknesses and then seek opportunities for development and identify threats that may arise. The grouping scheme used in the SWOT analysis is shown in figure 11.

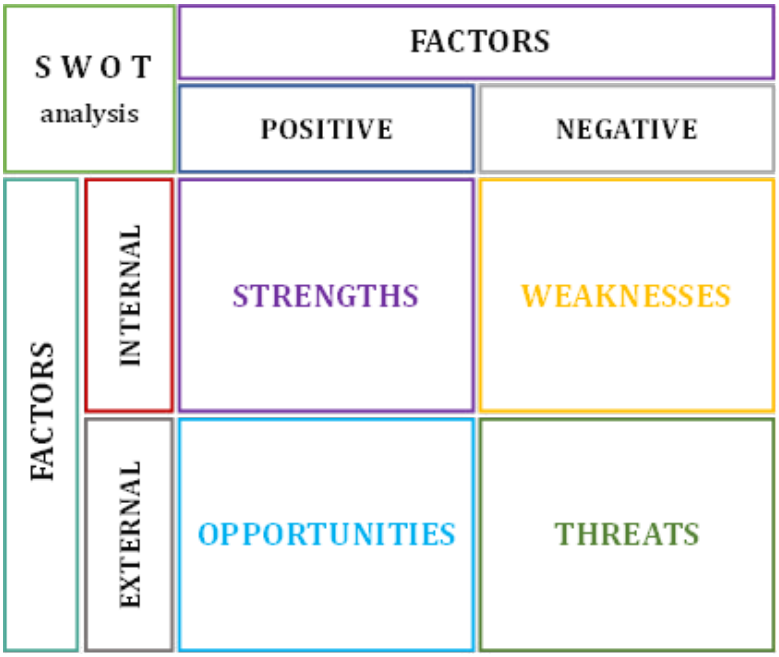

Figure 11. Layout of SWOT analysis

1.11. Mental map

Tony Buzan is the creator of mental maps. It is a method of visual representation of a problem/phenomenon using drawings, diagrams, symbols, pictures, slogans,

and phrases. The aim of this method is to systematize newly acquired knowledge, messages, and concepts. Maps are constructed according to the following scheme:

- the topic title is placed in the middle and is highlighted in some way, bolded, written in a different colour, etc,
- further elements are attached to the topic to form the main concepts–the key concepts,
- the graphic should be developed into a kind of map with information, and as information is added, it can be ordered or grouped, maps will be more readable if you use a lot of colours logically arranged, arrows, symbols, drawings, photos, etc.

Mental maps can be modified (one map can be used for the whole course in a subject). The most common form used in this case is the poster, but it can also be another graphic form. An example of a mental map is shown in figure 12.

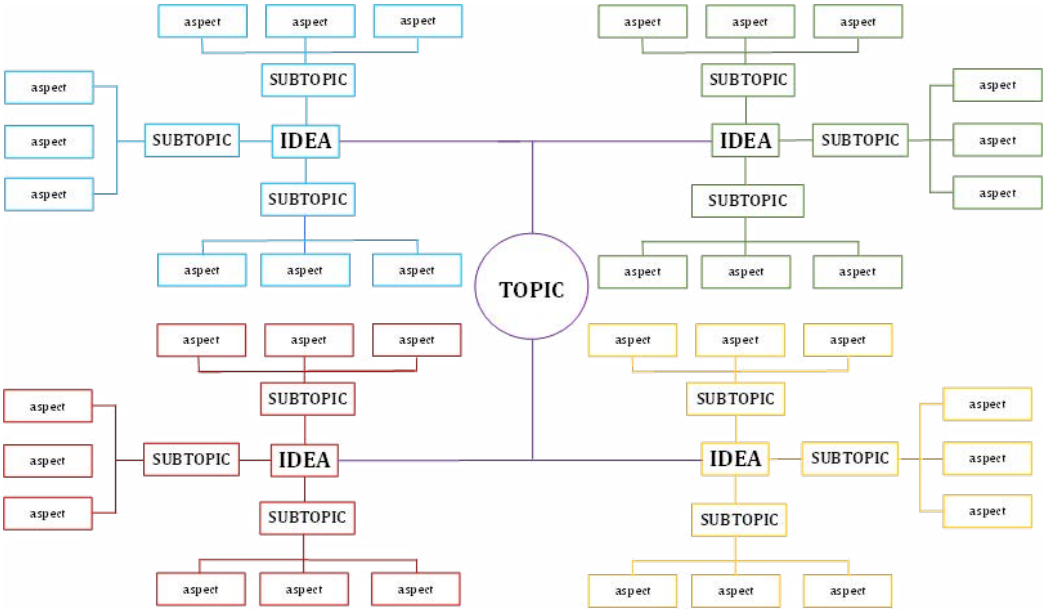

Figure 12. Example of a mental map (complementary elements should be varied with illustrations, symbols, slogans)

1.12. Drama

The method involves creating a situation in which the student can identify with another person or thing, can empathize with another personality, show a situation,

thus deepening the understanding of others, developing the ability to cooperate, awakening sensitivity and reflectiveness and enhancing the ability to analyze. Imagination and fiction become fact and deed. Stepping into a role (*I have experienced, I have taught so I know*), improvisation, the use of movement, gestures, words, thoughts and feelings requires participants to be strongly motivated. Before the students start role-playing, they should familiarize themselves with the situation/problem, know their roles and the scenario, and prepare props. Afterwards, the participants should have time to tell, in the form of a free discussion, how they felt being in the role. Each drama is observed by non-participants and they can record their observations on a prepared observation sheet, which deepens the debriefing discussion. There are different possible types of drama role-play techniques, as shown in figure 13.

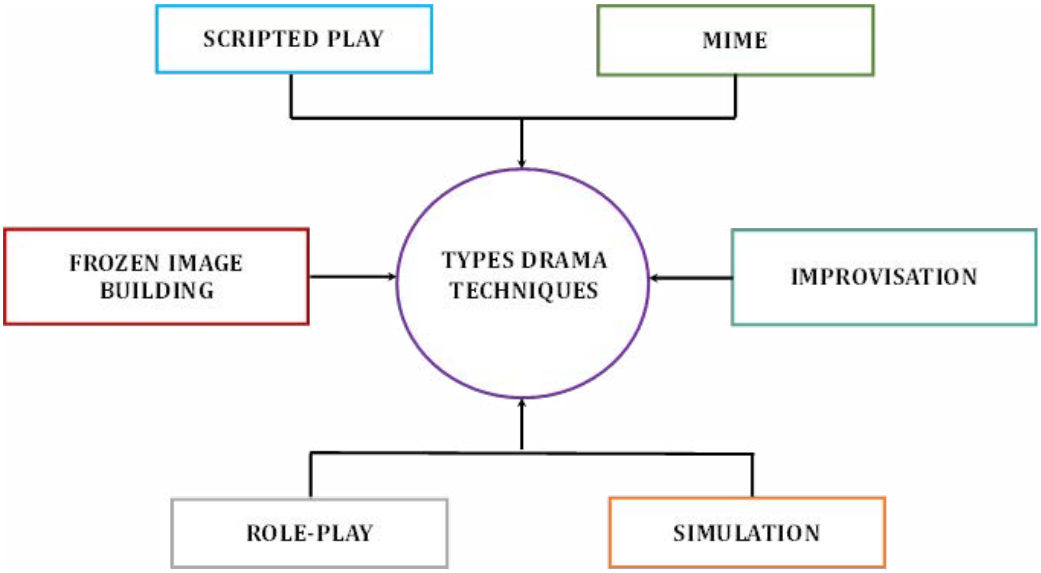

Figure 13. Types of Drama techniques

1.13. Interactive science journals

A method that not only engages in the study of a topic, but also familiarizes students with the layout of scientific publications, teaching them to organize their knowledge in the logical order used in scientific publications. The arrangement of the topic discussed should include: an introduction (background information on the knowledge in the topic), a research problem, a discussion of the problem, a search for solutions and a conclusion. Creating scientific journals on one's own also teaches how to use standard journals, and it is the teacher's task to verify that students, if they do it on their own, have chosen the correct materials to create their own jour-

nal. This method can be very useful when students do a group project involving a scientific experiment. Once they have collected the results, they can produce their own draft scientific publication independently. The method can also be used to create an advanced version of lecture notes, in which students show the information they have acquired in different forms, but in certain templates. The layout of such notes should resemble a scientific publication, i.e. graphs, photographs, graphic abstracts should appear alongside the content. The work can be done in handwriting or on computers. Such a method fosters a deeper connection between the student and science and promotes higher-level thinking. In addition, it allows the creation of materials that can be used in the future (figure 14).

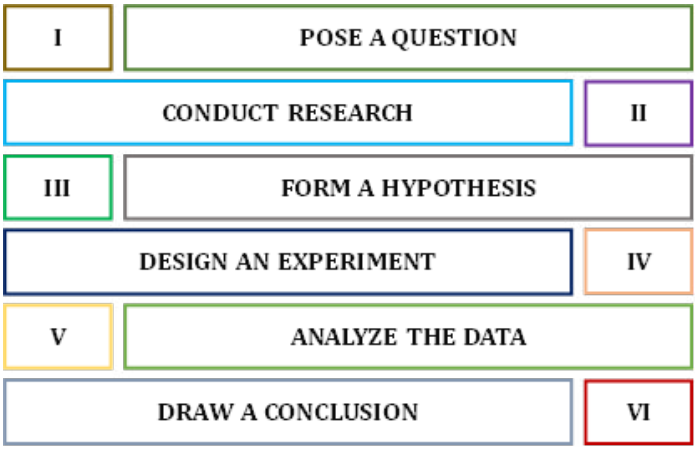

Figure 14. Standard layout for use in interactive science journals

1.14. Moodboard

Moodboarding involves the artistic representation of the participating students' thoughts and ideas on a topic set by the teacher. The method is based on the creation of a so-called mood-emotional collage. Students make a composition in the form of a poster, which can consist of various elements such as photographs, newspaper cuttings, drawings, text samples, material samples and objects that are related to the topic of the project.

1.15. Storytelling

Storytelling used in various fields (business, marketing, management, teaching) is defined as the art of conscious relationship-building by capturing the imagination and emotions of the listener through 'real-life' stories and metaphors. Storytelling in teaching should involve telling a story related to the subject matter of the class that

addresses the important content of the particular subject matter. The key elements of Storytelling are plot, characters and a narrative point of view, but the most important feature should be authenticity–real-life stories have the strongest impact on the emotions and engagement of the audience. The main advantage of Storytelling as a teaching method is that it promotes a sense of community and belonging, enables the creation of a network of relationships, engages participants in making meaning, and develops empathy and confidence, ultimately facilitating the learning of a topic (figure 15). The story can be told, as a whole, and contribute to a group discussion or, more engagingly, be created by the students over the course of several classes or an entire course. Storytelling can also be a very good complement to conventional lectures.

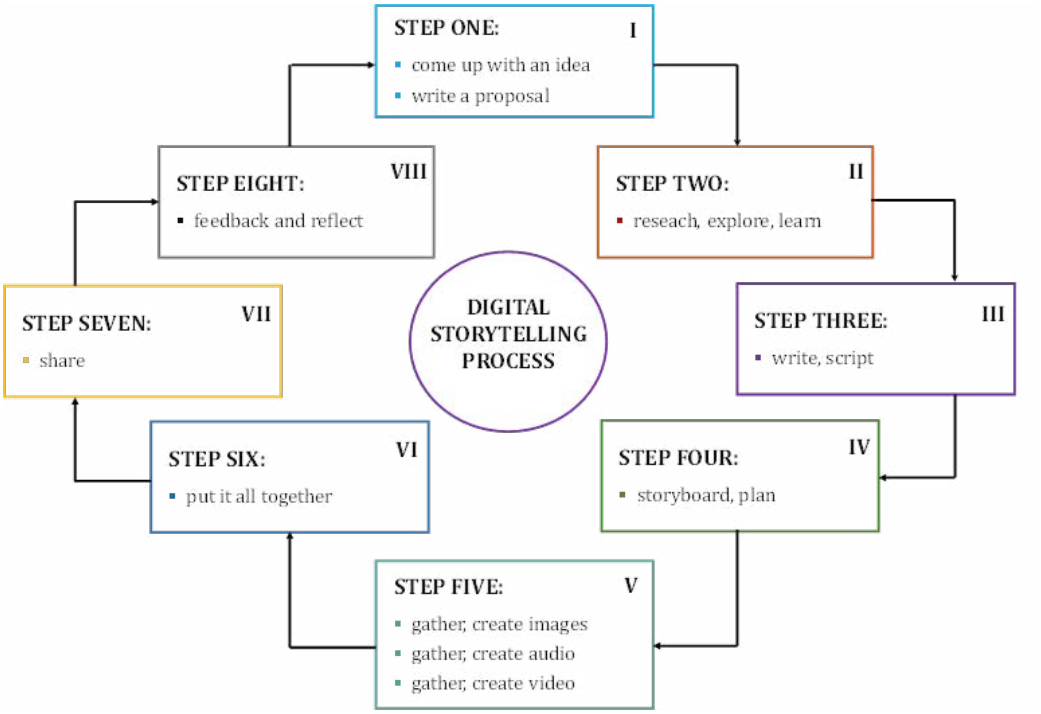

Figure 15. Storytelling process

The use of a good, exciting story relating to the content of the lecture has a strong effect on stimulating students' attention and interest in the subject matter. It is also a method that is not limited in any way by the online teaching mode and should even be used more often in online teaching in order to focus attention or activate students. The possibility to search for interesting stories in the age of the Internet is unlimited, so the teacher can use stories relevant to the teaching content or ask students to search for such stories, which adds variety to the classes for the benefit of the final outcome, i.e. better understanding and memorisation of the content material.

1.16. Fishbone (Ishikawa) Diagram

This is another method that uses a visual tool to organize critical thinking. The method should be used especially to solve posed problems. The fishbone diagram helps to demonstrate to students the causes of a problem being considered and to quantify the relationship between effect and cause. The method should be used in groups. Each designated group works to produce a complete skeleton, where the head of the fish represents the problem and the major bones of the skeleton indicate the causes. The minor bones provide supporting evidence. This method was developed by a Japanese organizational theorist Kaoru Ishikawa in 1968. Its original use was in corporate management team meetings and the method is also called a cause-effect diagram. The original Ishikawa concept recommended the analysis of six main possible causes of a problem following the head (problem) and they comprised areas important in enterprise organization:

- machinery, equipment;
- methods,
- material,
- human resources,
- measurement,
- environment.

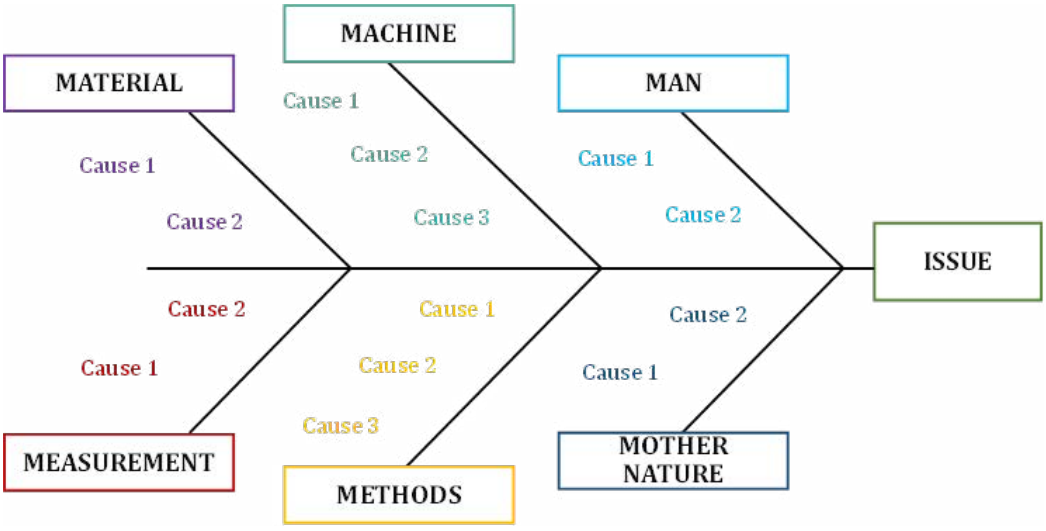

Figure 16. The original Fishbone diagram created by Kaoru Ishikawa

This arrangement is shown in figure 16. Adaptation of the method for use in student teaching often requires modification of the main bones, although for some theoretical engineering problems posed it can be used in the original layout. In general, the idea of the method is, as described above, to try to solve a problem by diagnosing its causes. The work in class can be organized by the teacher dividing the students into groups assigned to the main causes. Once the groups have worked together, the construction of the whole fishbone can begin.

1.17. Group work–Four Corners

The method serves to present different opinions in a group based on a given statement. Participants group themselves in designated corners according to how much they agree or disagree with the statement given. In their respective groups, individuals jointly agree on arguments to support their opinions. At the beginning of the exercise, the teacher formulates a thesis and invites participants to take a moment to reflect on their position towards the statement. The teacher then indicates the different corners: very much agree, agree, disagree, very much disagree (figure 17). In the designated corners, group work follows involving the collection of arguments. The group prepares a defense of its position. The activity ends with a discussion and conclusions.

Figure 17. Subdivision of class participants in the Four Corners method

1.18. Gamification

Gamification is a variety of methods used in education that involve adapting mechanisms known from games in order to appropriately modify behaviour outside the context of the game. The main rationale for using games in the learning process is to achieve an increase in motivation and engagement. In addition, mechanisms used in games–introduced into educational activities–can stimulate creativity, systematicity and determination. By using gamification in both online and stationary forms, we can turn activities that are not particularly attractive into ones that per-

manently capture the student's attention and create fun from something that usually has little to do with fun. Gamification of activities can take the form of:

- a single game related to the topic of the course,
- introduction of points and achievement rankings throughout the course,
- application of bonuses and badges awarded for a given achievement,
- and many others in which we focus on competition among the participating group.

The introduction of competitive elements strongly influences student activity and, as a result, significantly improves learning outcomes. The examples given above demonstrate that gamification can be introduced into the teaching process through the use of games in the classroom or the use of game mechanisms in the assessment and grading process. Imparting features known from game mechanisms should be based on:

- precise definition of specific tasks to be completed,
- defining clear rules of the game,
- defining clear measures of progress, e.g. levels, stages, sections,
- developing and explaining a system of rewards, bonuses, points or rankings to participants.

Practically, gamification is implemented in classes by the teacher even unknowingly because teachers always establish their requirements (conditions) for passing ("winning") the course i.e. clearly define what needs to be accomplished to pass the class, set stages, introduce bonuses, rankings, etc. However, this can be organized and presented to the students as a game, which makes the course more attractive. In practice, at the beginning of each class, the teacher should define and set expectations for the students, and each of these can be an element of the game necessary for the student to pass. The simplest examples of activities that the teacher may indicate as components of the game may be homework, completed projects, activity in class, punctuality, preparation of additional materials, individual assignments, etc. The teacher must ensure that the participants of the game are continuously informed about their achievements and ranking.

Games introduced as a diversification to a course have virtually unlimited possibilities. The teacher can create the scenario for the game on his/her own or have the participants create the scenario as an assignment. The game can be played in class, in the field or as a homework assignment to be assessed later. A good source of ideas is, of course, the Internet, including numerous applications that can be used

to create quick quizzes and other forms of competition. The game, through its form and storyline, should be exciting, and introduce competition but also cooperation. The game form strongly influences motivation, increases activity and influences participants' self-esteem. It should be noted that the generation currently studying is brought up on numerous computer games, which can also be used in the teaching process. The popularization of online teaching has led teachers to adopt methods that specifically target the use of computer tools. These methods remain effective in classroom teaching. Regardless of the form of the class (online, face to face), these methods are strongly student-activating and produce much better results than methods considered to be standard. Below is a description of these methods.

1.19. Peer-to-Peer Teaching

The method involves the students themselves teaching each other and sharing their prelearned knowledge on a topic. This promotes engagement in learning, teaches cooperation and often brings much better results than traditional teaching methods in a teacher-student setting. Above all, students who learn from each other usually share similar experiences, so it is much easier for them to communicate. They establish a much more friendly and informal relationship with each other during classes than they would traditionally. Students feel more comfortable during such activities, which significantly influences their engagement and helps them to remember information. In the Peer-to-Peer Teaching approach, students are involved in mastering the content of the scientific topics covered on their own, seeking and discovering scientific information autonomously and, at the same time, asking questions. For the method to be effective, the student must pay attention to expressing his or her thoughts clearly so that they can be understood by others.

Additionally, as he conveys his knowledge further, he must first organize it himself. This enables the student to better organize the information and better understand the knowledge he already possesses. The method also teaches students to manage time and tasks properly and to evaluate themselves and others. The lesson plans can be varied, and the underlying principle is that the teacher stands by and is not involved in the teaching process itself, but should control the course and progress of the class. Once students have acquired the knowledge they are expected to impart to others, activities can be organized in the form of diverse discussion groups. A standard student-led lecture alone will not be effective, it is important to ensure that the whole group is involved and active in passing on the knowledge gained. When the whole group is engaged, the best results are achieved (figure 18).

The method is considered to enhance students' engagement in the learning process and increase their motivation to learn, especially when, by definition, part

of the teaching takes place online. In the traditional teaching model, the class starts with introducing the topic which is in the form of a theoretical lecture (knowledge), followed by the presentation and discussion of examples (understanding). At the end, homework is often given (independent learning). In this model, the teacher is the source of information and the students are passive recipients. At home, already without the teacher's help, the students have to practically apply the knowledge, the theoretical principles of which they have learned in class (application, analysis and synthesis). What if they have doubts, problems, have not understood something? Frequent problems with understanding lesson material result in students having lowered self-esteem, demotivation and sometimes quitting incomprehensible lessons.

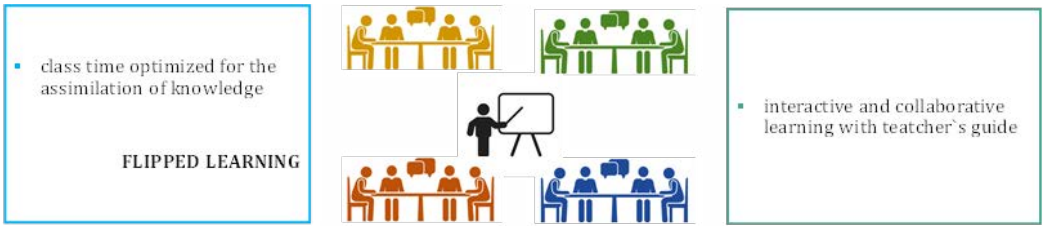

Figure 18. Peer-to-Peer Teaching

1.20. Flipped Classroom

The 'flipped classroom' model assumes that students become familiar with the theoretical material at home (knowledge and understanding), so they come to class prepared. At university, they perform practical tasks and exercises to consolidate and review the content (application, analysis and synthesis). The materials with which students should familiarize themselves should be varied, e.g. articles, texts prepared by the teacher or appearing on the Internet, video instructions–this is the first stage of so-called digital learning. The second stage takes place stationary in classrooms, where students can be engaged in challenging tasks related to the information gathered through online learning. This flipped learning frees up time in the classroom for practical activities such as laboratories, guided exercises or online simulations.

Chemistry teachers, Jonathan Bergmann and Aaron Sams from Woodland Park High School, USA, are considered to be the first practitioners of this method. In 2007, they recorded their lectures to allow students who have missed classes to catch up. However, they quickly realized that the recordings were also popular with those in attendance. Thanks to their involvement, the time spent introducing the topic of the lesson and explaining the basics of a topic has been significantly

reduced. The Flipped Classroom makes students more cooperative, more active and more likely to speak up in class. Teachers, on the other hand, finally have time for consolidation exercises and knowledge reviews, and are also able to help those with learning difficulties during the lesson, while the more able students tackle tasks on their own. This method has previously been used in higher education, with students being asked to recall their knowledge of the subject before coming to the science class. Numerous academics have used the method of a short quiz before allowing the student to take part in practical classes. Nowadays, the use of online techniques and video material greatly enhances the individual learning stage, making the students more involved and improving the effects of self-study (figure 19).

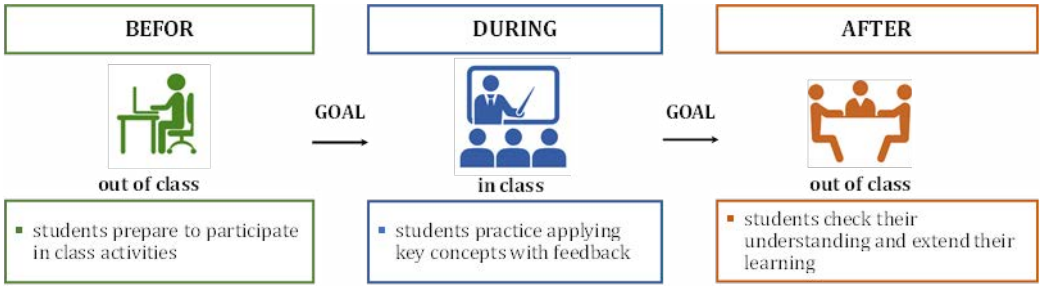

Figure 19. The Flipped Classroom method

1.21. Jigsaw

Jigsaw is a method that strongly integrates the group, but, above all, utilizes the highest level of learner engagement during the class, giving the best results for memorizing the content, i.e. teaching others at the same time (in this case the students teach each other after familiarizing themselves with the materials prepared by the teacher). The way the class is conducted is shown in figure 20 and should proceed as follows:

- the teacher divides the class content into thematic parts,
- first division of students into groups (puzzles of the same colour, so called expert groups),
- the teacher hands over the created partial topics to the expert group or has such a topic developed as part of the group's own work,
- classroom work in the expert group to learn content related to the topic, exchange of views and agreeing on a common position on what to communicate to other groups on the topic,

- splitting of expert groups and creation of new groups, the so-called study groups, in which one expert on a given topic is present, and whose task is to transfer knowledge on the developed topic to other members of the new group,
- the class ends with a summary–i.e. a discussion of the entire topic with the teacher or verification of the outcome in another form (test, written work, etc.).

The teacher's most important task is to control whether each study group has all the information needed to complete the "puzzle", i.e. has learned the content of the given lesson. In summary, all of the methods presented in more detail can be adapted to both stationary and online teaching, so that by using them, the teacher is not limited–he/she can "agilely" plan classes combining stationary and non-stationary lectures/exercises. Moreover, classes that use these types of methods enhance the development of currently desired learning outcomes i.e.:

- cooperation skills,
- organizational and independent work skills,
- networking among students (integration),
- innovation,
- presentation, self-presentation and communication skills.

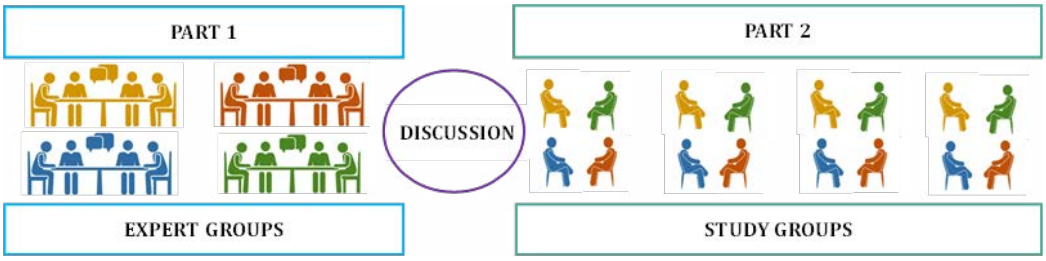

Figure 20. Jigsaw teaching method

An important component not only of the methods discussed, but also of other forms of activity, can be numerous computer applications used in online teaching (e-learning, synchronous learning or remote teaching). Applications have become popular especially during the lockdown period, but many of them can be used in classroom education. We can group them into videoconferencing systems, applications for creating graphic designs, applications that enable the creation of games and applications that support the student's and teacher's own learning. Some apps combine different functions and can be a universal tool to support teachers and students in line with the contemporary trend of digitalising the learning process.

The main tools currently in use, especially for online learning, are web-based videoconferencing systems that allow real-time sharing of audio, camera images, videos, presentations, whiteboard or your own computer screen, and these are for example MSTeams, Webex, Big Blue Button, Zoom, Moodle, Blackboard, D2L. Another group are web-based tools that allow the creation of graphic designs in a more attractive form than standard computer software and these are, for example, Canva, Prezi, Mentimeter, Thinglink. There are also applications for creating courses, quizzes, assignments, text correction such as: Kahoot, Quizlet, Socrative, Grammarly, Panopto. Apps that support self-learning, offering tutoring and learning materials (lectures, flashcards, textbooks) are extremely popular nowadays, and can be used in independent work or incorporated in the courses taught, or used directly during classes. Such apps include, for example: Chegg Tutors, Course Hero, Quizlet, Top Hat, Varsity Tutors, Labster, Studystream, TED.

1.22. The role of online methods in agile teaching[1]

Online (remote) or synchronous electronic learning (SEL) is now an increasingly common form of knowledge transfer. This way of teaching makes use of many online applications and computer programmes. It is worth highlighting the advantages of online teaching, both for the teacher and the student. For example, it offers the convenience and possibility to teach or participate from anywhere, relative ease of organizing online training, and absence of travel and accommodation costs. Nevertheless, there are also problems that may reduce the effectiveness and quality of online learning. These are mainly: negative associations with lockdown and the associated compulsion to teach online, bad experiences with remote teaching, lack of digital skills, limited interaction between the teacher and students (as well as between students themselves), technical issues, limited choice of online teaching tools and platforms, financial barrier (online platforms or applications are often chargeable), and physical fatigue from sitting in front of a computer for long hours. Figure 21 shows the three most important groups of qualities and skills that every lecturer who teaches online (but also onsite or hybrid) should have.

[1] This part is based on the research results conducted within the project „Skills Development and Certification for Trainers of Synchronous Electronic Learning (SELCERT)", and coordinated by „Euro-Idea Socio-Cultural Foundation Poland", under the contract 2021-2-PL01-KA220-VET-000051360 (ERASMUS+ Key Action „Cooperation for innovation and the exchange of good practices", 2022-2024). One of the aims of the research was to determine what skills an online teacher should have (hard and soft), and to identify the advantages and disadvantages of online teaching. As part of the empirical research, nine focus groups were interviewed, including three from Cyprus, two from Italy, two from Greece and one each from Poland and Sweden. A total of 96 participants took part in the study. All participants in the focus studies were teachers (trainers) professionally involved in adult teaching.

Figure 21. Core competencies of an effective online teacher in agile approach

The basis of curriculum development and teaching is knowledge, no matter what form is applied: traditional, online or hybrid. Digital skills related to the ability to impart solid knowledge are in second place, as well as pedagogical skills of an online teacher. Additionally, soft skills, primarily communication competencies such as speaking skills, listening skills, and awareness of the importance of verbal and non-verbal communication are also crucial. Figure 22 shows the specific competencies of the teacher relating to digital competencies and soft skills, based on the Focus Group Report in Cyprus 2023 conducted within the project „Skills Development and Certification for Trainers of Synchronous Electronic Learning" (ERASMUS+ Key Action „Cooperation for innovation and the exchange of good practices" 2022-2024). When considering the desired skills of an online teacher, it is therefore important to start with professional qualities: technical and technological knowledge (digital skills). These will include properly engaging with tools and software, ice-breaking and energizing methods and time management methods within an online environment.

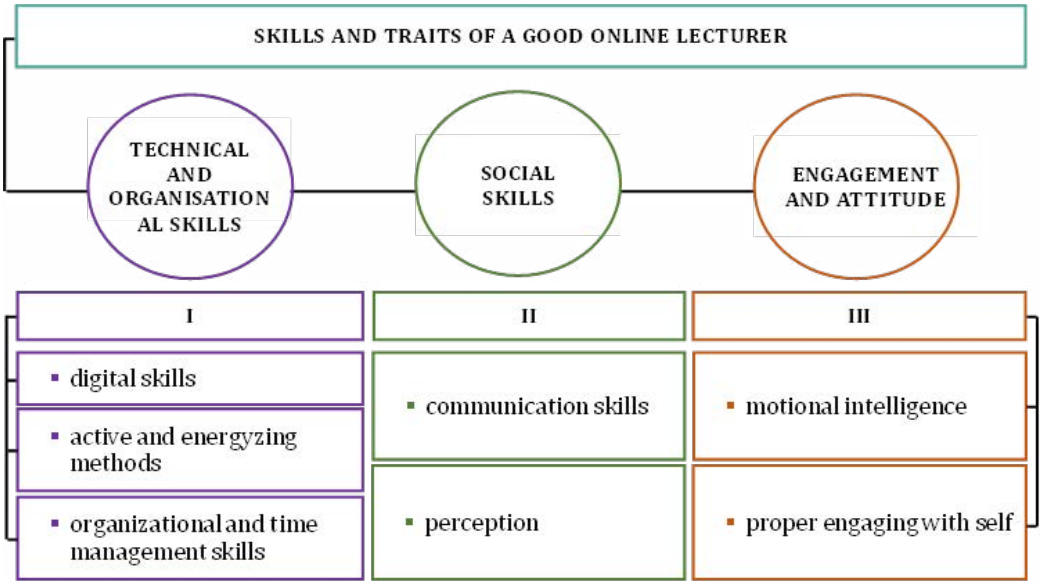

Figure 22. Specific characteristics in online teaching

It is the responsibility of the teacher to have the appropriate equipment to enable the class or programme to be delivered smoothly, without unforeseen interruptions that will hinder the achievement of learning objectives (e.g., faulty computer, no camera, microphone interference, poor room lighting, no visible face, etc.). The teacher should have the ability to combine software and tools (e.g., Zoom with Moodle; Teams with MOOC, etc.). Digital skills also include the ability to use interactive platforms (MS Teams, GoogleMeet, ClickMeeting, Skype, Zoom, Messenger, etc.) and combine them with other tools and techniques (e.g., Kahoot, Mentimeter, Slido, interactive whiteboards like Miro, etc.). When teaching online, the teacher should be able to use engaging presentations (e.g., PowerPoint slides, Prezi, Canva, etc.) in screen sharing mode and incorporate innovative energisers such as dance, movement, music, short films, or using any physical object as an 'anchor' and demonstrating it to the camera.

Successful delivery of remote classes can be achieved through good planning and preparation. The preparation and implementation of online activities (eg. training courses, lectures, classes, workshops) can be based on the concept of the ADDIE model and applied to the planning of activities with students. The ADDIE model consists of five stages: 1. Analyze, 2. Design, 3. Develop, 4. Implement, and 5. Evaluate (Mayfield 2011). The first stage involves diagnosing the participants and setting the purpose of the course by using a short online survey among the learners for instance. The design part means defining the timeframe and topics of the lectures / classes, preparing the scenario and tasks for students. Then, development seen as organization refers not only to the class itself but also–in the case of online training–to the ability to organize the space through arranging a place or a room, checking internet connections and all devices needed. The implementation stage consists of following the training plan, taking breaks into account, not "dragging" the classes beyond the scheduled time (but it is also not professional to shorten the classes). The last stage, evaluation, means assessing the training or online classes, e.g., through an online survey or comments obtained in a forum or chat. This provides the lecturer with feedback and can give information on what should be changed or improved. All the information can be used to develop further courses or curricula for students.

As can be noticed in Figure 23, soft skills (social, communication) and attitude are also vital in a teacher`s set of competencies. Social skills are important to interact with students. This ability can provide for building the right space and atmosphere for learning within an online classroom. A good online teacher needs to be an active listener. It is also extremely important to take nonverbal signals into account, even if this is largely limited in remote teaching and lacks certain means of expression. At the nonverbal level, facial expressions and paralanguage (tone, tone of voice, diction, rate of speech) remain. An "agile" lecturer is a person who knows how to talk

to people, has a background in content and also knows how to 'embed' theoretical knowledge in practice. He or she knows how to lead and moderate the group, knows how to react in different situations, and is characterized by a high level of emotional intelligence.

Professional knowledge and digital skills of a lecturer should be combined with soft skills (Figure 23). A good teacher is willing to continuously embrace new tools for remote teaching (platforms, applications, software) and monitors the emergence of new tools and solutions in remote teaching. Online learning has become increasingly important in recent years. On the one hand, it provides new opportunities and new tools, but on the other hand, it somewhat limits interpersonal expression, which has to be replaced by other forms of expression (or tools). An online teacher has to use what is visible and available, i.e. facial expressions, voice characteristics, elements of the physical environment like the appearance of the room and objects visible on camera, etc. However, not all elements of traditional classroom learning can be translated into online ("remote") form. Therefore, if possible, hybrid classes should be introduced, e.g., conducting part of the class in contact form, offering face-to-face tutorials, meetings, or debriefing meetings at the end.

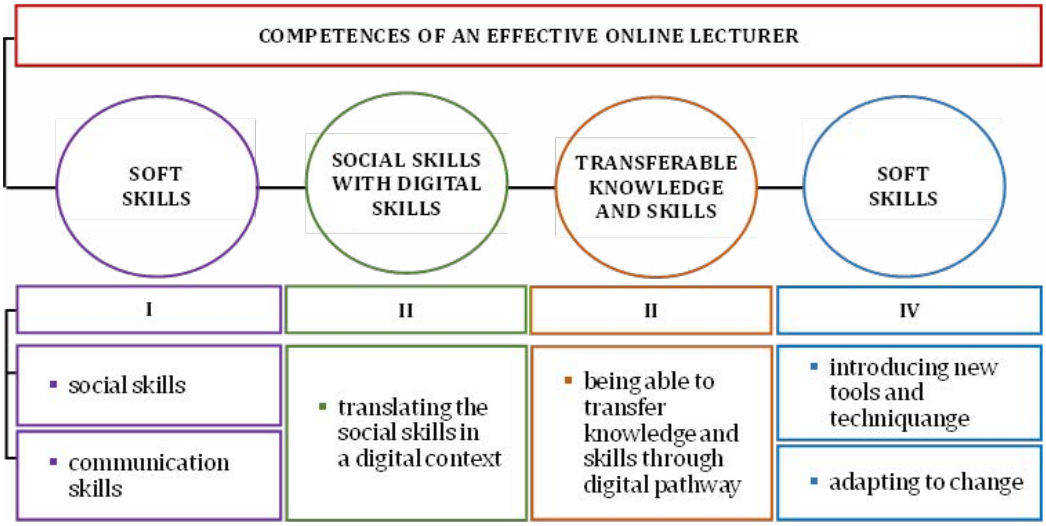

Figure 23. Features and competences of an effective online teacher

This builds up the relationship between the teacher and the students, as well as between the students in the group, which significantly contributes to the effectiveness of the educational process.

This chapter does not cover all possible teaching methods already used by university teachers. It is a very broad topic and the creativity of the leading teachers is

often almost unlimited. An important guideline for teaching practice is making the right choice of methods and techniques and combining them effectively in planned courses. This enables the teacher to make a smooth, 'agile' transition, e.g., from face-to-face teaching to online teaching or build hybrid programmes. Certainly, the self-motivation of the teacher is essential as he can build relationships with students and motivate them on that basis. The next chapter describes methods of student or learner motivation illustrated with examples from practical experience.

Chapter 2

Motivation

The first part of this chapter is written by trainers and practitioners who teach creative methods and motivational techniques. Therefore this part of the chapter, mainly focused on students' motivation, contains a lot of practical examples and case studies. The second part of the chapter was prepared by an academic teacher who shared the newest research fundings and her own teaching experience. Motivation is what we all need in life. Motivation helps us when we study, when we work and when we pursue personal goals. Can you imagine building a house or running the first marathon without motivation? Motivational states are commonly understood as forces acting within the agent that create a disposition to engage in goal-directed behaviour. Fostering motivation of students and teachers is a difficult but necessary task. In the following chapter you will learn about different motivational techniques and methods. Fostering motivation of students and teachers is a difficult but necessary task. In the following chapter you will learn about different motivational techniques and methods.

2.1. Theories of motivation–intrinsic vs. extrinsic

There are many motivational theories. One of the first and most popular is Maslow's hierarchy of needs (Maslow, 1943). According to this theory, people are not most motivated by security or money to work, as long as these needs are already fulfilled at a satisfactory level. Instead, the highest motivation is to contribute, develop their talents and use skills. The highest need is self-actualization! However, this theory has been questioned a lot in the recent time, mainly because it treats humans in a general way (figure 24). Self-determination theory (SDT) (Ryan and Deci, 2000) is another theory of human motivation that is concerned with the social conditions that facilitate or hinder human flourishing. The theory has been commonly used to understand what moves students to act and persist in educational settings. SDT focuses on the factors that influence intrinsic and extrinsic motivation, which primarily involves the satisfaction of basic psychological needs for:

- autonomy refers to having a choice in one's own individual behaviours and feeling that those behaviours stem from individual choice rather than from external pressure or control. In educational contexts, students feel autonomous when

they are given voice and options, within a structure, about how to perform or present their work.

- competence refers to perceiving one's own behaviours or actions as effective and efficient. Students feel competent when they receive clear feedback and track their progress in developing skills or an understanding of course material.
- relatedness refers to feeling a sense of belonging, closeness, and support from others. In educational settings, relatedness is fostered when students feel connected, both intellectually and emotionally, to their peers and instructors in the class. This can often be accomplished through interactions that allow students and teachers to get to know each other on a deeper, more personal level (Yarborough, Fedesco, 2020).

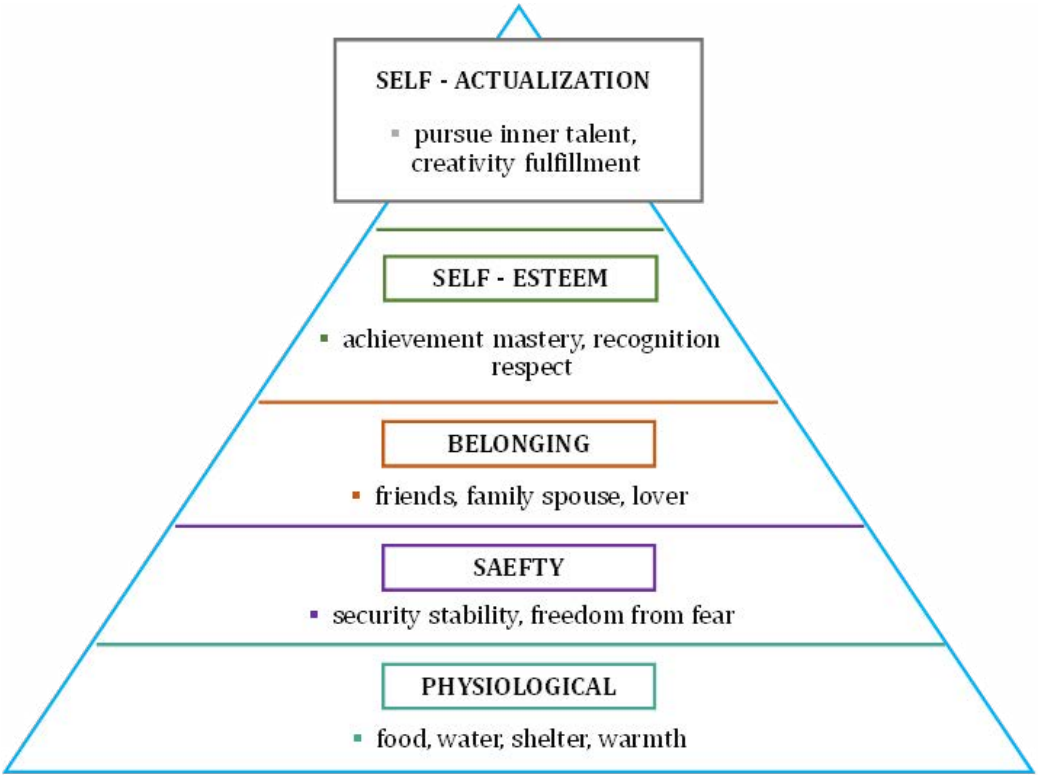

Figure 24. Maslow's hierarchy of needs

Intrinsic motivation is the act of doing an activity purely for the joy of doing it, and it is frankly very rare in school and work contexts. Extrinsic motivation is the use of external rewards or punishments to encourage student work completion (Chuter, 2020, Bain, 2004). However, as intrinsic motivation is way more effective

and satisfactory to learn, it is worth to point that in some cases extrinsic motivation can lead to intrinsic motivation, in the sense that students may embark on a task for reasons associated with extrinsic motivation but become intrinsically motivated through the process of engaging with the task and learning to value it.

2.2. Impact of motivation on students' performance

Motivation is an irreplaceable catalyst of a learning process. Students who are motivated are less likely to give up. They are more intended to push forward. The deeper the motivation for learning, the more likely that the student will not accept easy answers to complex questions. According to the research (Chuter, 2020), intrinsic motivation fosters strong and flexible critical thinking skills. On the other hand, amotivation and purely extrinsic motivation lead to low interest and academic persistence. Intrinsically motivated students are not more intelligent than unmotivated students, but their need to find out the answer to a question or to master a concept pushes their critical thinking and creativity. They will spend more time working on complex challenges and will not mind being confused. Moreover they will more easily transfer and adapt learned solutions and apply them in a practical context. Surprisingly motivation has also a positive impact on students' selfassurance and resilience. Individuals who engage in intrinsically motivating activities react less emotionally to a low grade on a test or a harsh criticism from a teacher or peer.

2.3. How to motivate students to learn–strategies for motivation

Strategies to enhance (Yarborough and Fedesco, 2020)**:**

- autonomy:
  - have students choose paper topics,
  - have students choose the medium with which they will present their work,
  - have students choose the topics you will cover in a particular unit,
  - drop the lowest assessment or two (e.g., quizzes, exams, homework),
  - have students identify preferred assignment deadlines,
  - gather midsemester feedback and make changes based on student suggestions,
  - provide meaningful rationales for learning activities,
  - acknowledge students' feelings about the learning process or learning activities throughout the course.

- competence:
  - set high but achievable learning objectives,
  - communicate to students that you believe they can meet your high expectations,
  - communicate clear expectations for each assignment,
  - include multiple low-stakes assessments,
  - give students practice with feedback before assessments,
  - provide lots of early feedback to students,
  - have students provide peer feedback,
  - scaffold assignments,
  - praise student effort and hard work,
  - provide a safe environment for students to fail and then learn from their mistakes,
- relatedness:
  - share personal anecdotes,
  - get to know students via small talk before/after class and during breaks,
  - require students to come to office hours (individually or in small groups),
  - have students complete a survey where they share information about themselves,
  - use students' names (perhaps with the help of name tags),
  - have students incorporate personal interests into their assignments,
  - share a meal with students or bring food to class,
  - incorporate group activities during class, and allow students to work with a variety of peers,
  - arrange formal study groups,
  - convey warmth, caring, and respect to students.

Strategies for motivating students (Yarborough and Fedesco, 2020; Chuter, 2020; Bain, 2004):

- become a role model for student interest (deliver your presentations with energy and enthusiasm. As a display of your motivation, your passion motivates your students. Make the course personal, showing why you are interested in the material);

- get to know your students (you will be able to better tailor your instruction to the students' concerns and backgrounds, and your personal interest in them will inspire their personal loyalty to you. Display a strong interest in students' learning and a faith in their abilities);
- practice growth mindset (students who feel like they will improve through hard work will exert more effort than those who believe that their success is based on intelligence. Teaching students to use the phrase *yet* when explaining their gaps in knowledge helps to move them away from this deterministic orientation. For example, if a student says: *I can't do that*, suggest that *you can't do that, yet*);
- use examples freely (many students want to be shown why a concept or technique is useful before they want to study it further. Inform students about how your course prepares students for future opportunities);
- use a variety of student-active teaching activities (these activities directly engage students in the material and give them opportunities to achieve a level of mastery. Teach by discovery. Students find it satisfying to reason through a problem and discover the underlying principle on their own. Cooperative learning activities are particularly effective as they also provide positive social pressure);
- encourage self-efficacy (students who are paralyzed by low academic self-confidence will struggle to drive their own motivation. A sense of competence is enhanced through optimal challenges. These are also referred to as 'just right' challenges because they are difficult enough to be just above the student's current ability to work independently but easy enough for the student to follow along with the teacher);
- set realistic performance goals and help students achieve them by encouraging them to set their own reasonable goals (design assignments that are appropriately challenging in view of the experience and aptitude of the class);
- place appropriate emphasis on testing and grading (tests should be a means of showing what students have mastered, not what they have not. Avoid grading on the curve and give everyone the opportunity to achieve the highest standard and grades);
- normalize the struggle (students may give up because they falsely believe that, if they were going to succeed, it would be easy. You can disentangle this misconception by providing examples of failures that well-known individuals overcame along their journey towards success);
- be free with praise and constructive in criticism (negative comments should pertain to particular performances, not the performer. Offer nonjudgmental feed-

back on students' work, stress opportunities to improve, look for ways to stimulate advancement, and avoid dividing students into sheep and goats);

- minimize competition when there is one right answer (a pressure to compete tends to diminish motivation unless the two students are and perceive themselves to be equally competent: if a student at the top of the class is pitted against a student who is struggling, the latter student may feel that there is no reason to try. This is not to say that class or school-wide competitions should be avoided. When broader competitions are more open-ended, students can creatively self-guide their projects, and will feel a stronger sense of intrinsic motivation);
- give students as much control over their own education as possible (Let students choose paper and project topics that interest them. Assess them in a variety of ways (tests, papers, projects, presentations, etc.) to give students more control over how they show their understanding to you. Give students options for how these assignments are weighted);
- avoid tangible rewards (tangible rewards are often counterproductive, and the more external the reward, the less inherently valuable the student will find the activity. Even when students complete an activity for the inherent value they see in it, and are given an unexpected reward, they later regard their motivation for doing the activity as more extrinsically motivated than students who were not given a reward).

2.4. Building environment which fosters motivation

As an academic teacher you may have a limited influence on a space and environment where you teach. However, even if it is true in your case, you may be able to apply some of the following good practices (Piecuch and Wieczorek-Przybyło, 2022):

- space (the size of the room should not overwhelm or crowd the amount of people participating. Too large a space overwhelms and too small could be a limitation to the participants emotional state. Furniture positioning should be flexible to allow participants to move around freely and adapt their setup to what best suits the task at hand. A relaxing space with couches can be an advantage, but only to a certain extent. Too many cushions and couches may lower the energy level too much to work, however on the flip side, too formal a setting may restrict the amount of creative thinking occurring. A space that has a clear focal point with a visual objective is a great option that encourages movement as well as communication. Plants are also very easy on the eye and stimulate creativity.

Being close to nature is one of the most effective imagination boosters out there, so when we conduct indoor sessions, we have at least a few plants inside);

- colour (some, but not all colours, are helpful. Take colour theory into consideration when planning your material: Red increases your heart rate; yellow stimulates the intellect, and blue is often called the colour of the mind. To be very detail oriented, strong blues evoke clear thoughts and delicate blues help us stay focused and calm. If there is no colour in the room you can always prepare motivating sentences, print them on coloured sheets and stick them to the walls);
- temperature (surprisingly, the optimum temperature for creativity and thinking is about 20° Celsius. If people feel cold, it is better to warm them up with movement rather than heat the room. If people are warm, the best course of action is to open the window. This will also let you keep the air in the room from becoming too dry or humid);
- light (daylight is best when learning as it helps balance serotonin levels in the body. Try to avoid direct sunlight – you shouldn't have to squint. Light up pools of darkness (the corners for example) with reflective surfaces, even a light coloured table or mirror works. If overhead daylight is not possible then a bright artificial light with a full spectrum or "daylight bulb" may help. Flexible lighting is definitely an advantage);
- sound (acoustics in any given room should not be too harsh. Music is an option depending on the group dynamics and work purpose. For divergent thinking (when we want our imagination to run wild) music can be a great facilitator. The option with the most amount of research backing it is the classical genre and jazz: Bach, Mozart, Vivaldi. However, when people need to focus and analyze the results of brainstorming for example, music can impair the process. It is advisable to ask the group what suits them best. Despite the popular idea that fidgets or music support student focus, brains generally need quiet or ambient noise to stay engaged. Higher level brain functions such as creativity and critical thinking are inextricably linked to a state of flow, so students who are constantly interrupted will never be able to reach this level of highly motivated thinking. Therefore, independent and collaborative work should occur at separate times, or in separate spaces if they must occur simultaneously).

2.5. Academic teacher as an effective facilitator

As a teacher, to support students' motivation, you may want to conduct classes in a form of workshop. Here are some tips and good practices you might find useful (Imaginarium Toolikt, 2022):

- create a trustful, free and open space (the facilitator's task is to support people in accepting and making good use of the information obtained during the meeting. This means that you should be able to create an atmosphere of trust, freedom and openness. The facilitator engages and motivates the group by: taking note of and encouraging the active participation of each member of the group; ensuring that participants understand each other; ensuring that each participant has space to express their ideas, which are considered by the whole group; clearly explaining that the participants take joint responsibility for the outcomes of the meeting);
- listen and ask questions (a good facilitator is an active listener, which means constant focus on the group. You should often paraphrase what the participants say, and make frequent recaps in order to liven up the discussion and obtain additional information. A good facilitator must be also able to ask questions that engage the group and motivate discussion. This aspect is a key element. Thanks to pointed questions, you can put the conversation on the right track, helping the group focus on achieving the goal);
- be empathetic (understood as: *the ability to put yourself in a situation that does not directly concern you* or to *walk in someone else's shoes*. Empathizing means to understand other people's feelings and expectations, sometimes even to set aside your individual beliefs and biases);
- be neutral (this is one of the most important skills a good facilitator has. Regardless of whether you agree with a group or you are utterly contrary to its views, you should remain completely neutral. The point is not that you, as the facilitator, have to agree to everything but that you are able to properly validate the situation and accept the solutions that best suit the group and the workshop goals);
- notice and appreciate even small group successes (to be appreciative, you have to be mindful of both small and big achievements of the group, changes, behaviours and what participants say. Facilitation work gives many ways and opportunities to appreciate these things, probably many more than situations for confrontation and constructive criticism. Which *eye* you look at the group with – critical or appreciative – depends largely on you. When you think about being appreciative, your best bet is to start with yourself: *can I appreciate myself* or *am I only guided by my inner critic?*);
- accept the silence (it is in silence where people can connect with their feelings more deeply, clarify their thoughts, and formulate an appropriate question. Very often we are afraid of this space and find it uncomfortable. How

often do you try to fill silence with jokes, piling up over-intellectualized questions, calling a break? Get used to the silence – first in yourself, then in the group you accompany. Being in silence is an essential tool in the facilitator's work);

- be flexible (the facilitator should be able to adapt plans and assumptions to unexpected situations that may occur during the workshop);
- play with warm ups (we warm up not only to connect with each other. We could do a warm up before each part of the work. In the same way an athlete prepares before the main event by stretching their muscles, our warmups prepare the mind, emotions and body to work on a given topic, to be open and curious);
- rest, when you can (are you surprised by this tip? Facilitation is a very exhausting activity that requires many hours of mindfulness, self-awareness, self-control and instant decision-making. Use breaks for lying down! Rest the way you like best: Reset your mind, get rid of tension in your body, let your emotions run through you. A tired facilitator is an ineffective one).

2.6. Giving motivational feedback

Why give feedback?

Feedback refers to a comment on an act or behaviour that either seeks to change or reinforce that act or behaviour. That is, feedback is always intentional. It's easy to give nice feedback, but it's really important to learn to speak up if things aren't going well. Feedback should be viewed as an opportunity to foster personal growth and build others' self-esteem. Feedback should be a source of continuous improvement. A lack of feedback causes hesitation in people. In this state questions arise as to whether or not anyone is interested in what or how they are doing. When there is no feedback on the work being done, it's easier to feel anxious and insecure. Students who have thoughts about themselves, their skills and their development and don't receive support are often found at lower levels of achievement than those who are given feedback and encouraged (Piecuch and Wieczorek-Przybyło, 2022).

How to give good feedback?

Timing is important in providing feedback. It is not advisable to wait for the perfect moment to give feedback, give it immediately so it feels relevant and focused. Feedback can also be expressed as micro feedback, body language, expressions, gestures or a few words and can provide the student with a feel-ing of success. It is

important to give more positive than negative feedback. Even if there's a balance between positive and negative feedback, one usually hears, remembers and is more sensitive to negative feedback. Giving negative feedback requires emotional intelligence and skills. The person giving the feedback must be able to control not only their own feelings, but also be able to feel empathy and again, timing. In this case be aware of who is around and how their presence will impact them and the one receiving the negative feedback. Sometimes corrective social feedback is also needed. Learn to tell students how he or she could do differently. Give constructive feedback on what to do and not to do, never about the person (Piecuch and Wieczorek-Przybyło, 2022).

Tips to remember when giving feedback:

- the purpose of feedback is always to help the recipient move forward,
- be genuine and sincere,
- don't give feedback when you are irritated or tired,
- you can never give too much positive feedback,
- do not use sarcasm or embarrassment to bring the lesson home,
- speak clearly and concretely even when giving corrective feedback,
- remember the message of constructive feedback: *tell us what you see, notice, hear; tell them how it affects you*; *share your feelings*; *encourage students to take a new approach*;
- be prepared to discuss, refine, and answer questions, feedback is a two-way street where the parties meet.

2.7. Situation-Behaviour-Impact method

Situation-Behaviour-Impact method (SBI) is a structured method of constructive feedback. It contains three elements (*Center for Creative Leadership*, 2022):

- situation (describe the specific situation in which the behaviour occurred. Avoid generalities, such as "last time," as that can lead to confusion. Example: *This morning you were half an hour late for my class…*);
- behaviour (describe the actual, observable behaviour. Keep to the facts. Don't insert opinions or judgments. Example: *Your entrance disturbed my lecture* instead of: *You were rude*);
- impact (describe the results of the behaviour. Because you're describing exactly what happened and explaining your true feelings–not passing judgment–the

student is more likely to absorb what you're saying. If the effect of the behaviour was negative and needs to stop, you can use words such as *troubled* or *worried*. Example: *I felt frustrated when you interrupted my lecture because it broke my train of thought*).

To make SBI even more successful you can inquire the student about her or his intent. It will make the conversation two-way and it is likely for you to get more understanding of the situation.

2.8. How to build motivation during an online teaching

The main concern in working online is establishing positive group energy. In face-to-face class, it is easier to promote this energy through body language, ice-breakers and energizers, group work, physical movement, physical materials, and incorporating fun into your approach. In a remote workshop, this is much more challenging. To be effective in online learning you need:

- online tools (before the class, spend some time testing the online tools you have chosen (e.g. *Teams* or *Zoom*). During the class, you should be strict about time-keeping. With online sessions, students are stuck in front of their computers for an extended period. Delays and time wastage are, therefore, more frustrating. In this case, it is important to streamline your approach to ensure that your class is concise and keeps participants engaged);
- energizers (To engage and motivate students it is good to incorporate a variety of activities that encourage people to exercise, play or have fun. You can use an energizer, such as an online poll to get students' attention. In an online workshop environment, it is much more difficult to manage the energy of the group and sense their level of engagement than it is in a face-to-face session. Therefore, you need to try different methods to sustain group engagement.).

2.9. Practical tools and methods for boosting motivation during online classes

Here are two types of exercises you can easily use in an online environment. The first one are online polls which can serve as warmups, energizers or evaluation tools. The second one is brainstorming, a good method to boost students creativity and invite them for example to project work

Online polls (*Better-teams*, 2022):

Duration: 5 minutes.

Most educational platforms have a builtin polling feature. If they don't, you can check out some commonly used polling apps like Mentimeter or Kahoot. Polls are one of the easiest ways to add energy and engagement to an online class. They are also an excellent way to quickly gather information or opinions from any student size group, and it takes less than a minute or two to execute. Here are some examples to use polling during your online class:

Purpose 1: *Get people ready to talk about a topic. How do you feel about our online classes?*

- *They rock.*
- *Pretty good.*
- *Just ok.*
- *Uh, I miss our face-to-face classes.*

Purpose 2: *Find out how students in the class think/feel about a topic or how much knowledge they have with the topic. How familiar are you with the "X" policy?*

- *I have never heard of the "X" policy.*
- *I know a little bit.*
- *I'm fairly familiar with it.*
- *I could write a book about "X" policy.*

Purpose 3: *Check in to be sure students understood and remembered your key point.*

At the end of a class, you can ask a series of test questions to assess understanding and retention of key content.

Purpose 4: *Evaluation. Give the students the opportunity to assess the course or the class. Example, you can ask one or more questions to gather information about their experience. The information provided was helpful to me.*

- *Strongly agree.*
- *Agree.*
- *Neutral.*
- *Disagree.*
- *Strongly disagree.*

Brainstorming (*Better-teams*, 2022)**:**

Duration: 40 minutes.

Brainstorming is a great way to generate ideas (e.g. if you want your students to work on a project) and can be easily done online, e.g. on Google Jamboard (students can write virtual post-it notes). Steps:

- give people time to get prepared (ideas and innovation are not born in a vacuum. Imagination needs to be fed. When you tell people what kind of challenge you are going to brainstorm the day before, they will have time to get prepared, do some research and reflect);
- do not push participation (the worst brainstorming participant is one who doesn't want to be there. They will resist, break rules, and demotivate others);
- remind the most important brainstorming rules:
  - do not judge others' ideas, there are no stupid ideas, each one is valuable,
  - quantity is more important than the quality of ideas,
  - one idea per virtual sticky note – ideas should be described with a max of 5 words, but still be understandable to others, they can be also presented as a simple drawing;
- facilitate the process (it is always good to have some handy ideas for how to structure the process and help students to reach their imagination:
  - step 1 (5 minutes for individual work. You can specify the number of ideas you expect from each student. It can be any number, when you have 5 people and each comes up with just 4 ideas, you will generate 20);
  - step 2 (time for sharing ideas – make sure that everybody has a moment to speak and share);
  - step 3 (discussion and building on others' ideas. This step can be simultaneous with the previous one. When somebody presents an idea, others can build on it and develop some more innovation);
  - step 4 (when students need some inspiration to get out of the box, you can propose a "Role playing" activity. Give them some exam-ples of fictional creatures or real people and ask how they would solve the problem: *What idea would Steve Jobs, Mother Teresa, Shrek, Einstein propose?* Ask everybody to choose one person and come up with at least one idea).

The whole session should last no more than 40 minutes. The teacher acts as a time-keeper, and this is one of the most important roles during brainstorming. Time structure keeps people on the right track and stimulates a good level of energy.

2.10. Design Thinking prototypes (ideas) from the *Bioera+*

In the *Bioera+* project the project team conducted four Design Thinking workshops in universities in Poland, Spain, Czech Republic and Portugal. The workshops were attended by academic teachers and students. The goal was to find innovative solutions to improve academic teaching and learning. To create something new, to improve an existing thing or to solve a complex problem, people need freedom and space, physically, mentally and socially. This limit-lessness can easily lead to chaos. Without parameters, it can be difficult to determine progress and analyze when something is finished and when it needs more work. Design Thinking is a process that leads you through chaos and helps you to organize it. Thanks to its structure, you can move from complexity to solutions. You can keep sight of the goal while providing the opportunity to immerse yourself in limitless possibilities.

Design Thinking can be flexibly implemented into academic study processes, serving equally well as a framework for a course design or a roadmap for an activity or group project. You can find out more about the Design Thinking method in the *Design Thinking Handbook for Academic Teachers*. How to create a more meaningful and satisfactory teaching experience for students and teachers (Piecuch and Wieczorek-Przybyło, 2023). In the last chapter of the book, you will find two scenarios: Design Thinking as one 90-minute class activity and Design Thinking as a one-semester course. During the *Design Thinking* workshops within the *Bioera+* project students at partner universities were asked to explore what motivates them and to design solutions they would like to see implemented in their universities. Below are three of their ideas, described in more detail: *My Ideal Course, Learn, Connect, fly and Appreciation Day.*

2.11. My Ideal Course and Learn, Connect, Fly

Students from the University of La Laguna in Tenerife, Spain were asked to design a new hybrid university program (on-line and face-to-face classes) which would inspire, motivate, and teach them. The first group came up with an idea they called *My Ideal Course*. Here are the most important features they emphasized:

- open communication with a teacher, who provides guidance,
- open minded relationship with a teacher,
- a teacher who has energy and conducts creative classes, but is also organized,

- a teacher with a high level of emotional intelligence who is a good listener,
- a teacher who uses online tools, such as kahoot, autocad, unity, drive, youtube, sketchup,
- the program is based on teaching students how to conduct research, but includes a practical application of knowledge as well,
- the *ideal course* contains also student council sessions – students voice matters,
- evaluation is based on different components: project work, research, the best projects get funded by university (figure 25).

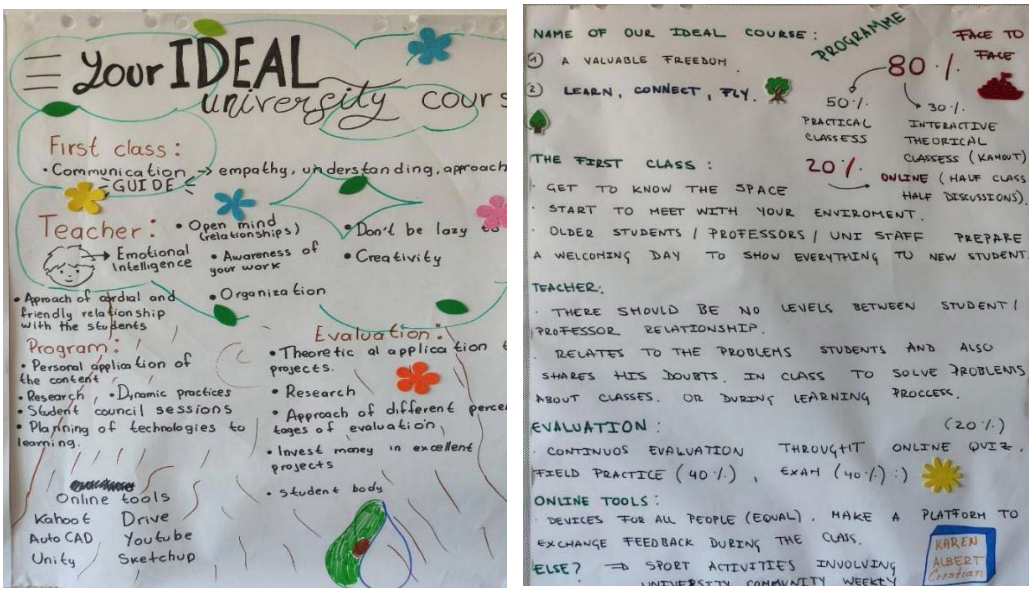

Figure 25. Posters of students from University of La Laguna in Tenerife

The second group of students designed an idea they called *Learn, Connect, Fly*, which contained the following elements:

- at the beginning of the first semester older students, teachers or university staff prepare a welcoming day to show everything to new students,
- a teacher relates to students' problems and also shares his or her doubts, a teacher solves problems related to classes or the learning process,
- the program can be designed in the following way: 80% face-to-face (50% practical classes, 30% interactive theoretical classes–e.g. using tools such as Kahoot), 20% online–half class, half discussion,

- continuous evaluation through online quizzes (20%), field practice (40%) and exam (40%),
- online tools (same devices for all students and a platform to exchange feedback in real time),

weekly sport activities involving university community

2.12. Appreciation Day

Appreciation Day is an idea developed by students of Mendel University in Brno, the Czech Republic. The idea intends to solve an issue of students' lack of confidence. The group designed a programme which involves dedicating one day per course to creating a supporting environment where students and teachers can openly appreciate and provide feedback to one another. How can it be organized? Simply, by removing chairs from the classroom and sitting in a circle, giving feedback and appreciating each other, fostering open communication and relationship building (figure 26).

Figure 26. Poster of students from Mendel University in Brno

2.13. Motivation of teachers

Being motivated to do the job is an essential pre-requisite of doing the job successfully, in the right way and with pleasure. When you are motivated, not only do you benefit but so do your colleagues, friends, and family. A satisfied man contributes to the quality of life of all in society. Moreover, the economic impact of such work is substantially higher while using fewer resources. Das and Banerjee (2021) confirm that a motivated teacher can bring success to an organization. Richardson (2014) defines teacher motivation as the internal and external factors that stimulate an individual's desire and energy to teach, and sustain their interest and commitment to making their best effort in supporting student learning goals. The quality of education is heavily influenced by the quality of teachers. To teach effectively, teachers need to know (Alonso-Tapia and Ruiz-Díaz, 2022):

- what to teach,
- how to teach it in a motivating and effective way and
- how to use technology in the classroom.

Teacher quality has a significant impact on student learning outcomes. But what is the best way to motivate teachers and ensure they not only show up in classes but also teach in a way that taps into their potential? Answering this question is particularly pressing given the high enrolment rates in developing countries, where policies aimed at increasing access to education for all have been implemented (Worldbank, 2016). Being a teacher is often regarded as a relatively easy job, involving simply talking to kids or students, having a lot of holidays and working only a few hours a day. In some regions, teachers´ wages are not very high and their social status is quite low. Under these circumstances, the decision to become a teacher is often driven by an individual's internal motivation and interest. It needs to be noted that teachers play an important role in the lives of children. In addition to facilitating learning, teachers are key agents of socialization and helping students reach their highest potential (*The Pennsylvania State University*, 2017).

Of course, there are still some individuals who choose to become teachers for reasons such as the perceived ease of the job or the number of holidays. However, these individuals may soon discover the reality of the profession. If you want to be a good teacher[2], you must:

- devote a lot of time to preparation,
- think about new possibilities and methods of learning and teaching,

[2] which is also an issue: What makes the teacher to be "a good teacher"?

- follow your field of teaching to keep up to date.
- be strong mentally as the job is psychically demanding because you often deal not only with children but with their parents as well.
- necessarily manage administrative issues and follow all the regulations and laws.

Between 23 to 42 percent of teachers quit their job within the first five years. (Chalk, 2022). Forty-three percent of all teachers who left voluntarily and before their scheduled retirement said they did so because the stress and disappointment of teaching was not worth it. It was nearly twice as many as those who said the pay wasn't sufficient (Will, 2021). The Pennsylvanian university conducted research on the stress factors for teachers. (Pen. Univ., 2017). As stress is one of the key factors in motivation, their findings are useful to help prevent the decrease in motivation. The following stress factors have been identified:

- School Organization: Leadership, Climate, and Culture;
- Job Demands;
- Work Resources: Support and Autonomy in Decision-Making,
- Teachers' Personal Resources and Social-Emotional Competence.

To be able to deal with these stress sources, authors conclude with intervention approaches based on:

- Organizational Interventions,
- Individual-Organizational Interface (IOI) Interventions,
- Individual Interventions.

All of these involve personal training programs, mentoring, time management, and technical and social support. The outcomes of stress prevention and intervention programs are promising. Apart from better health of teachers, savings on average medical claims payments have also been reported. Eliminating or rather preventing stress is a very important issue. However, even if theoretically there is no stress related to the job, the teacher must be satisfied with work and results to stay motivated. In order to achieve that, teaching should be not only efficient but also continuously interesting to students and teachers themselves. Keeping the motivation at a high level for a longer period is therefore difficult. Let us analyze some attitudes, examples, and ideas related to sustaining motivation. Hildebrandt and Eom (2011) found five motivators:

- improved teaching,
- financial gain,

- collaborative opportunities,
- self-validation,
- external validation.

This study was conducted in the United States, where teachers themselves can decide whether or not to become professionals, and it addressed the question of teachers' motivation to professionalize if they were given the choice. This is a factor that should be kept in mind when applying the results of their research, however, there are some interesting findings that may be useful in general. A better teaching and professional development can serve as strong motives for teacher professionalization. In addition to internal incentives, there are also important external incentives, such as rewards from:

- society,
- friends,
- a boss.

Important factors of motivation are also dependent on age. In a research done in 1979, Lipka and Goulet did not find any significant differences in motivation among teachers of different ages. On the other hand, Kuhlen and Johnson (1952) claimed that younger teachers are being more motivated by achievement, and older teachers by a higher power. Teachers with less experience face different problems in their work than more experienced ones (Van Maele and Van Houtte, 2012). However, some motivating factors were not proven to be age-related. These factors were: motivation for becoming a better teacher, for collaboration, and for internal validation. Teachers' professional motivational profiles can be studied from different perspectives and focus on different variables (Alonso-Tapia and Ruiz-Díaz, 2022).

2.14. Improved teaching

Motivated students and their good results are extremely important for teachers to stay motivated to do their job. When (only then) the teacher can see the results of his or her efforts, he or she remains keen on teaching and giving new knowledge to students. There are many methods, teaching techniques, and learning attitudes that can be used to enhance the educational experience. It is also important to individualize the teaching process to meet each student's needs. However, this does not necessarily mean individual teaching. Even in a class of twenty or thirty students, the teacher can keep an individual approach through the creation of: conditions, opportunities and possibilities for the development of each student. No two students in the class are the same. To encourage the potential of each student, it is necessary to create conditions that respect their individual needs. With regard to

different learning types, kinaesthetic, visual, and auditive, there should be a possibility for each student to:

- *touch*, e.g. *try* the problem,
- *see* (good graphics, pictures, videos),
- *listen* (interesting interpretation and explanation).

Working with the whole class at the same pace and style, without allowing students to choose their own way of exploring, can hinder individualization. This does not mean that "frontal teaching" should never be used, but it does not have to be the prevailing method. Adopting an individualized approach to teaching requires more preparation, but it can be very rewarding. Often, teachers stick to one teaching method because it is the one that suits them and comes naturally to them, and is most efficient. Incorporating auditive, visual and kinaesthetic types of presentations into lessons can be a good start for adopting more differentiated methods of teaching.

Visual type

- *How to recognize it?*

Does your student remember the faces but not the names? If a student is bored, he or she is looking outside the window or glancing at the mobile phone, he or she could be a visual type.

- *What can you do in the lesson/class?*

Use pictures, charts, schemes in your presentation. Use different colours representing definitions, explanations, formulas. Each type should have its own colour, frame or background.

- *Do not do this:*

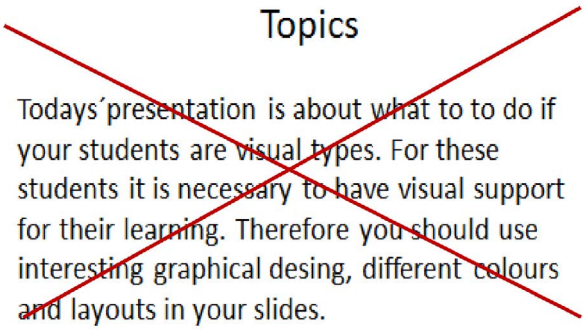

Figure 27. How not to present content

- *But rather this:*

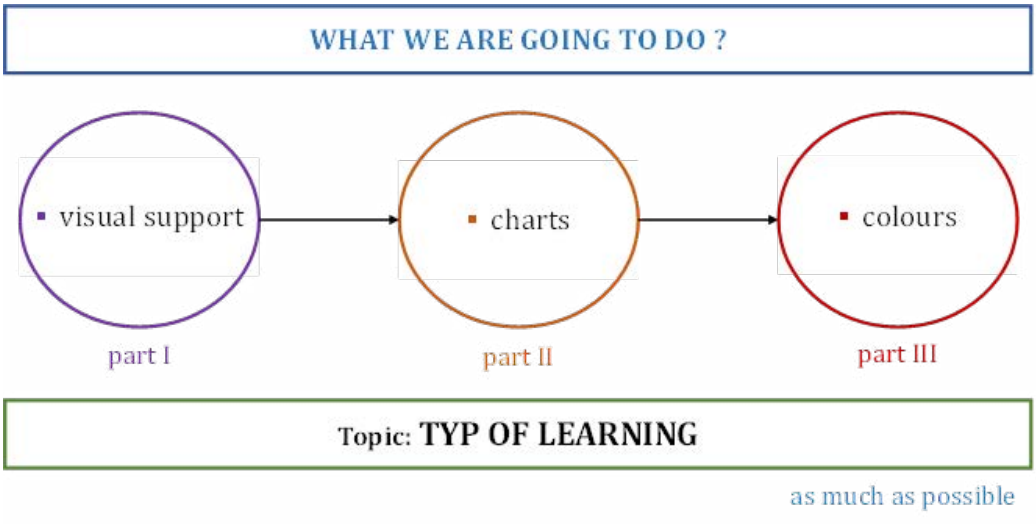

Figure 28. How to present content

- *If it is possible, use posters and photos in your class*:

Figure 29. Example of what a class looks like

Auditive type

- *How to recognize it?*

Does your student know names, lyrics, definitions but is not able to remember faces? If he or she is bored, he or she is speaking to the neighbour or mumbling to herself, he or she could be an auditive type.

- *What can you do in the lesson /class?*

Speak about the topic. Give examples and explanations. Ensure your voice is loud enough (but not too much), and not monophonic. You could use a short rhyme if possible, or a song or poem for smaller children. Enable students to record the lesson or give them recordings about the topic. Ask the student to repeat the main issues in his or her own words or ask him to explain the topic to others.

Kinaesthetic type

- *How to recognize it?*

Does your student move his hands when speaking? If he or she is bored, he or she is undercutting the leg, clicking the pen or tapping to the desk, he or she could be a kinaesthetic type.

- *What can you do in the lesson/class?*

Enable your student to move around the class. Ask him or her to write something on the board. If it is possible, play a short game related to the topic or organize an excursion to a museum, park, or some other place related to your lesson.

If you think you have not succeeded, do not give up. Try something new, communicate with your colleagues, students, and their parents. Ask your friends about their experiences as students, what they liked and did not like. Communication is an important factor that impacts motivation. It can enhance one's motivation towards their job, while a lack of communication brings demotivation (Das and Banerjee, 2021). Both teacher collaboration and teacher autonomy positively affect teacher motivation, which has been proven by many empirical findings (Kollek, 2019). Conversely, teacher motivation has been recognized in different empirical studies as a key factor in strengthening teaching effectiveness (Han and Yin, 2016) and student success.

Communication is the basic way of solving problems and it can also provide new incentives and encouragement for continuing your job. To be able to reach the optimal solution for each person involved, communication should, of course, be voluntary rather than forced and it should be efficient. Both (all) partners have to want to reach a positive outcome and should be prepared to make compromises.

Different types of communication should be used when dealing with colleagues (other teachers), with the boss, with children, their parents or with adult students. Moreover, communication is also specific to different people according to their: characteristics, types, and knowledge. It should differ based on:

- age,
- education,
- job, etc.

Ask your colleagues about their experience with teaching. What do they do and what are their students´ reactions and outcomes? Is it possible to take part in your colleagues´ lessons? It could be beneficial both for you and your colleagues. You could learn some new methods of teaching or communication with students. On the other hand, you could give feedback to your colleague and give him/her some tips.

2.15. Job shadowing

My colleague, who has been teaching statistics at the university for 20 years, has grown increasingly frustrated and bored with her job. She finds the repetition of teaching the same lessons year after year to be tedious, and she feels that each year new students are less interested in the subject than the previous ones. As I teach the same group of students in my lessons, I asked them what they liked about the statistics lessons in general and what they would like to change. The students admitted that the lectures in statistics were tough and boring, and that even with effort, they were not able to pass the exam. Based on the feedback from both my colleague and the students, it appears that there may be additional underlying issues that need to be addressed.

I discussed this issue with my friend who teaches at another university, and she suggested a potential solution. At her university, they have a system of shadowing colleagues in their classes. The system is voluntary and is based on a personal agreement between an active teacher and a "shadow" teacher. The shadow/observing teacher sits at the back of the classroom and just listens. This way, he/she can monitor better than the active teacher what the students do in each part of the lesson. After the class, the shadow teacher shares their observations with the active teacher, providing valuable feedback and suggestions for improvement. Moreover, the shadow teacher can learn from the active teacher and copy their methods in his/her lessons.

I asked my colleague, who teaches statistics, if I could observe one of her lectures from the back of the classroom. Although she was hesitant at first, she eventually agreed. At the beginning of the class, she told students what they were going to do that day. She added that she was sure they would be bored and not pay attention as usual, but it was their problem. Then she started her lecture by presenting the material using a word document filled with formulas. However, she made an effort to provide real world examples for each formula, explaining their practical applica-

tions and relevance. After the explanation, she instructed the students to apply the formulas to their own data using Excel.

Many students struggled with this task, and my colleague stayed at her desk offering assistance only to those who asked for it. After about 20 minutes some students finished the task while others were still working. Those who finished, started to use their mobile phones or chat with others which increased the noise level in the class. I noticed that some students were stuck but did not ask for help, and my colleague was unaware of their difficulties. Eventually, my colleague became frustrated with the noise and asked the students to show her the results. Nobody replied at first. When she confronted some students individually, some of them tried to answer while others admitted they did not have the result. With the class nearing its end, my colleague assigned the remaining calculations as homework.

After the lecture, my colleague and I went to lunch. She expressed her frustration with the students for talking during the class even though they had not completed the task. I asked her if she thought it would be possible to make some adjustments in her lecture. I suggested that she should avoid starting the class by telling the students they would not be interested in the topic. Next, she could create a PowerPoint presentation with visual aids to make the material more engaging. I offered to help her prepare the presentation. Another suggestion I had was to have students do the calculations manually rather than using Excel. This would eliminate any issues with using the programme and could also help the students better understand the formulas by writing them down by hand.

Finally, I suggested that my colleague could walk around the classroom while the students were doing their calculations. If she noticed a student who was not working, she could approach them and offer assistance. Initially, she was not willing to implement all of my suggestions, but after a month she told me she had tried some of them and could see an improvement. I also incorporated some of her teaching methods into my lectures, using explanations and highlighting the connections between our respective subjects. It seemed to resonate with the students, who were satisfied that they had already known something beforehand and could see the connection and continuity of the material taught in our respective lessons.

2.16. Financial motivation

Another possible way to motivate teachers is through performance-based pay, a system commonly used in the private sector. In 2014, The US government introduced performance-related pay, in which a teacher's salary progression is tied to their success in the classroom (*Department for Education*, 2016). The success is defined by the school or authority's appraisal schemes. However, the effectiveness

of this approach is debatable. A study by Sutherland et al. (2018) found that 64% of teachers surveyed did not believe that bonuses were an appropriate way to incentivize extra effort. There were also concerns about the fairness and accuracy of the evaluation process. Are you a better teacher when students have better knowledge of the topic or when they are more satisfied with the lessons?

Kelley and Kimball (2001) found that while money was initially a strong motivator for professional development, its importance diminished over time as other factors became more significant.

Another important factor to consider is the overall level of financial compensation for teachers. In low-income countries, the status of teachers has declined in recent decades, and inadequate pay has been identified as a major obstacle to providing quality education (Libent-Mabagala and Bilantanye, 2019). A report by UNESCO (2015) on the state of education in Asia found that teachers' salaries in public schools have increased over the past decade. Okumbe (2001) argues that job satisfaction and motivation are crucial for the continuing growth of educational systems around the world, and that these factors are closely tied to the level of professional knowledge and skills among educators.

The study concluded that for financial incentives to remain effective as motivators in the long term, it is crucial to manage other related variables, such as fairness, equity, and transparency in the distribution of rewards. A teacher is more likely to feel fairly treated if they perceive the ratio of their inputs to outcomes comparable to that of their peers. The study of more than 500 teachers found that:

- teachers and administrators report that they are highly unmotivated and concerned about the fairness of their compensation, particularly with regard to salary and benefits,
- most teachers and administrators receive a salary and benefits, but few have received other forms of financial support, praise or recognition,
- teachers and administrators find their salary and benefits unfair,
- the most motivating aspect of their work is inservice training and continuous professional development.

Teachers and administrators alike are eager to collaborate more with their colleagues and receive more feedback and encouragement from their superiors. On the other hand, some studies have found that financial incentives are not the primary motivator for teachers. A study by Shikalepo (2021) found that financial incentives had contributed little to the performance of learners in rural schools. Instead, teachers were motivated by factors such as being connected to nature in

rural areas, lower living costs, supportive school leadership, and community care. *The Accelere! Project* (*USAID*, 2016) explored non-monetary performance-based incentives for improving teaching and learning. The results showed that male and female teachers had different preferences, with men valuing appraisal and power while women preferred flexibility in schedules to allow for more time with their families.

2.17. Collaborative opportunities

The workplace environment, relationships with colleagues, and overall job conditions are also important factors that affect teacher motivation. Studies have shown that favourable workplace conditions are associated with higher levels of job satisfaction among teachers (Lee et al., 1991; Mueller et al., 1999). Research on teacher professional development by Tran et al. (2020) found that favourable workplace conditions greatly enhance teachers' knowledge and teaching practice. All of these refer to the social capital of a school/university which cannot be created or changed quickly. Building a positive social environment requires cooperation among all staff members and effective leadership. Teachers see "collaboration with their colleagues as an important resource for exercising professional agency through actively developing teaching practices" (Eteläpelto et al., 2015).

Fulton and Britton (2011) claim that when teachers work and learn together in teams, they can build the collective capacity necessary to create a culture of success that improves school performance and student achievement. Cooperation with colleagues (locally, within schools, or peripherally) can help teachers develop new ways of teaching. They come up with new ideas and monitor the success of their efforts, discuss outcomes, and reflect critically on their teaching practices (Butler et al., 2004). A good example might be the professional development of starting teachers. Teacher preparation programs usually include workplace practice. By working alongside experienced teachers, new teachers gradually assume more central roles while developing their skills through reflection-on-action. A key factor for new teachers is the development of their identity as a teacher which motivates and shapes their learning processes. New teachers are not just passive recipients of knowledge but also actively contribute to the development of teaching practices. Such collaborative communities can generate teaching innovations (Butler et al., 2004). features of collaborative learning (le et al., 2018):

- it is a set of teaching and learning strategies promoting student collaboration in small groups,
- its aim is to encourage students in their own and each other's learning,

- to achieve this purpose, teachers organize different types of collaborative activities in their classroom.

The main characteristics are (Dicke et al., 2015):

- cooperation with pupils,
- a pleasant classroom climate,
- feelings of enjoyment and self-efficacy,
- enthusiasm and commitment to the profession, which may prevent teachers leaving jobs.

The *Emotional Support* domain considers the overall emotional tone of classroom interactions as:

- either positive, warm and respectful,
- negative, stressful and marked by conflicts.

The teaching through interaction model highlights the interactions between teachers and students as a core task of a teacher's work. The factors having impact on classroom climate are (Alonso-Tapia and Ruiz-Díaz, 2022):

- school climate,
- teachers' motivational variables related to students,
- students' motivation.

When cooperating with students in classrooms, Butler et al. (2004) suggest:

- to identify learning goals,
- to establish approaches that will help to achieve desired outcomes,
- to provide feedback on progress and self-assess performance,
- to revise teaching approaches.

One of the main challenges that students face is a lack of collaborative skills (Le et al., 2018). This is usually a problem among younger children than among adult students. According to Gillies and Boyle (2010), designing appropriate group tasks, composing groups, and managing class time are key challenges in this regard.

2.18. Self and external validation

A crucial factor in teachers' motivation is an appraisal by:

- other colleagues,

- head teacher,
- students,
- parents,
- satisfaction with teaching outcomes.

This satisfaction should be based on the ability to critically evaluate one's own performance or accept external feedback. Self-evaluation is the primary method for personal and professional development. In general, the intent is:

- to set the goal a person would like to reach in a defined period of time,
- to evaluate if the goal has been reached after a stated time period.

Not less important is:

- the identification of reasons for failure in reaching the goal,
- finding the obstacles,
- finding ways for overcoming and solving the obstacles.

One advantage of self-assessment is the "internality" of such evaluation. If you have not succeeded in reaching your goals, you do not have to be afraid to admit the negative outcome as there are no unpleasant consequences, such as a negative evaluation from your boss or a loss of respect from your colleagues. On the other hand, there are also some disadvantages:

- the objectivity of the evaluation – individuals may be more lenient towards their own mistakes or failures,
- certain level of stress (both positive and negative) resulting from potential appraisal or penalty could be motivational for some people,
- another person may have different knowledge, experience, skills and ideas that could help you solve problems.

A useful method of external evaluation can be coaching and/or mentoring. There is evidence that coaching can improve both teacher performance (e.g. skills and teaching practices) and students' outcomes (Cornett and Knight 2008; Speck and Knipe 2001). From the theoretical point of view, there are many types of coaching and mentoring (Ali et al,2018). One of the possible categorization is the differentiation into:

- *directive coaching*, where the coach leads as an expert and focuses on predetermined practice or strategy,

- *reflective coaching*, which is focused on collaboration of the coach and teacher for reflection while the balance between both is believed to be most conducive.

Cohen et al. (2018) observed that coaching had a significant impact on teachers´ perceptions of student behaviour and their ideas for addressing perceived behavioural issues. Based on this finding, they suggest that novice teachers can improve their skills through coaching, rather than having to learn everything *on the job*.

2.19. Online teaching. How to keep teachers motivated?

The *Covid-19* pandemic that began in 2019 forced the world to shift most activities to a virtual environment. While there has been a significant amount of research on student motivation during online learning, less attention has been paid to the motivation of teachers in this context. The role of the teacher was (Ma et al., 2021):

- to familiarize themselves with the digital methods,
- to work with new online programs,
- to deal with administration,
- to try to keep students motivated.

While the unsatisfactory academic performance of a student was identified as the major factor associated with the online teaching / learning situation, teacher motivation has emerged as one of the priorities in remote learning. An analysis by Juwait et al. (2022) focused on the motivation of physics teachers as an important component in ensuring effective learning. To maintain this motivation, it is necessary to understand the factors influencing the motivation of those involved in the educational system. The results show that teachers have a high level of technological pedagogical content knowledge, commitment, and motivation for implementing online teaching and learning methods. Several factors were found to have a significant relationship with and influence on the teachers' motivation to implement online teaching and learning methods, such as:

- commitment to school,
- commitment to teaching, and
- commitment to profession.

These findings contradict the study by Rasmitadila et al. (2020), who found that teachers were less motivated to implement online teaching and learning which was because teachers find face-to-face meetings more enjoyable. This was coupled

with technical problems with equipment and difficulties in adapting materials to online processes. In conclusion, motivation and commitment are interrelated in a teacher's performance. According to a study by Gurung (2021), the ways to increase students' motivation and self-confidence to handle the situation are:

- creating an enjoyable environment,
- talking to students during online teaching,
- building a relationship with students.

Even if more than 20% of respondents of this study believed that teaching online classes is more difficult than classroom teaching, almost half of the respondents enjoyed flexibility of time and place. Teachers were forced to prepare and present the teaching content in a more impactful manner as they had to implement new teaching. Motivation is the one of the most important factors having an impact on the result of every activity and if the result is adequate to the effort put in, it can be highly motivating. This *snowball* effect also has implications on personal well-being and overall quality of life. The teaching profession can be fulfilling and joyful as well as exhausting and stressful. The more motivated the teacher is, the better results can be expected from their students, which increases their chances to obtain a good and meaningful job in the future. While there is a wealth of research and resources available on this topic, simply having knowledge of these techniques and issues does not ensure internal motivation. However, understanding these concepts can help individuals find their internal, personal motivation, which is ultimately the most useful and meaningful outcome.

Chapter 3

Assessment and evaluation of students' work

Given the complex and uncertain nature of any evolutionary process, humanity is progressing in its transformative journey and it is inevitable that education too will undergo change. Therefore, it is imperative to ensure a meaningful teaching approach that is focused on the teaching-learning process and thus flexible. There is no longer any doubt that when students are given the opportunity to take responsibility for their own educational process, they move from being passive recipients or consumers to active agents (Bovill et al., 2016; Alcalá et al., 2019). Not only do students become active, but they move from the simple concept of responding to tasks to a path of developing a metacognitive awareness of science, concepts, concerns and the meaning of learning (Bovill et al., 2016). Humanity needs competencies and values that enable individuals to collaborate effectively and contribute to positive change towards a more sustainable and inclusive society. There is a need to reflect on the role of educational communities, to understand how active learning methods can be used, to change the assessment system and thus contribute to the transformation of the school institution itself.

3.1. Assessment vs evaluation of students' work

Assessment: Assessment is the process of collecting information about a student to aid in making an evaluation of the student's progress and development (Roger, 2006).

Evaluation: Evaluation involves making judgments about the quality, value, or worth of a response, product, or performance based on established criteria (Roger, 2006).

Evaluations are usually based on multiple sources of information and can be used to inform students, and their parents/guardians where applicable, about the progress they are making towards attaining the knowledge, skills and attitudes to be learned; and to inform the various personnel who make educational decisions (instructional, diagnostic, placement, promotion, graduation, curriculum planning, program development, policy) about students (figure 30).

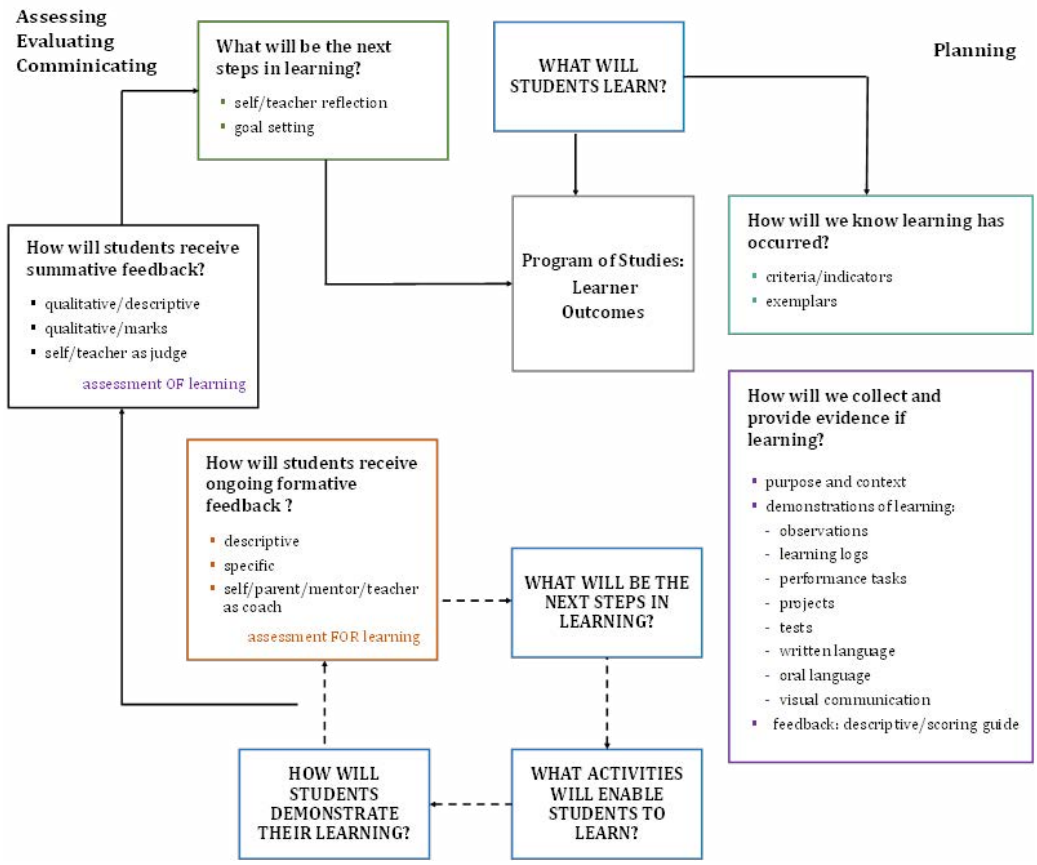

Figure 30. Different types and concepts of assessments

In the classroom, assessment generally serves one of three purposes:

- Assessment of learning;
- Assessment for learning
- Assessment as learning

Before starting a course, it is desirable for the teacher to recognize the students' knowledge. A diagnostic evaluation must be conducted to assess the students' strengths, weaknesses, knowledge and skills. Based on this data, teachers can better plan their lectures/courses not only in terms of content, but also in terms of methodology (Alcalá et al., 2019).

Abduh (2021) highlighted the importance of feedback in enhancing the effective-ness of the assessment process in online learning during the COVID-19 lock-

down. He pointed out that teachers engaged in online instruction often lack the skills to provide instant and constructive feedback. Khan & Jawaid (2020) divided online methods of assessment into synchronous or asynchronous. Synchronous online assessment can include auto-scoring and feedback quizzes, simulations, or presentations. Asynchronous online assessment can take the form of e-portfolios, reflections, projects, or assignments (figure 31).

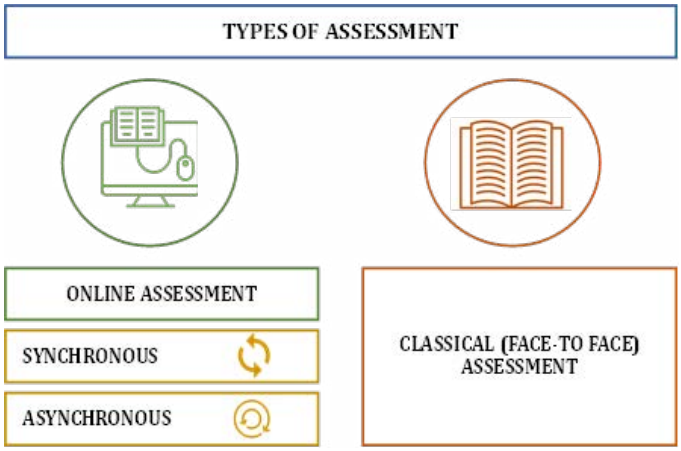

Figure 31. Types of assessment

It is important to emphasize that the main objective of assessment is not to give a grade to the student but to provide information for both students and teachers that aids them in navigating the teaching-learning process successfully. Therefore, it is important to clarify the difference between evaluation and classification corresponding to the former in order to determine a classification of the student's academic performance at the end of a process (Sadler, 2005). Students' perceptions of assessment methods play a significant role in this discussion (Struyven, Dochy & Janssens, 2005). According to these authors, students' perception provides justification for assessment practices and assessment methods in the current learning environment.

Sokhanvar et al. (2021) bring *the concept of authentic assessment* to increase the synchrony between assessment tasks and professional life, which is why the concept has gained popularity in higher education. Authentic assessment is defined by Gulikers et al. (2004) as *an assessment that requires students to use the same competencies, or combinations of knowledge, skills and attitudes, that they need to apply in the criterion situation in professional life* . For Alcalá et al. (2019) the concept means *the adopted assessment techniques, instruments and activities being clearly applied in real learning situations, activities and contexts*.

Lines and Gammie (2004) also bring *the concept of high-risk assessment* as one that can change the course of a candidate's life in some way, as with the final qualifying exams. The assessment criteria should describe the context of the actions/activities (e.g. preparing a business plan for a specific client) and only what is essential to demonstrate that the student has achieved the learning outcome. It is important to measure the effectiveness of learning and responses to instruction as well as long term benefits. Long Term benefits can be determined by following students, or by changing student behavior. The successful learning of these subjects should be reflected in the students' professional life, according to the definitions of Alcalá et al. (2019) the concept means *the adopted assessment techniques, instruments and activities being clearly applied in real learning situations, activities and contexts*.

3.1. The importance of co-creating assessment criteria: building collaborative networks

Model of co-creation

In this model, the teacher invites students to study their criteria carefully, and not to create the assessment or develop the criteria from scratch. In these cases, the construction of a culture of understanding of the criteria is built. It is important that whenever students are asked for their opinion, they are prepared to take it seriously (Sackstein, 2016, Sackstein, (2017) and the transparency of the process is unquestionable (Bovill et al., 2016). Staff–student partnership "is a dialogic relationship which is sustained by mutual trust and respect" (Deeley & Bovill, 2017).

In case when a teacher creates high-quality assessment with clear criteria, why is it necessary to include students? Is their own teaching experience not sufficient? Sackstein, interviewed by Gonzalez (2021), claims that including students in the process has several advantages.

- A teacher can have excellent ideas but not know how to communicate them appropriately to their students. Including students in the process can alleviate the issue of lack of clarity on the part of the teacher.
- Establishing the criteria together (teacher in cooperation with students) allows teachers to better understand the areas where students already feel confident and those where they still require assistance. This aspect can benefit the academic success rate.
- Students' ability to self-assess improves. Students need to be active participants in the process to fully understand marking criteria. If this happens, and students use discussion and collaboration to build together the criteria,

they create an academic community of practice in the sense of "the creation of a learning space where students can mentor each other" (Meer & Chapman, 2015 p. 6). The partnership, according to Meer & Chapman (2015), empowers students by giving them ownership of the criteria which are then used in a peer- and a self-assessment exercise.

How can the creation of collaborative networks be accomplished?

A good practice for high-quality assessment might be to spend some class time analyzing the proposed task, developing the success criteria, and only starting the task. It may also be beneficial to anticipate a lesson plan or task for the next les-son, which gives students time to take ownership of the subject matter and to think how to assess their learning about that subject (Sackstein,2016).

If there are teachers who consider engaging students as partners in learning and teaching to be a positive measure (Cook-Sather, Bovill, and Felten, 2014), then others have long been worried about giving over control to students (Bovill et al., 2014).

According to Bovill et al. (2014) certain questions may arise, including:

- is the contribution meaningful if students do not have the knowledge of the subject?,
- what should be the negotiation limit with students?, and
- can we ensure quality in this model?

According to Bovill et al. (2014), although there are different disciplinary and institutional contexts, concerns and challenges can be overcome in many cases, particularly through mutual help between members of the academic community who hold varying levels of experience, knowledge and decision-making power. Therefore by initiating, supporting, sustaining, or extending student-staff part-nerships, everyone can contribute to enhancing learning and teaching for all in higher education (Bovill & Felten, 2016).

Authentic assessment activities

A systematic review of the literature led Sokhanvar et al. (2021) to suggest that authentic assessment activities help students to

- improve communication,
- improve collaboration,
- improve critical thinking,

- improve problem-solving skills.

The intertwined way in which these aspects relate to and feed each other, en-hances technical skills, communication, and joint responsibility (Waldron, 2017), and improves confidence, development of reflectiveness and self-awareness in learners (Sokhanvar et al., 2021). This was also demonstrated by Alcalá et al. (2019) when they analyzed the impact of using formative and shared or co-assessment systems on the acquisition of transversal competencies in higher education. These authors confirm the impact of this type of assessment on autonomous work, interpersonal and intrapersonal skills, reflective and critical communication skills, and also metacognitive skills such as organization and planning.

Although the various studies that have been developed present particularities and have to be viewed in a certain specific context, they must encourage higher education lecturers who are interested in implementing assessment methods in their modules or courses. For this to happen, it is important to consider the participation of students in the assessment process and to remind that formative and shared or co-assessment in higher education cannot be effective without the use of a set of active and participatory teaching and learning methodologies that ac-tively involve students as part of the process. And, as pointed out by Vandas (2021) in https://www.thecorecollaborative.com/, "To be immersed in deep learning is an empowering experience, and Co-Construction of Success Criteria allows learners to move from being knee-deep in trying to determine expectations to being knee-deep in growing their brains".

3.2. Assessment methods and measures to judge student learning

Changes in learning theory should be considered as primary since they have im-plications for changes in curriculum and assessment methods. In this sense, in order to develop a framework for the most suitable assessment methods and techniques, it is important to first define the learning theory that justifies the form and purpose of the assessment method that is being used by the teacher. Although not discussed in this paper, this is of utmost importance since it provides a mutually reinforcing set of ideas that shape current thinking and practice.

Assessment methods

Assessment methods are the techniques and tools for gathering information about students' progress and the extent to which they have achieved the desired learning outcomes. These methods should enable teachers to evaluate student work openly and fairly and they should help provide constructive feedback to students and offer

a clear justification for the assigned grades (RRU, 2022; Prashanthi and Vijetha, 2019).

There are seven types of assessment methods: Diagnostic assessment, Formative assessment, Summative assessment, Ipsative assessment , Norm-referenced assessment, Criterion-referenced assessment, Grade-based assessment.

Diagnostic assessment

Diagnostic assessments can help benchmark student progress (Fan et al., 2021). Consider giving the same assessment at the beginning and at the end of the unit so students can see how far they have come. This type of assessment provides the information you need to understand student knowledge and engage the entire class.

Some examples of **game-based learning platforms** that engage students and could be included here are:

- Short quizzes
- Journal entries
- Student interviews
- Student reflections
- Classroom discussions
- Graphic organizers (e.g., mind maps, flow charts, KWL charts)

Formative assessment

Formative Assessment takes place during instruction and learning with the following objectives:

- To inform students, on an ongoing basis, about their progress towards achieving the intended learning outcomes as set out in the programs of study.
- To identify the gains and difficulties students are experiencing in what they are being asked to learn or perform.
- To provide specific, descriptive, and meaningful feedback.
- To motivate students to learn by providing feedback on a continuous basis.
- To monitor student performance toward the expected learning outcomes as set out in the programs of study
- To adjust instruction on the basis of the findings where necessary (Schildkamp et al., 2020).

Formative assessment enables you to monitor the growth and evolution of student knowledge in your classroom in real-time. Just because students made it to the end-of-unit test, does not mean they have mastered the topics in the unit. Formative assessments help teachers understand student learning while they teach, and provide them with information enabling them to adjust their teaching strategies accordingly. Meaningful learning involves processing new facts, adjusting assumptions and drawing nuanced conclusions (Ismail et al., 2022).

Some examples of formative assessment tools include:

- Portfolios
- Group projects
- Progress reports
- Class discussions
- Entry and exit tickets
- Short, regular quizzes
- Virtual classroom tools like Socrative or Kahoot!

Summative assessment

Mahshanian et al. (2019) and Ismail et al. (2022) highlighted the significance of summative assessment in conjunction with teacher-based (formative) assessments on the learners' performances. Summative Assessment takes place after an instructional segment (e.g., group of integrated lessons, unit, reporting period, grade) with the following objectives:

- To describe the degree to which each student has achieved the learning outcomes as set out in the programs of study.
- To analyze assessment information and results obtained from assessments conducted for each instructional segment.
- To understand each student's progress and achievement at the end of the instructional segment.
- To inform future instructional planning.
- To synthesize assessment information and results obtained from assessments conducted for each instructional segment for the reporting period. This forms comments and grades, which summarize the student's strengths and areas of need, to be communicated to students and their parents/guardians at the end of the reporting period.

- To evaluate the effectiveness of the instruction used during the reporting period (Ismail et al. 2022).

Summative assessments measure student progress as an assessment of learning. Standardized tests are a type of summative assessment and provide data for you, school leaders and district leaders (Ismail et al., 2022).

Try creating assessments that deviate from the standard multiple-choice test, like:

- Recording a podcast
- Writing a script for a short play
- Producing an independent study project

Ipsative assessment

Ipsative assessment can be incorporated into your classroom by using:

- Portfolios
- A two-stage testing process
- Project-based learning activities

One study on ipsative learning techniques found that when it was used with higher education distance learners, it helped motivate students and encouraged them to act on feedback to improve their grades.

Norm-referenced assessment

Norm-referenced assessments are tests designed to compare an individual to a group of their peers, usually based on national standards and occasionally adjusted for age, ethnicity or other demographics. Norm-referenced assessments include:

- IQ tests,
- physical assessments,
- standardized college admissions tests like the SAT and GRE.

Criterion-referenced assessment

Criterion-referenced assessments compare the score of an individual student to a learning standard and performance level, independent of other students around them. In the classroom, this means measuring student performance against grade-level standards and can include end-of-unit or final tests to assess student under-

standing. Outside of the classroom, criterion-referenced assessments appear in professional licensing exams, high school exit exams and citizenship tests, where the student must answer a certain percentage of questions correctly to pass.

Grade-based assessment

Assessments of learning are usually grade-based and can include:

- exams,
- portfolios,
- final projects,
- standardized tests.

They often have a specific grade attached to them that communicates student achievement to teachers, parents, students, school-level administrators and district leaders. Common types of assessment of learning include:

- summative assessments,
- norm-referenced assessments,
- criterion-referenced assessments.

New approach for assessment

- *Description of the prototype and benefits to the prospect*

Assessment system suitable for on-line systems based on knowledge packages (compulsory + optional). At the beginning of the year, students themselves propose which grade they are working towards. The CUBE is a system of method assessment which consists of 3 boxes. Students have a choice of 3 levels of difficulty. This way, e.g. students who are very active do not end up in demotivating groups. There is also the possibility to change the group, once during the course the student can move to another group:

- small box (compulsory on-line lectures–recorded 20- minutes lectures available online)–students resaved minimum grade–3.0);
- medium box (compulsory on-line lectures connected with optional scientific papers as an additional knowledge–the student chooses 5 of 10 papers, which should be read). Students receive medium grade–4.0);
- big box (compulsory on-line lectures connected with optional scientific papers as an additional knowledge–the student chooses 10 papers, which should be read before dialog session). Students receive maximum grade 5.0).

Dialog–students who decide to receive medium (4.0) or high grades (5.0) are obligated to attend a dialog session (Oxford debate method). Project–students who decided to receive high grades are obligated to prepare a project, which will include knowledge gathering from lectures and dialog sessions. Benefits–direct (on-line/ face-to face) teacher – student contact, involvement, subjectivity and co-responsibility for the outcome, flexibility over time. Possibility to include also ' withdrawn' students in active study (figure 32).

- *What needs to be in solution?*
  - internet connection at university (CUBE),
  - basic materials (films, lectures),
  - small groups of up to 15 people.
- *What could be in the solution?*
  - professional e-learning platform,
  - professional teaching materials,
  - modernized classroom,
  - time flexibility.

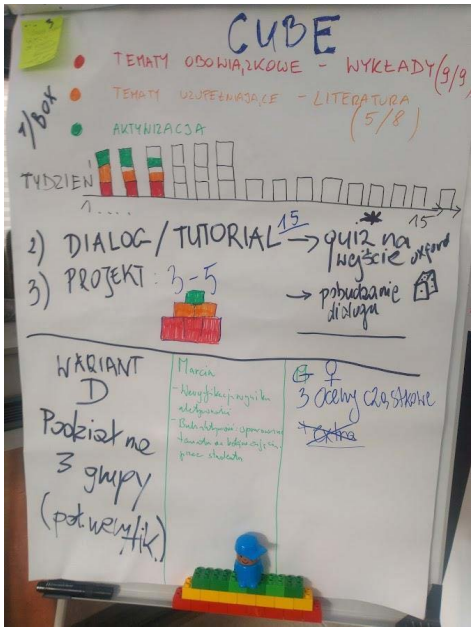

Figure 32. Poster of students from University of Agriculture in Cracow–workshop Design Thinking Assessments

3.3. Classification of assessment depending on the needs of the teacher

Assessment in classrooms (face to face)

The purpose of assessment in classrooms is to help students learn and to improve instruction rather than to rank students or to certify the end products of learning (Shepard, 2000). Students are engaged in collaborative conversations and tackle extended real world problems in order to involve them directly and more deeply in their own learning, increasing their confidence and motivation to learn by emphasizing progress and achievement rather than failure and defeat (Stiggins, 2001; Chappuis and Stiggins, 2002). This provides students with opportunities for monitoring and communicating to others their progress, and taking more responsibility for their learning process. According to Shepard (2000), the substance of classroom assessments must be congruent with important learning goals, since assessments must mirror important thinking and learning processes. This form of assessment aims to help students take the next steps in learning rather than to judge the end points of achievement. In this sense, it is primarily formative in nature, since students participate fully in creating the goals, analyzing assessment data, and developing a plan of action to achieve the next goal (Clarke, 2001*).*

Peer-to-peer learning

It allows classes to be more interactive, as students explain to each other the concepts under analysis and work on solving the questions developed in the informative/ evaluation form (Durão and Raposo, 2020). Peer assessment is suggested as an alternative assessment method that can be applied in higher education (Şahin, 2002). It is also considered a technique to support collaborative learning, as it facilitates the process of learning in a structured way and allows students to critique and provide feedback to each other about their work (CTI, 2021). Thus it provides skills for self-assessment and self-improvement. Durão and Raposo, (2020) stresses the importance of punctuality and staff involvement in an effective peer review process. As more peer-reviewed quality measures are carried out, learning will become more effective. Hanrahan and Isaacs (2001) report and conclude that higher education students felt they benefited from performing self-assessment and peer assessment, based on the inductive content analysis of the benefits and problematic aspects in a study conducted on students' perceptions of the benefits and problematic aspects of self-assessment. These authors defined eight general dimensions: difficulty, a better understanding of the score, discomfort, productivity (including learning benefits and improvements work), problems with implementation, reading the work of others, developing empathy, and motivation.

Self-assessment/reflection

Self-assessment is the ability of a student to judge his/her performance, that is, to make decisions about themselves and their abilities. Despite the fact that there are a number of definitions of the term self-assessment, Noonan and Duncan (2005) argue that they are quite general. For example, Rolheiser and Ross (2000) define self-evaluation as *students judging the quality of their work, based on evidence and explicit criteria for the purpose of doing better work in the future*. The authors Rolheiser and Ross (2000) stress the importance of teacher training and professional development to help them better understand and implement effective practices that are important elements of formative assessment.

Work-based assessment methods

Work-based learning is centered on discussion-reflection that occurs around work practices. The emphasis is placed on collective learning through action and/or problem-solving, regardless of whether it is for a small task in a classroom or a deeper working time and project. Learning through work is based on the concept of collective intelligence and views the creation of knowledge as a shared, collaborative and collective activity. These assessment practices value all individual knowledge and skills and put the critical collective reflection and work on all the individual aspects. Depending on the duration and level of work required , students can remain in unalterable groups or, alternatively, work in different groups. In the latter case, it is customary to start by thinking individually, then discuss the issue in a small group and later expand to a larger group. There may even be more than one assessment of the final product.

Objective tests (e.g., multiple choice, true-false, fill-in-the-blank items)

Teachers need to help students understand how objective testing can be designed to test their knowledge at different levels (Pusateri, 2009).

Written work/output (e.g. term papers, lab reports, critiques)

This form of assessment facilitates student command of a specific area and provides practice in the critical skill area of writing. Students should receive feedback from the teacher to apprehend the progress in their understanding of the topic. Writing projects should be tailored to the developmental level of the student. For example, formal term papers typically work best in advanced courses. It should adopt a style sheet based on APA writing conventions that can help students practice consistent format strategies (Pusateri, 2009).

Posters

Can be used to hold students accountable for their independent projects, reducing the grading burden compared to writing projects. Posters also provide opportunities to integrate communication skills (e.g., writing, graphics, oral defense and presentation) and can incorporate team effort. In addition, expert judgment and peer review can be facilitated with predefined criteria. It is recommended that the students use provided models or performance criteria as this will facilitate better outcomes. Poster sessions can be scheduled within classes or across classes as a departmental event. Awarding best of show may be a helpful strategy to enhance motivation among the best students (Pusateri, 2009).

Oral presentations (e.g. debates, role plays)

Success in oral presentations will depend on several elements (Pusateri, 2009): providing guidance and structure beforehand; normalizing speaking discomfort and pointing out that overcoming those fears can happen only through practice; specifying and sticking to set time limits; circumscribing topic areas or requiring topic approval; coaching regarding the use of support technologies; and developing appropriate performance criteria.

Experimental Laboratory

Hands-on, in general, means learning by experience (Holstermann et al., 2010). This can happen in both natural and social sciences. Experimental labs can thus refer to practical activities in the field of biology or chemistry, for example, but also to social laboratories. Laboratory events are created for research purposes (Strong, 1971). While in natural sciences, the articulation between problem-solving and experimentation allows the use of directed investigation strategies, which increases the elaboration of a didactic strategy to improve understanding of the contents (Goi and Santos, 2020), social laboratories promote the meeting of knowledge, facilitating changes in ways of thinking and acting, and contributing to individual and social transformation. They can be considered a basis for transdisciplinary and collaborative work (Vasconcelos et al., 2020). As the authors point out, *a social lab cannot be correctly evaluated by only looking at the outputs (products, such as actions, strategies). As part of a lifelong educational (transformative) process and contributing to socio-ecological literacy, the outcomes (e.g. trust, intellectual capital) can be furthermore important and lasting*. The various assessment techniques described can, in the end, also be used as evaluation tools insofar as the teacher can use the elements gathered from them to produce a quantitative final result, that means a final grade.

Quality of the assessment

Gardner (2012) formulated a set of principles that he believes underlie a quality assessment:

- all types of assessment must promote learning because, in fact, assessment makes sense only if it is at the service of learning, hence the need to be useful,
- assessment methods must be able to promote improvements in all important learning objectives, which implies that their results are easily reported,
- assessment procedures should include explicit processes that ensure that the information resulting from the assessment is valid and reliable,
- assessment should promote everyone's knowledge of the relevance of current and future learning goals to students,
- the products resulting from formative assessment should be treated as approximations and never as absolute certainties, taking into account that it is possible to make mistakes that could not be avoided no matter how careful you are in this regard,
- assessment should be integrated into teaching, enabling students to understand the scope of what they are learning and how the quality of their acquisitions will be judged,
- evaluation methods should promote student involvement in learning and assessment,
- assessment should enable and motivate students to show what they are capable of doing.

Assessment should combine different types of information, including self-assessment carried out by the students, in order to allow the triangulation of varied information from different sources, enriching the feedback that reaches the students. According to Wiliam and Thompson (2007), there are three essential conditions for proper evaluation in order for learning to occur:

- establishing where the learners are, taking into account the learning already achieved;
- establishing where they should arrive;
- establishing how they should get there.

Additionally, they identified five key strategies that should be at the base of the formative assessment to be implemented, taking into account the various roles that exist in the formative context: teachers, students, student's peers. The strategies will be developed according to table 2.

LEARNER /STUDENT	WHERE SHOULD HE/SHE ARRIVE?	WHERE IS HE /SHE NOW?	HOW TO GET THERE?
TEACHER /TRAINER	Clarify and share learning intentions and success criteria (1)	Make students' learning visible through tasks such as problem solving or working in small groups (2)	Keep students informed about their performance through useful and timely feedback, including guidance to continue their learning (3)
STUDENT´S PEER	Provide students with arguments that allow them to carry out peer assessment activities and respective feedback (4)		
STUDENT	Train students to be leaders in the construction of their learning (5)		

Table 2. Key strategies for the formative assessment

Formative assessment is not limited to observation, but it triggers pedagogical intervention (regulation) for teaching and/or learning. It is intended to help the student, and also the teacher himself, by giving feedback through multiple information (Council of Chief State School Officers–CCSSO, 2018). Occupying an important role in the learning and teaching process, formative evaluation accompanies the student's qualitative evolution, providing feedback that informs about the learning achieved and supporting the teacher's action in the selection of other teaching practices that allow the student to overcome the diagnosed difficulties.

Case study–Assessment Tool

Please calculate the final category mark (out of 5) by averaging the scores of all the items included in the category. Record your assessments in the spaces provided and indicate a total performance mark out of 10.

Category I – Responsibility for Own Learning

Rate your student on each item below by selecting the number that corresponds to the assessment scale. Please include comments and examples to support your assessment.

ISSUE	EXCELLENT (5)	VERY GOOD (4)	GOOD (3)	BELOW AVERAGE (2)	POOR (1)
MOTIVATION AND ENTHUSIASM	Motivation and eagerness to learn and to optimize the learning experience; Interest and enthusiasm in approaching work tasks. Degree to which the student takes responsibility for his/her learning objectives.				
WORK HABITS	Reliability in preparing for and completing tasks. Regularity of attendance and punctuality; Diligence in following instructions. Adherence to good safety practices, and appropriateness of appearance and presentation. Responsibility in meeting commitments made to the mentor and placement organization.				
INITIATIVE/ SELF-STARTING ABILITY	Initiative to accept responsibility, to seek new challenges, assignments and projects, to increase his/her level of knowledge and skill, and to assume ownership of his/her role in the workplace. Initiative in ongoing communication and collaboration with mentor (e.g., initiating placement performance evaluation(s) in a timely and effective manner).				
OPENNESS TO SUGGESTIONS /CRITICISM	Student's ability to learn from others, to accept suggestions and criticism positively, and to modify behaviour in response to feedback.				

Table 3. Rate of responsibility for own learning

Category II – Competence in Placement Activities

Rate your student on each item below by selecting the number that corresponds to the evaluation scale. Please include comments and examples to support your assessment.

ISSUE	EXCELLENT (5)	VERY GOOD (4)	GOOD (3)	BELOW AVERAGE (2)	POOR (1)
KNOWLEDGE BASE	Degree to which student demonstrates and uses relevant knowledge and skills in completing placement activities. Student's understanding of his/her duties and role in his/her placement position				
ORGANIZATION AND PLANNING	Degree of organization and planning for placement activities. Ability to manage time on tasks and complete work in a timely manner.				
COMMUNICATION SKILLS	Ability to communicate information and ideas in both writing and speaking in a manner that is clear, grammatically correct and appropriate to the audience. Ability to express own ideas and opinions openly using language that demonstrates respect for people and their differences. Ability to listen to others' ideas and opinions with an open mind.				
QUALITY OF WORK	Quality and effectiveness of student's performance in carrying out assigned tasks.				

Table 4. Rate of competence in placement activities

Obstacles of on-line evaluation and assessment

Virtual contexts and the emergence of new ways of learning have definitely contributed to the rethinking of assessment strategies. It is common to use various forms of assessment, from online multiple-choice tests, quizzes, participation in electronic forums, online group work (Tinoca et al., 2007) to blogs and e-portfolios (Gomes, 2010). Likewise, practices of self, hetero and co-evaluation have been developed (McConnell, 2006). This new *assessment culture* is characterized by emphasizing certain aspects such as: authenticity, that is learning situated in contexts that are real and linked to professional life; group work based on social interaction and feedback, which is essential in communication and higher-order thinking processes; the self-regulation of learning by the student who defines and negotiates the tasks (McLoughlin and Luca, 2001).

The research underlines that virtual learning contexts have contributed to enhancing students' self-regulation skills, in particular metacognition (Vovides, et al., 2007). Practices in these contexts can bring a set of benefits related to the possibility of immediate feedback and greater involvement of students through the interaction and reflection provided by online forums. These practices materialize in forms such as essays, reflections, oral presentations (podcasts), digital narratives (storytelling), and artifacts (individual or group), which are very demonstrative of how a stimulating and regulatory formative assessment can and should be carried out. According to Osman (2020) the assessment of students performance in online environment remains to be a challenge to both teachers and students, particularly the assessment of practical skills.

Chapter 4

Work organization

When organizing work, it is important to not only define the structure and content of the training program, which serves as the reference framework for a degree or course, but also to specify the methodological procedures that will guide the teaching-learning processes. This implies that after establishing the competences a student should acquire in relation to specific subjects or training content, it is necessary to determine the activities and experiences that will enable them to achieve these competences as a result of the learning process. Developing a training program also implies specifying the methods and procedures through which students can achieve the proposed learning outcomes. In accordance with the approaches that inspire the process of European Convergence, the scenarios and methodologies of university teaching must undergo a profound renewal. In contrast to the classical didactic positions centered on the classroom and the activity of the teacher, today teaching that is centered on the autonomous activity of the student is advocated, which means that both the planning and the carrying out of the teaching-learning processes must be conducted from this point of view.

4.1. Modalities of the traditional teaching–learning process

When establishing a teaching methodology, it is important to define the various approaches that can be used to help students acquire the knowledge that is required. These approaches vary in terms of location, purpose, tasks, and resources needed. We will focus on two modalities: theoretical and practical classes, including laboratory, field, and classroom settings. While theoretical classes are often used in higher education, they may not promote autonomous learning. Practical classes typically lack clear definitions but often specify the number of students.The use of modalities can aid in organization by assigning tasks to faculty, allocating spaces, and setting schedules. Therefore, when designing the methodology, it is important to consider both the subject content and teaching methods in order to structure the curriculum and optimize the students' learning experiences. It is essential to classify and define modalities due to variations in terminology based on disciplines, local traditions, and teaching methods. For example, the terms lectures, classroom lectures, and large group sessions all describe similar organizational models, which allows for a variety of methods to be used. The table below shows each of the modal-

ities considered, includes a short description of each, and highlights the communicative purpose of the modality from the teacher's point of view.

Table 5. Modalities of the teaching-learning process

	MODALITY	DISTRIBUTION SCENARIO	PURPOSE/DESCRIPTION
CLASSROOM HOURS	THEORETICAL CLASSES		**Speaking to students:** ▪ expository, explanatory and/or demonstrative sessions of content (presentations can be by the teacher or student, etc.)
	SEMINARS WORKSHOPS		**Building knowledge through interaction and activity:** ▪ supervised monographic sessions with shared participation (teachers, students, experts, etc.)
	PRACTICAL CLASSES		**Showing how students should act:** ▪ any type of classroom practice (case studies, diagnostic analyses, laboratory problems, field laboratory, field class, computer classroom)
AUTONOMOUS WORK	STUDY AND GROUP WORK		**Making students learn from each other:** ▪ preparation of seminars, readings, re-search, papers, reports, data collection and analysis, etc. to be presented or delivered in class through the work of the students in groups

4.2. Organization and development of a theoretical class

From an organizational point of view, the development of a theory class involves the management of a *communication process that is carried out for a specific purpose and in the specific context of a class. Although each teacher has a particular way of approaching and managing this task of talking to the students*, we can exemplify in general terms the elements common to all communication or exposition, namely:

A. The intentions or purposes that the teacher sets out to achieve in a class or lesson. Although these are usually formulated in general terms for a subject or teaching unit, it is important to establish specific objectives for each particular class in order to guide students' learning;

B. The information the teacher sends to the learners. Messages transmitted through various forms of communication (verbal, non-verbal, extra-verbal, audio-visual,

etc.) In order to enable learners, gain the knowledge, skills, competences and attitudes they are aiming to acquire. Hence the importance of the resources used and how they are used;

C. Reception and recording of information by the learner. Learners' response to the teacher's messages by activating mechanisms to attend to, select and memorize the information received in class over the short, medium and long term;

D. Learner response to messages received. Reactions generated in each student from the messages issued by the teacher, and which involve both the activation of cognitive processes the development of activities as a consequence of the lesson given;

E. Assessment of student learning and teaching activity. Finally, the teacher must evaluate both the objectives they intended to achieve with the lesson and the manner in which the lesson was conducted. This evaluation should logically have consequences for future lessons.

According to this model there are five factors that determine the effectiveness of a theory class. Three of them depend on the teacher (A, B and E) and two on the student (C and D). Logically, there is an obvious connection between them, since the way the teacher performs the task will influence the response of their students. These factors, in turn, constitute the frame of reference that we can use to evaluate theory classes from the perspective of both the learner and the teacher (Franchuk and Prydacha, 2021; Lawrence, 2019; Westhoff et al., 2002).

4.3. Organization and development of seminars and workshops

Seminars vary greatly in terms of their organizational modalities, which can differ both across fields of study and structures. A fundamental seminar structure generally entails three phases:

- engaging participants,
- indepth study,
- integrating new knowledge and commitment.

This model is applicable to both brief and extended seminars, with a focus on fostering the development of students' skills and knowledge rather than discrete moments. Effective teaching necessitates teacher-student interaction, rigorous teacher training and preparation. Organizational factors to consider are the distribution of student groups, size, session frequency, duration, and room layout based on task types. Case studies, problem-based learning, and group projects are several

methods that can be utilized. Methods for promoting communication and activating groups comprise subgrouping, role assignment, brainstorming sessions, symposiums, and panel discussions. These techniques can encompass individual work, pairs, small groups, or whole-group collaboration.

During seminars, teachers may function as participants, moderators, or observers using specific approaches. Key competencies include effective communication, group management, integration of theory and practice, and the promotion of reflection and critical thinking. Students take an active part in acquiring specific competencies through reading, writing, demonstrations, and debates. Evaluation is based on predefined indicators that are shared by the instructor at the beginning of the seminar (Soloveva et al., 2020)

4.4. Organization and development of practical classes shops

During practical classes, the teacher's role may range from actively taking part, demonstrating previous knowledge applications, solving problems, or illustrating exercises to offering advice and guidance and overseeing students' post-explanations. Practical classes are an appropriate organizational method for various teaching methodologies, including problem-solving, problem-based learning, case studies, and cooperative learning. Consequently, the selection of a methodology can result in considerable differences in the roles of both the teacher and the student, as well as the internal organization of the session (Basmanova et al., 2020; Okrepilov et al., 2020).

Besides their duties in theoretical classes, instructors of practical classes must complete particular responsibilities related to planning, implementation, and assessment. During the preparatory phase, instructors choose and design demonstrations and create assignments, such as problems and exercises, for students. If needed, they will also create laboratory or field manuals. Instructors may collaborate with other teachers, notably if many are involved, given that these hands-on sessions typically sup-plement theoretical coursework. Instructors lead planned demonstrations or monitor students as they complete assigned tasks during the sessions (Ualiyeva and Murzalinova, 2016). Brown and Atkins (1984) distinguish five levels of activities according to four key characteristics: the existence of objectives, methods and predefined solutions established by the teacher and the provision of materials and procedures. These activities include:

- demonstrations (designed to illustrate theoretical principles that have been developed in lectures. tasks are carried out by teachers and/or students),

- exercises (highly structured experiences designed to achieve specific results. students follow precise instructions),
- structured enquiry (students must select and develop their own procedures and provide their own interpretations. it requires problem-solving skills and the use of tools and instrumentation),
- open-ended investigation (a problem situation is formulated which requires the student to identify the problem, formulate it clearly, develop appropriate procedures for its resolution, interpret the results and consider their implications).
- Projects (the situation and problem are selected or identified by the student. they are usually associated with large scale experiments or investigations and allow for an indepth study of a specific topic).

4.5. Organization and development of practical classes shops

Johnson and Holubec (1999) long ago formulated the most characteristic and important components that define or distinguish effective cooperative learning:

- positive interdependence (each member clearly perceives the link with peers in such a way that one cannot succeed if all the others do not. Some of the strategies to achieve this goal may include:
  - joint incentives (each group member gets extra points if all peers reach a high level of achievement),
  - distribution to each group member of different elements (resources, information) that are only really useful when shared,
  - assigning complementary roles (secretary, moderator, animator.) to different members of the group);
- individual responsibility: each learner is not only responsible for his or her own learning but also for that of his or her peers;
- face-to-face interaction: the dynamics of the task implies continuous and direct interactions between members;
- inherent small group skills: the learner must acquire, develop and use basic group work skills;
- evaluation of results and processes: the group must develop activities for reflection and evaluation of group work.

In terms of resources, this organizational modality poses some challenges to the traditional structure of our classrooms and centers. This involves arranging

seats that support collaboration in small groups, tables that allow mobility and classrooms with good acoustics. The optimal sessions should range from two to three hours. Accomplishing successful group work requires addressing potential issues such as frustration and free-riding behavior. Initiating early discussions regarding students' expectations and ideas for group work facilitates the establishment of effective codes or rules of operation. To build confidence in their new roles within the group, students require initial activities that create a sense of security and familiarity with the group dynamics, promoting balanced participation and leadership.

The implementation of these principles can have a multitude of variants. Two widely recognized cooperative group work techniques are:

- *Jigsaw* or *Puzzle*. Elliot (Aronson is the most renowned author of this approach (*http://www.jigsaw.org/overview.htm*). The strategy is to form small groups of five or six members. Each student works on an aspect and meets with peers from other groups who are also responsible for the same aspect. Together they develop that aspect and then bring it back to their original groups);
- *Student Team Learning* – STAD (Its main author is Robert Slavin. It is notable for its simplicity and applicability. The teacher provides information to the students on a regular basis. Each student prepares and studies these materials with the goal of enhancing their own understanding and assisting the learning of their classmates. They are assessed individually from time to time, but will only be reinforced if all members of their group have reached a certain level of competence).

In group work, teachers serve a variety of integrated roles, including that of a facilitator, boosting students' confidence in autonomous learning and problem-solving. They also serve as role models, demonstrating positive cooperative skills. Teachers act as monitors and observers, identifying and resolving issues while reinforcing positive performance. Additionally, they serve as *evaluators*, offering uninterrupted feedback on the progression of group work. It is essential that group members assume diverse roles that rotate among them. The practice of these roles is imperative to the learning process. Every group has three critical roles: coordinator, secretary, and facilitator (Escudero, 2000; González, 2003; Slavin, 2020).

4.6. Organization and development of practical classes shops

This subchapter will offer advice on group formation in three key topic areas: group classification, group dimension and group configuration.

Group classification

Collaborative learning groups come in various forms, customized to specific objectives, activities, and timeframes. These attributes are interdependent, resulting in the categorization of groups as informal, formal, or base (Badger, 2021; Bourke et al., 2018; Matthews et al., 2012):

- informal groups are formed randomly and spontaneously, commonly uti-lized in face-to-face classes as brief pauses from lengthier tasks. For example, a teacher may pause class and direct students to briefly collaborate in answering a question, solving a problem, or brainstorming ideas. Informal groups can be formed frequently with new members at each session;
- formal learning groups, which are designed for more complex objectives, may last from a single class period to several weeks, depending on the task's complexity, such as writing a report or preparing a presentation. Forming formal groups necessitates conscientious and deliberate selection of members, as their aspirations are centered on attaining mutual objectives, capitalizing on diverse skill-sets, and optimizing learning opportunities for all participants;
- base groups are established for an extended period and collaborate on di-verse assignments over the academic year. Their primary aim is to offer members with support and motivation as they cooperatively progress towards an overarching objective. Learning communities, for instance, are a type of foundational group identified by integrating curricula, offering team teaching, and possessing institutional support.

The selection of group type ought to correspond with the group's intention, the type of project, and the projected timeframe for completion. Melding multiple group types throughout a semester is widespread. For instance, the use of base groups primarily may be effective, yet introducing variety by occasionally switching to informal groups with different members can be advantageous. Informal groups could be preferable for shorter sessions, while formal groups could be established for more extended projects. The critical aspect is aligning the group type with the desired outcomes and the completion timelines of the task.

Group dimension

Collaborative on-site groups typically consist of two to six students. Pairs often prove effective, especially for brief interactions such as during an interrupted lecture when minimal disturbance is desired. Small groups, particularly those consisting of two or three members, can be advantageous early in the semester as they encourage participation and simplify scheduling meetings (Endeley and Zama, 2021). The size

of groups in face-to-face classrooms may be influenced by factors such as physical facilities or the nature of the learning task. For example, science and computer labs or large classes may necessitate groups of two or three members.

Although group size can be affected by various factors and preferences, Bean (1996) contends that a group size of five is the most effective. He notes that groups of four tend to divide into pairs, while groups of three often split into a pair and an outsider. As they become larger, logistical challenges emerge, and the experience tends to dilute, although groups of six can still work reasonably well. Generally, advocates of collaborative learning suggest that groups be small enough for full participation and trust-building, but large enough to ensure diversity and access to the resources required for completing the learning task.

Group configuration

Groups can be formed through random selection, learners' choice, or the teacher's discretion. Group membership can be based on shared interests, abilities, attitudes, or other relevant characteristics. Additionally, groups may be either heterogeneous or homogeneous in terms of their composition. Research generally supports the use of heterogeneous groups in education, as they provide individuals with exposure to diverse ideas, backgrounds, and experiences, leading to enhanced educational value and productivity in multidimensional tasks (van Dijk et al., 2020; Vuopala et al., 2019).

However, there are disadvantages to using heterogeneous groups, including students potentially feeling uncomfortable with differing opinions and tensions arising from disagreements. Placing female or minority students in groups based solely on diversity may result in their isolation and hinder their academic success, potentially leading to marginalization and stereotyping (Felder et al., 1995; Lu et al., 2012; Rosser, 1997; Sandler et al., 1996). Additionally, when heterogeneous grouping is based on academic achievement, low-achieving students may not have enough opportunities to demonstrate leadership, whereas high-achieving students may miss out on interactions with peers who can provide academic stimulation.

Homogeneous grouping can offer distinct benefits for certain types of learning activities. This approach can help students with similar characteristics to feel more comfortable discussing sensitive or personal topics (Brookfield and Preskill, 2005). This method can be effective for mastering highly structured skill-building tasks because learners share a similar level of knowledge. This approach may also be well-suited for language learning or the acquisition of specific content that requires reinforcement of similar knowledge or skills (Cooper et al., 1990; Johnson and Johnson, 1984; Lee and Ihm, 2022). Additionally, students typically pre-

fer collaborating with peers who share similar characteristics, leading to increased satisfaction with learning ac-tivities conducted in homogeneous groups. However, homogeneous groups may lack the diverse range of perspectives and interactions found in heterogeneous groups. Decisions regarding group composition should align with course objectives and learning goals. When group membership lacks a clear rationale, teachers may choose to employ random assignments or mix groups periodically during the course. This approach creates both homogeneous and heterogeneous groups at various times.

4.7. Organization and development of the student's study and autonomous work

When planning the teaching and learning of profound subjects like knowledge, several crucial factors must be considered. These factors encompass establishing interdisciplinary connections to enhance comprehension of the topics, fostering the ability to apply knowledge across diverse contexts, and purposefully designing pedagogical techniques and procedures. This approach necessitates deliberate and intentional teaching methods. It is vital to instill awareness of the cognitive, emotional, and interpersonal aspects of learning. Additionally, meticulous planning for the gradual transfer of control to students is imperative, enabling them to take increasing responsibility for regulating their own learning. Blended learning systems have revolutionized education, emphasizing the significance of independent study and self-directed work by university students. Empowering students to achieve their learning goals goes beyond teaching them universal learning methods and techniques. It requires careful consideration of the task's nature, the learning environment's demands, and individual student resources. Notably, the teacher's instructional approach plays a pivotal role in shaping the development and application of learning strategies.

The teacher acts as an intermediary between the content and the constructivist undertakings of the learners. All pedagogical interventions strive to develop self-sufficient individuals who can effectively adjust to changing conditions and requirements within their environments. On occasion, these learners are even capable of generating their own contributions as autonomous practitioners. The responsibilities of educators promoting autonomous learning encompass defining and rationalizing the structure of autonomous teaching and learning, providing essential subject matter information, guiding the design of students' learning paths, supporting their autonomous learning journey, continually assessing processes and outcomes, and overseeing practical applications by students. Educators should establish well-organized websites or platforms specifically designed to distribute subject guides, stu-

dent work guidelines, relevant documentation for formalizing learning agreements or projects, supplementary materials, potential student contributions, discussion forums, and collaborative spaces. Such resources are crucial for cultivating autonomous learning among students.

Learners must take responsibility for their learning experiences, demonstrating accountability and self-regulation. Autonomous and strategic learners perform various tasks, including assigning importance to new information, identifying their unique learning needs, and setting specific learning objectives. Maintaining motivation at the outset and throughout the learning process is essential for students, who should also strive to boost their self-assurance simultaneously. Creating a practical work plan for one's educational path is critical. This involves searching for, selecting, critically evaluating, and synthesizing relevant information encompassing the subject matter and the skills one aims to enhance. Strategic learners actively and intentionally build their knowledge by acquiring, refining, and applying cognitive and metacognitive strategies in unison. It is essential for self-reflection to be conducted on the learning process in order to understand one's preferred learning style. Students should create a learning portfolio, establish a supervisory relationship with their mentor, and regularly evaluate themselves during and following the learning sequence. Ultimately, learners must take ownership of their own accomplishments and draw valuable lessons from their errors (Bernard, 1995; Colen I Riau and Giné I Freixes, 2004; Endeley and Zama, 2021; Monereo and Pozo, 2003; Slavin, 2020).

4.7. How to transform the traditional teaching-learning process into a digital one

In order to deliver digital content, it is important to consider the fundamental and essential competencies required for the development of the skills of different trainers. This rigorous working methodology contributes to the improvement of students' perception of the designed teaching. In general, the following five capacities are considered essential:

- the capacity to understand and facilitate individual and group learning processes,
- the capacity to design educational programs,
- the capacity to manage one's own learning (learning to learn),
- the capacity to cooperate successfully in a team,
- the capacity to communicate meaningfully with others.

This pedagogical approach aims to facilitate the identification of diverse learning needs, thereby providing a framework for preparing students for any profession at vocational level. The intention is that readers will reflect on their own manner of teaching and successfully enrich it by applying other criteria. The Moodle platform allows for a high level of interactivity through the use of discussion forums, media sharing, article analysis, critical reflection and web-based interaction with the tutor, the invited technical experts and the participants. Regarding e-lecturers, we recommend the following three steps to facilitate a successful transition to e-learning teaching, such as:

- be on time, make sure that all students are able to log on to Moodle at the beginning of the course,
- be present, it is important to be active on the course platform minimum a few times each day and contribute to the discussions,
- create a good atmosphere, students need to feel comfortable online.

4.8. Capacities and skills for e-lecturers

- process facilitator (facilitating the range of online activities that are supportive of student learning),
- adviser/counselor (working on an individual/private basis, offering advice or counseling learners to help them get the most out of their engagement in a course),
- assessor (concerned with providing grades, feedback, validation of learners' work, etc.),
- researcher (concerned with engagement in the production of new knowledge relevant to the content areas being taught),
- content facilitator (concerned directly with facilitating the learners' growing understanding of the course content),
- technologist (concerned with making or helping to make technological choices that improve the environment available to learners),
- designer (concerned with designing worthwhile on-line learning tasks),
- manager/administrator (concerned with issues of learner registration, security, record keeping, etc.).

4.8. Managing conflicts during e-learning

Case study 1:

Inactive students online. Students can be inactive for many reasons. It is fundamental to identify the reason why the students are not participating. This is critical

especially at the beginning of the course, when high participation will result in high motivation. When a student is not active, the e-lecturer should promptly contact the student directly and privately to ask why he/she is not participating.

Case study 2:

Students with restricted time. This is a case of students with limited time available for the course. In an online course, the diversity of students is very high. Below is an example of an answer from a student with restricted time for the course in reply to the e-lecturer's emails:

Dear Professor,

I think that I'm so far behind already that it will be difficult for me to catch up at this point in time. My current work-life balance does not allow me to book time during the workday to follow this course, so it has to be in my spare time. However, I've realized that I don't have that much spare time available right now -maybe when the kids are older? It really bugs me, because I think the course is very interesting and e-learning is a good concept. But I can't invest the needed amount of time into it right now–unfortunately! I would like to continue to have access to the course-material, if that is possible.

Best wishes,

Answer from the e-coordinator:

Dear X,

I can understand that it is very difficult to integrate family, work and studies. We understand that you are busy and we are very glad that you have tried the course and that you demonstrated a good engagement in the e-lessons. So far you have passed 10 e-lessons, that is good! I think that if you continue passing 3 e-lessons for each e-module you will have a good chance to pass the course. You are of course welcome to continue reading in the discussions, and if you have something to add to the discussions you are also very welcome. In this way you can also prepare for the final exam if you want to try it.

It would be great if you continued with the course.

Best regards,

Case study 3:

Pandemic situation. Recently, a global pandemic has forced people to stay at home, leaving online learning as the only option for education. The pandemic has left students in a position of uncertainty and anxiety that could lead to them

dropping out due to mental health concerns. However, online learning can be used in such cases as a safe space for students to distract themselves from their concerns. It is therefore important that online space is interactive and engaging with feedback from peers and teachers to keep students' attention until the end of the course.

4.9. The capacity to facilitate individual and group learning processes

It is widely recognized that the teaching relationships developed between students, and the roles assumed by teachers, are crucial in higher education, as well as in other educational environments at any level. Teaching relationships also include the way in which learners relate to each other, although tutor-student relationships are the most important link in the learning process (James and Pollard, 2011). A meta-analysis confirms that positive teacher-student relationships are associated with optimal learning, with above average levels of cognitive and behavioral outcomes (Cornelius-White, 2007). The manner in which a teacher interacts with students sets the stage for learning that follows. Teachers consider their relationships with students to be central to effective teaching and learning. The characteristics of effective teacher interactions include:

- knowing the students, knowing which students need the most attention,
- mutual respect (respect for each other's opinions),
- good rapport (listening, high expectations),
- building trust,
- behavior management (so that the whole group has the opportunity to learn),
- humor, used appropriately and without sarcasm,
- relaxed atmosphere (relaxed learning with a fun element),
- active learning, such as during tasks or projects (offers many opportunities for teachers to build relationships with students).

During active learning, the role of the teacher can assume a variety of forms including that of a demonstrator, mentor, organizer, reflector, coach, facilitator and even co-learner. A relationship of trust is likely to be established between the teacher and learners as they work together and discuss issues at different stages of the task, so that the teaching partner becomes an 'accomplice' in the learning process rather than the knowledge base (Ualiyeva and Murzalinova, 2016).

4.10. The capacity to design educational programs

For those involved in the design of new educational programs, it is important to have a good understanding of the models commonly used in the construction of learning programs. How teaching is delivered will be strongly influenced by a range of both circumstantial and educational factors. Modeling is a prescribed structured sequence, designed to elicit a specific type of thinking or responses, in order to achieve particular learning outputs. However, it is very helpful for teachers to fully understand the concept of a teaching model and the main characteristics of the many existing models. The choice or use of the suitable model, or a combination of models, depends on the type of learning objective and the nature of the learner, as well as other considerations such as teaching strategies and competences. A solid body of research and practice suggests that the consistent use of specific models can increase the overall effectiveness of learning (Hattie, 2009; *Department for Education and Skills*, 2005; Kholmurzaev et al., 2020; Mcanally-Salas, 2005).

The concept of a *teaching model* appears to have been used to describe many other approaches. Various terms are used interchangeably in different documentation: models, strategies, techniques and methods, to mention but a few. Teaching models are not the 'real world', but simply a way of helping in our understanding and conceptualization of teaching. A large number of teaching models exist–some are variants of others and they come in many shapes, sizes and styles. Some terminology, such as *demonstration*, can be used for both a teaching model and a strategy or method. To differentiate between a teaching strategy and a teaching model, the definition of a teaching model has two distinguishing features. The first distinguishing feature is the nature of the learning objective and the required outcome and whether the learning is associated with:

- acquiring and learning skills, procedures, knowledge and the like,
- information processing, construction of concepts and rules, generation and testing of hypotheses, and creative thinking,
- collaborating and learning together to generate new knowledge and understand concepts.

The second feature is the structured sequence of steps or phases (the syntax) employed to reach that specific learning goal. In teaching models, a model is defined by the close relationship between these two aspects. In contrast, teaching strategies do not share the same link and can be more broadly displayed as an essential element of a teacher's repository for achieving a set of learning outcomes. The term 'teaching model' is also used in vocational teaching and learning to describe other, different concepts. However, if these concepts are lacking the distinction between

the two particular characteristics mentioned above, then they are not what is understood here as a teaching model. When developing teaching models in the context of vocational education, it is useful to analyze teaching models in order to find the commonalities and differences between the models. This could guide teachers in selecting or adapting a teaching model or a combination of models. There is a set of appropriate questions to answer for each teaching model. If adapted, it might serve as a useful base for further work on vocational learning (Kerka, 1997; Soloveva et al., 2020; Zhang and Collis, 1995). Four aspects are proposed below:

- aspect 1–*teacher aspects*:
  - how easily can the model be operated by the average vocational teacher?
  - how much does the model save teaching time (including class preparation time)?
  - how probable is it that the model will be accepted and used by the average teacher?
  - to what extent does the model make use of the teacher's profession-al knowledge or competence?
- aspect 2–*learner aspects*:
  - what degree of initiative is given to learners within the model?
  - to what extent is the model adapted to individual learners?
  - to what extent can the model be adapted to different age groups of learners?
  - how far can the model be adapted to different types of learning objectives?
- aspect 3–*flexibility and adaptability*:
  - how easily can the model be adapted to the current organizational system in the vocational field and to existing standards for learner assessment?
  - how well can the model be adapted to a variety of vocational set-tings?
  - is it possible to combine the model with other models?
  - how well is the model compatible with cultural expectations about the behavior of learners and teachers?
- aspect 4–*theoretical and Technological supports*:
  - has the model been developed using an appropriate theory?
  - what research and evidence are available to demonstrate the internal validity of the model?
  - in what ways could technologies and media support the model?

- are the most appropriate technologies and media available for the model?

This model analysis structure could provide a good starting point to identify which teaching models are most suitable for education and to determine the relevant aspect of each of the teaching models.

4.11. The capacity to direct learning

Direct teaching, one of the 'traditional' ways of teaching, is particularly effective in helping learners acquire skills. This highly structured approach is characterized by a strong level of interactivity, teacher-led instruction, and direct communication, typically with the whole class, although it can also be implemented with an individual or a small group of students. Direct teaching is most effective among the range of teaching strategies, though this may be partly because 'direct teaching' resembles a *Russian doll* that includes many other strategies such as active learning, revision and homework, so there is an additive factor (Kivunja, 2015). This often implies direct input from the teacher, coupled with a modeling or demonstration strategy and clear instructions to the students. The teacher then checks the learners' skills or understanding, gives guided practice and, finally, the learners carry out independent practice. Programmed learning is a self-directed, self-administered program (e.g. computer-based) that is presented in a logical sequence and with plenty repetition of concepts or skills. The sequence of activities (syntax) would be as follows.

The session starts with all students in the same phase and the teacher uses direct instruction:

Step 1:

In the first session, the teacher logs on to the computer with the screen visible to the students on the wall and the students log on to their computers. The teacher draws a square first, as this is the easiest. The teacher clicks on the line tool and asks the students to find the line tool and click on it. The teacher draws a line of a specific length, 30 mm. As the teacher demonstrates, he/she describes what he/she is doing.

Step 2:

Students select the tool and draw the 30 mm line and then a square.

Step 3:

The teacher quizzes the students and checks their progress, guiding them if necessary.

Step 4:

Once they feel more confident, students practice drawing squares of different sizes on their own.

The teacher shows the tools needed to draw a circle and the sequence of steps is repeated. The session advances step by step until all the tools and skills are covered. When a student gets stuck, the teacher sits next to the student, picks up the mouse, shows and describes what to do, and asks the student to do exactly the same thing. If the student makes a mistake, the teacher then explains what is wrong and makes the student repeat the task correctly. The student practices until he/she has acquired the necessary skills and the teacher does not pick up the mouse again, but can point to the main screen or ask the student a question if necessary.

Physically guided direct teaching

In a design session, the teacher provides physically guided direct teaching to help students acquire the learning task of modeling skill mastery. Regarding the context, the session is held in a workshop. The teacher is equally concerned about his relationship with the student. The teacher clearly understands the problems of personal contact and invasion of personal space, so he/she makes sure that he/she has the student's consent for physical contact. The teacher guides the student and gradually withdraws support, a process described as *scaffolded* learning. The sequence of activities (syntax) would be as follows.

Teacher has previously given a modeling exercise.

Step 1:

The teacher asks the student if he/she minds if he/she leads his/her hands; the student accepts (the teacher points out that if the student had objected, he/she would have not done so).

Step 2:

The teacher holds both of the student's hands while starting to model because the student does not yet have fine motor skills.

Step 3:

The teacher tells the student that he/she is going to take his/her hands away gradually and that she wants him/her to continue (the teacher explains that if he/she had

taken his/her hands away without warning, the student would have raised his/her hands).

Step 4:

The teacher removes his/her hands and the student continues modeling without help.

The teacher comments that this is a controversial technique, but that it is an effective way of teaching someone to model. The teacher points out that they often hold the mold too far away from the work. Teaching them the correct distance is important, as the apprentice needs to operate safely.

Direct teaching by demonstration

There are several ways of applying the direct teaching model. The model presented here is known as the "PAR" model: "Present, Apply and Review", which is a structured version of skills that could be applicable to many vocational areas. It consists of three basic stages: presenting new material, applying this new learning (*student activity*), reviewing the skills learnt in this lecture. In this session, the teacher uses a didactic model of direct teaching and the strategy of demonstration as a tool to introduce new material and reach the learning objective of acquiring technical drawing skills. The syntax would be as follows.

Step 1:

The teacher sketches a drawing on the blackboard. This is done in phases to teach students how to make a technical drawing.

Step 2:

Students copy the sketch in stages following along as the teacher progresses through each stage of the drawing.

Step 3:

Once the students have finished their drawings, the teacher explains what they have copied, approaches each student and gives feedback, praising good draw-ings and pointing out where they need to improve.

The teacher emphasizes the importance of knowing how to draw so that the learner can see exactly what the specialist technician intends to do.

4.12. The capacity to cooperate successfully in teams

Strategies for group and individual learning

Teachers use their competences to decide how to manage the learning process. This section includes activity-based learning through the use of strategies such as pair work, working in small groups, working in whole groups and working individually. Many of the strategies described could be used within teaching models focusing on group and cooperative learning and belong to the group of *social* teaching models. Group work and cooperative learning can shift the responsibility for learning from the teacher to the student.

Pairs

Pair work is a powerful way of promoting positive learning experiences that works alongside a range of other ways of learning. Pairs can be formed by the student, by friends, randomly or by the teacher based on abilities, both similar and diverse. For a role-play situation, the teacher utilizes his or her knowledge of students to facilitate successful pairings. This can be used to encourage the development of communication and social skills, as well as group cohesion. Sometimes pairing a more able student with a less able student can benefit both, as can pairing two students with complementary skills. Pairing can also be used to develop other aspects of learning, such as attention to appropriate detail in planning. Peer explanation enhances understanding of learning for both the receiver and the person explaining. It can be very helpful for some students as a complement to the teacher's information. Helping peers can also serve as a role model to demonstrate that something can be done and to motivate others.

Small-group works

The division of the whole group into smaller groups can be done in many ways and is common in vocational training. Apart from the curricular learning aspects of group work, there is also the social interaction and motivation linked to group work. Small group activities include:

- producing a presentation in which each person has a role to play,
- making an assignment, such as a questionnaire, or constructing something through group discussion to formulate ideas, decisions or content for assignments,

- groups competing against each other through contests, for example, to promote learning during assessment,
- carousel activity in which students move from one table to another,
- individual meetings for group work,
- working in groups on a project, followed by an individual version,
- at the end of a workshop, reinforcement of learning through questions and answers,
- role-playing in small groups can be a valuable tool for reinforcing learning, as explained in the example below, role-play can also be used in a larger group, with some individuals watching and others playing their roles.

Whole-group work

Group activity can take many forms:

- discussion on a given topic facilitated by the teacher, possibly following a presentation or demonstration,
- formal or informal debate,
- games,
- whole group activity following an individual, pair or small group activity to share a topic/activity: for example, individual research followed by a whole group discussion in which participants move around a room, relocating to different corners of the space to answer questions or vote on a specific topic.

Conducting a whole-group activity can involve both advantages and disadvantages, as illustrated in the following example. As all students work at more or less the same rhythm, it becomes easier to keep track of them and control the group, but then some members of the group may be dependent on others and it is harder to ensure that everyone has clearly understood the material. The next example is a domino game in which each student has a card with a word and a description of a different word. The idea is to match up the dominoes so that the words and their descriptions are next to each other.

Individual work

Self-directed learners often engage in many other forms of learning. In the case of group learning, part of the learning will involve the student writing, researching or reading. There may be individual work which is then exchanged with others for pair work. Students may complete an audit sheet while doing an individual task, such as

installing software on a computer. Working individually can also replicate working in industry where individuals frequently complete tasks on their own. Learning outside the classroom/workshop, at home or in the library, is often an individual task. An example would be a *Computer Aided Design* (CAD) class where students work on their own to familiarize themselves and become proficient in using CAD to draw diagrams for construction. Although some collaboration would take place, this is essentially an individual task. While linking with employers can be a group activity, it is also something that students can complete independently. It enriches learning and provides experience of working outside the school room, and offers an insight into how the industry itself works. In this example, an entrepreneur wants to design a website and the teacher encourages students to complete the *work* from start to finish, including the initial contact.

Constructivism, group investigation

Group investigation intends to recreate a democratic classroom environment where students work together to solve a problem. The collective participation of all group members makes the outcome better compared to individual efforts. Group investigation empowers students to take charge of their learning and lets them do research that interests them most (Leeand Ihm, 2022; Sharan and Sharan, 1990; Slavin, 2014). Typically, this type of work organization involves the following six stages (Abordo and Gaikwad, 2005):

- a problem is posed to the students,
- students brainstorm possible ways to solve the problem,
- students plan how to carry out the research as a group and assign roles,
- students work together and individually,
- students analyze progress and communicate results, and the process is evaluated

The following example shows some of the elements of constructivist learning and group investigation, although it does not follow the model in its entirety. The learning objective is for students to be able to identify the country and era in which a particular carbon neutral management object is located. In a design history session, the teacher helps students to build knowledge about carbon neutral management and where in the world the objects are placed. At the beginning, the teacher builds on the students' current knowledge and experiences. He or she then introduces known and unknown concepts of carbon neutral management and organizes a series of tasks for students to build their knowledge of

both the location and the time period in which they were produced. By requiring students to make presentations, the teacher is able to assess students' new knowledge by reviewing their findings and asking questions. The syntax would be as follows:

Step 1:

To introduce the topic, the teacher provides students with a paper that gives an overview of carbon neutral management pieces and their location in time and space. He/she then leads a debate by choosing one of the destinations and asking if students have seen similar objects. The debate is divided between European and global attractions and includes carbon neutral management and objects such as the thrones of different monarchs which the students are familiar with, even if they have not seen any.

Step 2:

Teacher shows a short video of carbon neutral management–*Churchill's* rocking chair and indicates where it can be found.

Step 3:

The teacher provides students with an A4 copy of the world map and many brochures and magazines on carbon neutral management. The assignment is to find pictures of as many famous carbon neutral environmental artifacts as possible from the provided brochures, indicate their location on the world map, and make a presen-tation on a large sheet of paper. Students consult an atlas to identify the locations and the year.

Step 4:

Students have to investigate two interesting facts about each carbon neutral object to add to their presentations. They also have a carbon neutral management design guide to use.

Using debate in groups

This time, the teacher used a learning activity in the form of a discussion for the students to develop their concepts and understanding of the differences between two types of tools. This activity had a secondary learning objective: to develop the skills needed for a debate. In this way, the functional competences of communicating and listening were integrated into the activity. The sequence would be as follows:

Step 1:

The teacher provides each group of students with the specifications of differ-ent carving tools together with the advantages of each one.

Step 2:

Each group must agree on a way to present the advantages of the carving tool.

Step 3:

The teacher explains and writes the rules for the debate: listen, do not intrude, maintain eye contact, etc.

Step 4:

Each group has 5 minutes to discuss how to use their tool, and then the oth-ers have to find out the possible advantages and disadvantages of their tool.

Step 5:

The teacher leads the discussion and opens the floor for questioning. The teacher then uses his or her teaching skills to ensure that all students contribute.

Cooperative learning using scenarios

In cooperative learning, groups of students work in small groups to maximize their own and each other's learning. The elements of the cooperative learning teaching model are: clear and positive interdependence among students, face-to-face interac-tion, individual responsibility, emphasis on interpersonal and small group skills, and group review to improve effectiveness (Slavin, 2014; van Dijk et al., 2020).

The teaching model in this example has elements of cooperative learning and the strategy adopted is the use of a scenario. The learning objective of the lesson is, for instance, to use the information given in a scenario to develop a typical risk assessment. As part of the context of this session, learners are employees and the activity requires them to draw on their experience to identify risks in a carbon neutral man-agement workshop. The syntax would follow this form:

Step 1:

The teacher introduces the class and presents the scenario of a workshop that holds a number of tools and machines in which there are numerous hazards.

Step 2:

In groups of three, students complete the first two columns of a table, identifying what the hazards are, who can be harmed and how. They use their own knowledge and experience to do this.

Step 3:

Each group reports their findings in turn and all are combined into a single composite document. By the end of the class session, everyone has contributed: each group brings something different or a new perspective on things and the whole class has a more detailed document.

In this model, the teacher's role is to set the scene and the environment and then to guide the students, who take responsibility for working together and learning from each other.

Role-play

Role-play is a model that focuses on social interaction, the enhancement of social skills and the development of a personal understanding of values and behavior. Situated in Joyce's social family, the role-play model is rooted in both the social and personal domains of learning. The aim of role-playing is to help students understand an issue from different perspectives by acting it out, either by adopting different roles or by observing. It allows students to perceive a situation through the eyes of another person, to adopt another perspective and to empathize. Role play is an effective way to explore feelings, attitudes, values and for problem solving. It actively involves students and builds on their experiences. According to Shaftel (1967), role play consists of nine phases:

- warming up the group,
- selecting the participants,
- setting the stage,
- preparing the observers,
- acting out the role play,
- discussing and evaluating,
- reenacting,
- further discussion,
- sharing experiences/generalizing.

Each of these phases has a specific goal that contributes to enriching and focusing on the learning activity. According to Joyce and Weil (2003), role-plays offer the opportunity to 'act out' conflicts, gather information about social issues, learn to take on the roles of others and improve students' social skills. The pedagogical model of role-playing emphasizes both intellectual and emotional dimensions. The analysis and discussion that follows the role-play are as important as the role-play itself. The role-play didactic model can be found in all professional areas, however, it is less likely to be used in traditional carbon neutral management workshops. The example below is to learn about quality assurance and the teacher uses the role-play didactic model.

Step 1:

The trainer uses slides to introduce the topic of quality assurance and its benefits, followed by questions and answers.

Step 2:

The teacher divides the students into pairs and presents them a card with a scenario about performing quality assurance on a product. One of the students should be the employee and the other the customer. The teacher explains why the process is important and also the necessity of writing things down formally. He/she defines the roles of the two people involved in the role-play and gives clear directions on who should ask questions and on the constructive nature of the input.

Step 3:

All students perform the role-play in pairs.

Step 4:

The teacher provides a handout with a checklist for the quality assurance role-play. It consists of two columns: one with questions for the employee and one for the customer. Questions such as: *Did the customer check the quality of the product? Was the customer satisfied? Why?* are included.

Step 5:

The teacher asks the students for feedback regarding their impressions of the role play.

Step 6:

The teacher summarizes the session.

4.13. The capacity to communicate meaningfully with others

Presentation

Presentation consists of giving information in various ways, such as:

- explanation by the teacher, often at the beginning of the session: *this is what we are going to do, these are the goals of the activity*,
- giving information/instructions and checking that students understand them, for example, by asking questions,
- clear presentation of information at the beginning of the session and then linking to other teaching strategies: presentation followed by an immediate activity,
- involvement of guest speakers from the relevant professional sector,
- delivering information through different sensory modes: visual, auditory, kinaesthetic.
- delivering information through different media: video, blackboard, paper, workbook, actual demonstration, verbal explanation, question and answer and practical activity,
- short slide presentations to report, to recap a previous session, to introduce exercises or to structure a session.

Some teachers use *PowerPoint* presentations as a convenient way of structuring their sessions and as a memory aid to ensure they cover all aspects of the topic. The slides encompass the learning objectives of the session and instructions for tasks or activities, and can be printed out to hand out to students during or after the session.

Demonstration

The demonstration has the added dimension of an explanation by example, a kind of exhibition, often, but not always, accompanied by a verbal explanation. Generally, it is important to follow the demonstration with a related activity. The teacher can use a variety of technological means, for example:

- the physical display of a skill, such as how to hold and use a blowtorch, or how to disassemble and reassemble a computer.
- a way of showing how something is done and that the tools used are suitable for the job.
- demonstration of an activity, showing how to develop a planning process–for example, with a sample of what the end result might look like.

- using technology such as Moodle and/or Storyboard to show what is needed, as well as providing information to set the stage, and using Smart Board to demonstrate tasks such as setting up a board in construction.

When showing how to do something, make sure students understand that there are different ways to do things and that if the end result is satisfactory, then that's OK. With demonstration, impact is an important factor.

4.14. Technological strategies

Educational technology is the study and practice of facilitating learning and improving performance through the creation, use and management of appropriate technological processes and resources. The use of technology in the delivery of teaching and learning in any professional area is increasing all the time. It is also one of the ten approaches described by LSIS (*Learning Skills International School*) as effective in promoting successful learning. Examples of technology employed to enhance the teaching and learning processes include:

- interactive whiteboards,
- computer(s) in each learning classroom for a variety of uses,
- websites for storing and accessing student work,
- multimedia learning,
- m-learning (learning on the move, including the use of mobile phone),
- self-assessment software packages,
- computer-generated quizzes and games,
- internet research,
- podcasts,
- mobile phones.

Teaching organizations are transforming technologically at different rates. Some use cutting-edge technology, which is helpful for learner participation, and others are lagging behind. Funding is one of the issues, along with cultural change.

4.15. Learning reinforcement strategies

Opportunities for practice-repetition

Practice and repetition contribute to the recall of learning that has taken place. Opportunities for this can be provided in a variety of ways, for example through:

- repetition of practice regarding usage each time students use computers.
- practice combined with questions to memorize information.
- fostering discussion to ensure that everyone understands what they are doing and how they can go back to an example to help them in case of difficulty.
- students writing about what they have achieved to show that they understand what they have learnt and recognize the importance of being thorough, for example, writing a plan and being able to follow instructions.
- the teacher keeping track of each student as he/she progresses: the student should need less intervention with each repetition of a task.
- referring back to objectives to reinforce learning.
- recap sessions at the end of lessons to see what knowledge has been retained.
- weekly recap to ensure correct understanding, via Moodle, e.g. by creating cross-word questions, automatic marking and an assessment grid to show in-dividual progress.

Questioning

Effective questions can be used to reinforce learning and include a combination of low and high level questions for deeper learning, and can also be used to keep learners working and check their understanding (Jia et al., 2020; Redfield and Rousseau, 1981), such as:

- used at the beginning of a session and throughout the session to determine prior knowledge and links to previous organizers,
- used to check understanding and identify students who are not fully engaged with the assignment,
- used to encourage students' assessment of their work and learning through the use of appropriate questions asked in a variety of ways, mainly openended, and not just superficial, but going beyond the initial answer to dig deeper into the subject,
- used to check understanding by requesting a student who may not have fully understood: the teacher does not provide the answer, but challenges the student to solve it, involving other students to provide the answer if appropriate.

When asking questions, it is important to involve all students, not only the more confident and assertive ones who volunteer to answer questions all the time. Sometimes students prefer not to answer when they are uncertain. Questions can be used to move students towards the correct answer through a process of elimination.

Learning capacity building strategies

Helping students to learn more effectively or *learn to learn*, allows them to acquire knowledge and skills more efficiently, which is in itself a valuable life skill. The active control of the thought processes involved in learning is called metacognition. Activities such as mapping out how to approach a given learning task, monitoring comprehension and evaluating progress towards task completion are metacognitive in nature. Since metacognition plays a key role in successful learning, it is important for both students and teachers. Metacognition is often referred to as *thinking about thinking* and can be used to help students *learn how to learn*.

If the organizational culture in which learning takes place systematically cultivates habits and attitudes that help students to be confident in their own ability to learn and to be creative, students are likely to learn faster, be more focused, resourceful, imaginative and collaborative, so that learning can be more enjoyable. Activities that encourage effective learning and higher order thinking include:

- asking questions that encourage the development of imagination,
- assessment activities,
- researching in preparation for an assignment, especially with colleagues,
- tasks in which students have to reason and apply what they have learned in a way that involves higher-order thinking,
- considering new information and making sense of it,
- research and experimental tasks,
- participating in role play sessions: seeing things from someone else's point of view,
- simulations to experience work situations,
- adopting step-by-step approaches: building step-by-step in a cumulative way.

For students to be more effective and develop higher order thinking, they need to engage in activities such as research and analysis.

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