Guide for teachers and VET trainers
on implementation and usage of e-learning digital tools

D-EWI

Digital Training for European Welding Inspectors

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Executive summary

This Guideline has been prepared as part of training materials developed for the *C1 - Short-term joint staff training* programme of the D-EWI - Digital Training for European Welding Inspectors - project. Our e-learning training course focuses on using e-learning tools for the purpose of facilitating high end e-learning educational courses to professionals that work in the Welding inspection industry.

Analysing the results of our survey on existing skill gaps and learners expectations, the overall objective of this training programme was defined as follows:

- The main focus is on offering pragmatic and practical support for trainers to get familiar with the selected e-learning platform, the Moodle Learning Management System. As the most appropriate methodology for meeting this objective, most of the time of the 24 hours training programme will introduce Moodle tools by presentations and demonstrations, showing the process of setting up and application of these tools. During the face-to-face training, (and also beyond it) participants have access to a practice-area, a "sandbox" Moodle course, where they may gain personal experiences by testing these tools in teachers' role.

- In addition, an important aim of the course is to encourage a change of mindset among the participants, so that they recognise the importance of modernising education beyond the digitalisation and use of ICT tools. We want to support the trainers in their efforts to enrich their pedagogical knowledge and to use a variety of methodological approaches to improve the effectiveness of learning processes of their students. The introductory lectures on the first day of the training programme and the first three chapters of this booklet serve these purposes, as a complementary training material, focusing on more generic aspects and approaches. This mindset-shaping, thought-provoking overview of recent educational developments and trends is complemented by reference lists, a collection of mostly online resources and useful links, a glossary of terms.

The fourth chapter of this booklet offers a short overview of the Moodle tools, as a starting point for educators to find the direction for the further steps – what tools can be used for different purposes. These tools will be introduced in detail in the series of ppt presentations.

It is hoped that reading this Guide will be inspiring to the course participants to not only teach up-to-date content, but also to pay special attention to the use of modern pedagogical methods and tools in their teaching activities.

1. Educational Innovation *(M. Kocsis Baán, M. Gáspár)*

In the recent decades we are witnesses of enormous world-wide socio-economic and demographic challenges, therefore answering them Europe requires an advanced educational system which contributes to innovation, competitiveness and economic growth. The Higher Education sector as well as Vocational Education and Training organisations should play key roles of this system, leading through developing, demonstrating and delivering innovation in education. Educational systems must be increasingly agile to respond to and survive within, an environment characterised by rapid and diverse changes. Education institutions must focus on reinventing, reinforcing and restructuring educational programmes with requirements of the innovation-driven economy in mind. They must do this by acknowledging the centricity of the lifelong learner.

In line with the growing expectations of the knowledge society, the mission of engineering education has also changed and evolved with the mainstreaming of lifelong learning, and knowledge on STEAM (Science, Technology, Engineering, the Arts and Mathematics) fields has become a key factor in the competitiveness of the economy. The accelerating pace of technological development has led to a need to accelerate knowledge transfer and to respond more quickly and effectively to the needs of the economy. The globalisation of the educational "market" and the exploitation of labour market mobility both require the effective development of new skills and competences so increasing importance of international cooperation in education is also continuously growing.

Another major challenge of the last three decades, which has permeated all aspects of life, is digitalisation. The dynamic development of ICT (Information and Communication Technology) is creating new opportunities, providing more effective tools than ever before, and opening up new horizons in training and knowledge acquisition with effects that are difficult to predict today. However, it is important to emphasise that this does not simply mean using modern ICT tools. Exploiting the potential of digitalisation would also require a change of approach and the learning, development, and application of modern pedagogical methods (constructivism, connectivism).

Why should we expect much more remarkable changes, then ever before, a real paradigm shift in education? Answering the needs arisen by the enormously rapid widening of the knowledge pool we have to decide if we will teach more, i.e. longer period to be spend in the education system, deeper i.e. more specialisation – but both direction will lead to a temporary solution only – we cannot predict, what knowledge our engineering students will need during the app. 50 years of period, to be spent in practice as an engineer.

So, the only feasible answer is that we should teach more effectively and instead of transferring more or deeper knowledge we have to focus on the development of individual skills and the person's capacity to learn. It must be realised that the pedagogical framework can significantly determine the transfer of knowledge and its effectiveness in placing the individual at the centre of lifelong learning. At the heart of the concept of lifelong learning is the idea of empowering and encouraging people to 'learn how to learn'.

This new approach requires rethinking the roles of the teachers in all levels. Educators in technical higher education and VET organisations are committed professionals with deep and wide range of professional knowledge, but they do not have pedagogical, methodological knowledge, they have not been prepared to learn how to teach – they follow the samples as they themselves were taught – in perfectly different socio-economic and educational environment. There is no doubt that trainers attach great importance to the continuous updating of the professional content of their training programmes - but only few (if any) efforts are paid to modernise the way as they teach. It should be again emphasized that it is not just (and primarily) the question of using modern equipment - the use of overhead projectors and ppt presentations does not yet make a methodological difference, if "one-way" knowledge transfer and lecturing characterise the teaching practice. Let us use an analogy, illustrated by Fig. 1.1. Using ICT tools to merely make our traditional textbooks available, using our traditional teaching methods in an online format, is as valuable as trying to use a digital slide rule for developing advanced engineering solutions instead of using complex CAD/CAM applications.
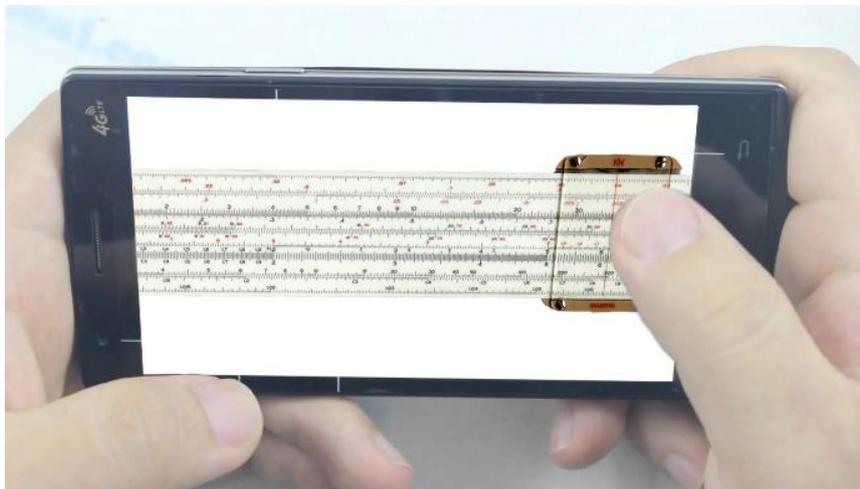
Fig. 1.1. Analogy for illustrating the need for paradigm shift and not only application of modern tools

Engineering knowledge is increasingly complex and diverse, it requires constant renewal - the educational offer is necessarily ever-expanding and highly differentiated. Defining the range, level and deepness of required knowledge and/or competences at different programs has risen up some very important dilemmas:

- "What should the proportions of general and specialist technological knowledge be?
- What should the proportions of technological and nontechnological knowledge be (including economics, management, ethics, humanitarianism) for a modern engineer?" [1]
- How the diversity of competencies to be gained for working at different types of firms/positions can be considered when planning an education program? Regarding a multinational firm typically more specialised technical knowledge and the following key competencies are required: team work, multicultural competencies, management skills, while working for an SME – independency and creativity, practice oriented and applicable knowledge on the specific field.

Let us review some relevant statements of world-leading organisations dealing with educational issues at the turn of the millennium.

New model of International Education of Engineers
The need for a change in engineering education
„Changing priorities in engineering practice will require corrections and perhaps more fundamental and painful transformations of educational programmes, the profiles of teaching faculty, and the organizational structures of institutions."

Engineering: Issues, Challenges and Opportunities for Development –
UNESCO REPORT [1]

„The future of learning
- will require the conceptualization and implementation of a new learning model. We need to be focusing more 21st century competencies and expertise such as **critical thinking, complex problem solving, interactive collaboration**, etc.
- will revolve **more around context than content**. We live in the Knowledge Society where **data, information, knowledge are easy to access 24/7**. We **need a radical change from teaching facts and knowledge to convey skills and creativity** (to find necessary data, facts, and knowledge) in a global context."

Present and Future Challenges in Engineering Education and the Strategies of IGIP,
M. E. Auer, International Society for Engineering Education (IGIP) [2]

„**A first step is to create the conditions** in which the **higher education sector gives parity of esteem to both teaching and research**, so that the **higher education teacher** knows that he or she **has to invest not simply in a command of his or her discipline**, whether it is law, literature or science, **but must invest in being a good teacher and will be rewarded appropriately for doing so.**"
„Technical university **teaching has often been perceived as a poor cousin to research**. Few technical universities require any specific technical teacher education for their academic staff. … this is the only level of learning where academic staff receives no teacher training."

Present and Future Challenges in Engineering Education and the Strategies of IGIP,
M. E. Auer, International Society for Engineering Education (IGIP) [2]

"In order to operate effectively, engineering graduates thus need to possess the following characteristics. They will
- be pragmatic, taking a systematic approach and the logical and practical steps necessary for often complex concepts to become reality
- seek to achieve sustainable solutions to problems and have strategies for being creative, innovative and overcoming difficulties by employing their skills, knowledge and understanding in a flexible manner

- be skilled at solving problems by applying their numerical, computational, analytical and technical skills, using appropriate tools
- be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional responsibilities
- be familiar with the nature of business and enterprise in the creation of economic and social value
- appreciate the global dimensions of engineering, commerce and communication be able to formulate and operate within appropriate codes of conduct, when faced with an ethical issue
- be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches."

Subject Benchmark Statement – Engineering
Quality Assurance Agency for Higher Education (QAA), [3]

It can be concluded that modernisation of technical education should be considered as a key factor in the socio-economic development of the future. Teachers must play an unquestionable role in renewing the teaching methodology for improving the effectiveness of learning, focusing more 21st century competencies and expertise such as critical thinking, complex problem solving, interactive collaboration, etc. Acting as driving force of this modernization process, teachers must be aware of the equal importance of three pillars of Educational Innovation, shown in Fig. 1.2. For this reason, we will shortly review these indispensable elements as Educational Technology, Pedagogy/Andragogy and Accessibility and Openness in the following chapters.
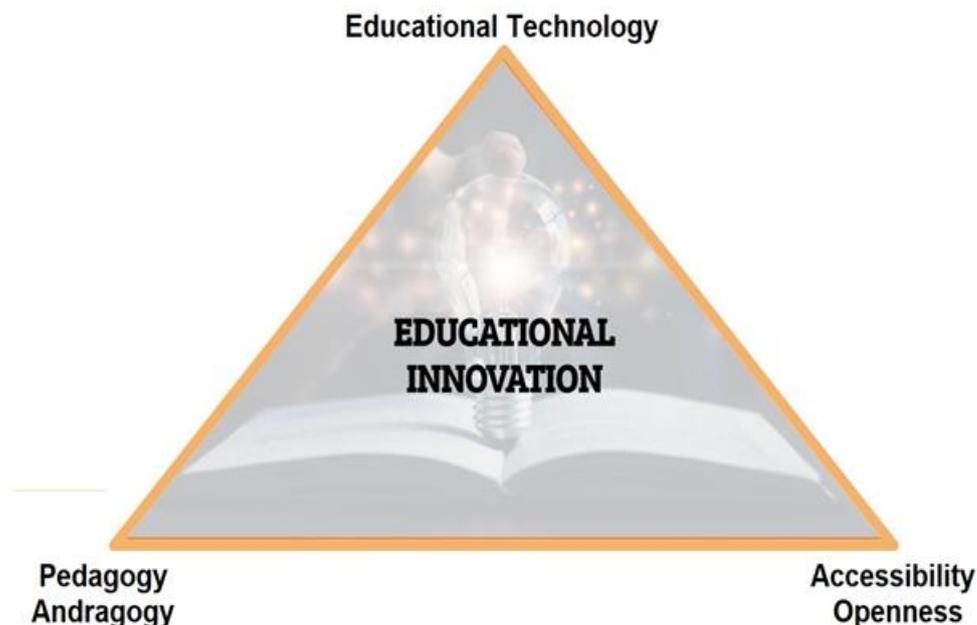

Fig. 1.2. Three pillars of Educational Innovation

1.1. Educational Technology

The most visible and attractive element of methodological developments is undoubtedly the rise of ICT in education. Since the mid-1990s, several European programmes (TEMPUS, PHARE, Leonardo, MINERVA, e-Learning. Lifelong Learning, etc.) supported the development of education system with special emphasis on Distance Education and e-learning, offering unique opportunities for gaining experiences in joint activities of educational development. These programmes and projects also offered the possibility to review the evolution process of educational technology in the last three decades. However, looking back to even a much earlier period of time we can say, that for thousands of years, oral presentations were the main delivery method, using only the tools humans were born with: their voice and body. The old-style written learning resources were supported by chalkboards and books. Moreover, physical models, laboratory demonstrations and posters were used as visual support of lectures.

In the early period of the 20th century, voice recording, and voice transmitting was discovered and as this equipment became more accessible, they proved to be useful tools mainly in language learning. [4] New possibilities of television broadcasting were also recognised in the early 60s. The Open University of UK developed excellent video-programs by BBC, also delivered by the BBC since the 70s. Computers at those times were used mainly for research and development programs, however they were available for the largest education bodies also for discovering the potential of using them e.g. for written tests, quizzes – again mainly in language teaching. The educational use of computing reached a turning point, a breakthrough when personal computers became widely available. However educational programs were quite expensive to be developed and worth to commercialised only when large number of learners were expected. These programs were delivered firsts on different data-storage tools e.g. floppy diskettes and later CD-ROMs. However, internet and the WEB 2.0 concept resulted in a real revolutionary progress, leading to a wide range of approaches and also versatility in terminology.

Educational technology encompasses e-learning, instructional technology, information and communication technology (ICT) in education, edtech, learning technology, multimedia learning, technology-enhanced learning (TEL), computer-based instruction (CBI), computer managed instruction, computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), flexible learning, web-based training (WBT), online education, digital educational collaboration, distributed learning, computer-mediated communication, cyber-learning, and multi-modal instruction, virtual education, personal learning environments, networked learning, virtual learning environments (VLE) (which are also called learning platforms), m-learning, ubiquitous learning and digital education. [5, 6]

Regarding the four major eras of educational technology related to computers are [7]:

- The Pre-Microcomputer Era.
- The Microcomputer Era.
- The Internet Era.
- The Mobile Technologies Era.

Accessibility of the dynamically widening pool of resources has brought a new demand for trainers: how to organise the overall process of learning into a manageable flow of activities, how to control the reliability of content and the progress of learners. The solution is offered by Learning Management Systems, which occurred first at the end of the 90s (WEB CT, Blackboard). In the first period, however we faced with several difficulties: LMS software packages as well as the software to be used for content development were expensive and not compatible with each other – so huge amount of money and huge efforts for developing course content were in a risk not to be able to utilise if support for the particular LMS will disappear or will be unpayable, and the content elements are not transportable. In parallel, technological infrastructure limitations as well as lack of IT competencies mainly on the trainers' side have slowed down the spreading of the online teaching methodology. Also low reputation of the first applications was resulted by poor quality of those courses where traditional teaching programs were tried to directly translate into online courses, showing very low interactivity and engagement for learners. Disappointing experiences were mirrored by high drop-out rates in such programs.

However, difficulties have been overcome step-by-step, and open-source solutions in both LMS programs (like Moodle) and content development tools, moreover standardisation efforts (SCORM) as well as the increased accessibility of internet and smart devices have all contributed to the rebuilding of truth and reliability. Recently, the digital transition forced by the pandemic unexpectedly triggered a more rapid adaptation to the digital world, and e-learning obsessives may have felt that the conditions for a paradigm shift were finally in place - but they were not. Of course, there have been significant advances in the use of ICT tools, but the short time available for the transition has also meant that the change of mindset has not happened, as the majority of teachers have transported their traditional teaching practices into the virtual space:

- In many cases, traditional "live" lectures were only available during class time, requiring remote but simultaneous attendance, whereas one of the most significant advantages of distance learning, besides its efficiency, is its flexibility.
- A multitude of Pdf and ppt files were uploaded on different platforms, unfortunately, instead of using the standardised e-learning systems available in most institutions, providing access in a very diverse way (e-mail, departmental website, GoogleDrive, Classroom, Facebook group, etc.) - drowning students in a chaotic learning environment, a flood of passwords and links.
- Assessment included an increased number of assignments, tests and live oral exams via some form of video conferencing.

Unfortunately, the lack of collaboration and the very low level of sharing of content and experiences characterise the daily practice of higher education also in that period. Yet, as might be expected, openness to online education is mainly growing among students aged 25-46 years, studying in correspondence courses, in technical and scientific fields of study, and who are also working while studying. It would therefore be worthwhile for higher education institutions involved in engineering education to make efforts to modernise correspondence education through distance learning methods, while at the same time making wider use of effective digital teaching methods in full-time education.

It is important to emphasise that Learning Management Systems play key roles in e-learning development, and all of them support four core activities:

- Content delivery,
- Assessment,
- Interaction and Communication,
- Analytics

Learning Management systems should show up the following six major advantages: interoperability, accessibility, reusability, durability, maintenance ability and adaptability, which in themselves constitute the concept of LMS. [8]

Wishing to meet requirements of different learning scenarios these systems are continuously developed and widened by more and more sophisticated features, so the complexity and difficulties of easy adoption and effective use may be more and more challenging to its users. Even if as a first step trainers use them to mostly content sharing, announcements, coursework submission and grade management, rather than many of the more advanced features, they should not be frustrated. At a basic level, being a competent LMS user does not imply the capacity to use every possible tool nor be an expert in any, but like with our smart phones or a word processor, what is needed is the capacity and competence to use the tool effectively. The goal is to learn enough to use the LMS efficiently to meet essential needs, a sense of ability and comfort in at least the first stage of troubleshooting and knowing who and how to ask for help when needed. So far gradually teachers may recognise and use more and more of the pedagogical or time saving features available within the LMS.

Besides using complex and adaptable LMS teachers may apply versatile digital tools for content development and further functions. Several of them offer easy-to-use and free, online solutions – the problem we face to is how to find the most appropriate ICT tools for our versatile purposes. One of the best guides can be the annual lists of TopTools for Learning portal [9] – since 2007, in each year a list is compiled based on the results of an open survey. Learning professionals (and others in related areas) are invited to nominate their Top 10 (digital) tools for learning and based on their contributions the annual list is created. From 2007-2015 this was a Top 100 Tools list, but to mark the 10th anniversary of the project in 2016, the list was extended to 200 tools, and in 2021 it was increased to 300 tools, generated from more than two thousands of votes from 33 countries. Recognising that in different learning situation preferences can be different, we may find three separate lists for Tools for Personal Learning, for Workplace Learning and for Education (colleges and universities). Moreover, we may easily look after any of the tools listed in the lists as search for them is possible according to alphabetical order, but also they are categorised by type, in 6 main categories.

Clicking on the name of a tool in any of the lists, you may find more detailed information on the function, its URL, availability and cost, moreover the ranking position in sublists and the overall rankings in the previous 14 surveys between 2007-2020, so tendencies can be observed. For some years, also infographics support the overview of the top tools for learning, as shown in Fig. 1.3.
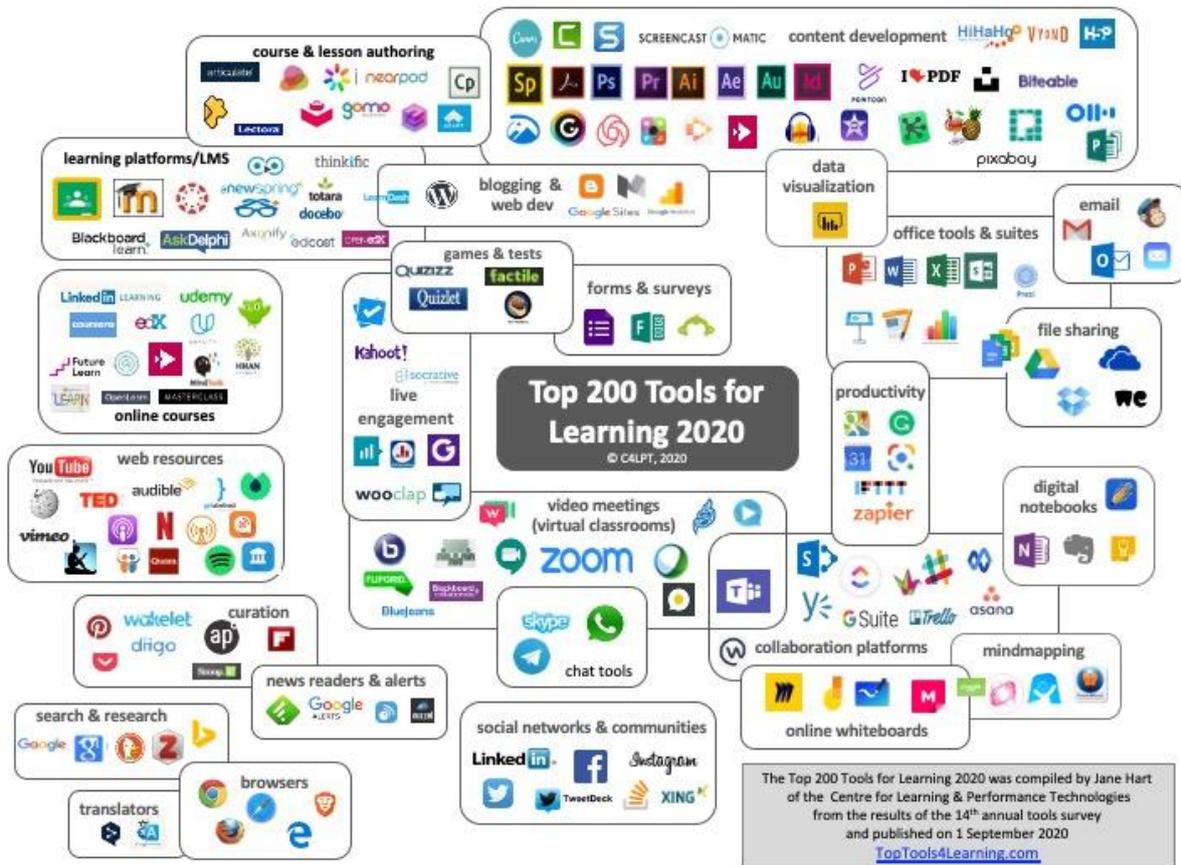
Fig. 1.3. The Top 200 Tools for Learning 2020 [9]

It is now taken as evidence that ICT offers a complex set of tools to be used to meet the challenges faced by education systems in several aspects simultaneously and effectively through innovative and creative solutions:

- It enables a rapid response to the dynamically changing needs of the economy and technological development.
- It provides the flexibility and efficiency needed for the lifelong learning of adult learners.
- Cost-effective to run - resulting in significant savings for both trainers and trainees.
- It supports the development of up-to-date competences.
- It can adapt to cultural, linguistic and diversity differences.
- It is cost-effective and yet capable of delivering high quality mass training and supporting individualised learning at the same time.
- Its compensatory effect enhances equal opportunities for disadvantaged people.

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1.2.   Pedagogy/Andragogy

Regarding the second pillar of educational innovation, we cannot overestimate the importance of pedagogy and andragogy. Teachers and trainers in engineering education – either in Higher Education or in Vocational Education and Training – face this challenge even a worse position than regarding renewing their teaching practice by application of modern education tools.

"VET teachers often have insufficient pedagogical knowledge to be able to effectively adapt their teaching strategies according to the desired learning outcomes. An additional problem in this regard is the mistaken perception in some countries that teachers' vocational expertise is in itself an adequate basis for teaching". [10]

1.2.1.   Some fundamental elements of pedagogy

Before focusing on some trends in innovative pedagogical methods, let us mention shortly two important elements of the basics in thinking on the efficiency of learning. First of all it is important to highlight that the average retention of learning varies from one pedagogical methodology to another, as shown by two presentations of the so-called **learning pyramid** (also known as "the cone of learning", "the learning cone", "the cone of retention", "the pyramid of learning", or "the pyramid of retention") in Fig. 1.4.
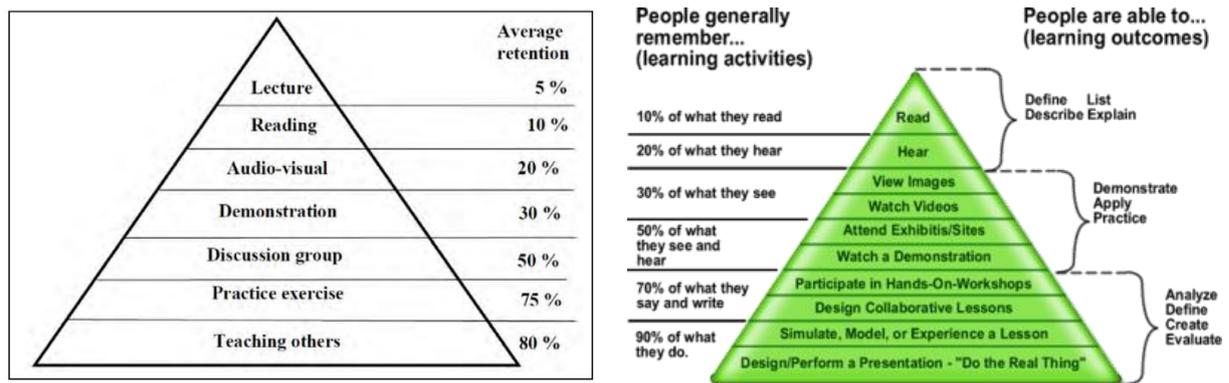
Fig. 1.4. Different presentations of Learning pyramid [11, 12]

Although these popular learning models are recently strongly criticized, as no evidence has been found that its numbers are based on reliable research results, we may agree with the main conclusion that different degrees of retention is induced from various type of learning, being the most effective the active learning ones. [13,14]

Underlining the tendency shown by these models, we may also cite the old Chinese proverb:

"What I hear, I forget;
What I see, I remember;
What I do, I understand."

The other, very important model is the Bloom's taxonomy, which is widely applied for classifying educational objectives. Its original version was created in 1956, and was revised by Krathwohl in 2001.

"Bloom's Taxonomy is a hierarchical classification of the different levels of thinking, and should be applied when creating course objectives. Course objectives are brief statements that describe what students will be expected to learn by the end of the course." [15] The authors of the revised taxonomy wished to add a more dynamic conception of classification, using verbs and gerunds to label their categories and subcategories (rather than the nouns of the original version). These "action words" describe the cognitive processes by which thinkers encounter and work with knowledge. There are several resources [16 - 18], introducing the application of Bloom's taxonomy (see Fig 1.5), also in relation with digital education [19, 20], finding the appropriate educational tools, and even in Moodle tool guide we may find references to different levels of thinking order according to Bloom's taxonomy [21, 22].
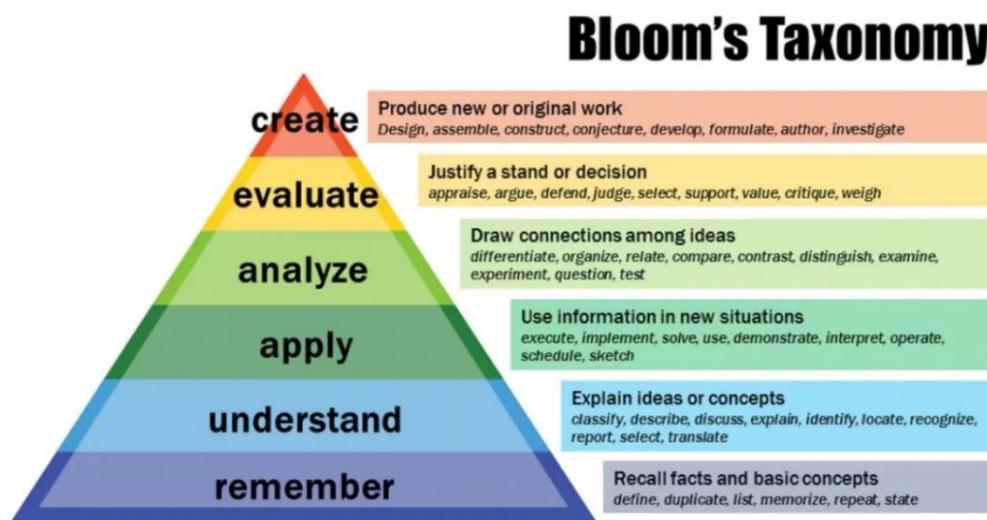

Fig. 1.5. Bloom's taxonomy [17]

Innovative pedagogical approaches can improve the quality of teaching and support the development of new competencies and skills, including soft and digital skills. The most important trends characterising the changes in pedagogy are the followings:

- *Educational focus* is shifting from *teacher-centered* to **student-centered**;
- *Teaching approach* is moving from *lecturing monotonously* to **facilitating students' autonomous and independent learning**;
- *Learning style* is shifting from *passive learning* to **active and collaborative learning.**

1.2.2. Pedagogical approaches

Traditional way of education delivery (labelled as "Instructivism" or "behaviourism") is focused on the transfer of knowledge from the teacher (in a traditional classroom situation) to the students, with rare opportunities for dialogue between a student and the teacher. Moreover, these opportunities are reduced with an increasing number of students present in the classroom. Communication between the students is discouraged. [23]

In this passive learning situation students are recipients of knowledge, and are expected to record and absorb knowledge delivered by an expert—a faculty member or textbook. The

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teacher controls what is delivered, and decides pacing and process. Therefore this traditional or facilitated learning is regarded as a teacher-centred approach. [24]

In contrast active learning aligns with the constructivist perspective of learning. The constructivist view embraces the idea that knowledge is actively constructed by the learner and integrated with his or her existing knowledge and experiences. The knowledge is seen as more subjective, dynamic and expanding rather than objective and static. The main tasks here are processing and understanding of information, making sense of the surrounding world. The learner has a clear responsibility for his / her own learning. This approach is therefore "Learner centred". The student develops independence and creativity; s/he learns to be critical when choosing his/her resources. The problems or tasks are authentic, and the student as a rule sees that what s/he learns can be applied in the real world. However it is time-consuming to find out by trial and error, going to the library, asking various people etc. This way of study may be best suited for the resourceful and independent learners. External control of what has actually been covered is difficult, and standardized, multiple choice testing is often less relevant. [23]

The third and even more challenging model is the collaborative learning, based on social constructivism. [25] It means that the students join a knowledge-generating community and in collaboration with others solve real problems and assignments in an authentic context as part of their study. In a social constructivist environment, the teacher will, though an "old-timer" (a master), to some extent be a learner together with his/her students, as the generic skills of collaboration, problem-solving and creating new knowledge are important goals by themselves. Fig. 1.6 illustrate the interconnections of the three main pedagogical approaches.
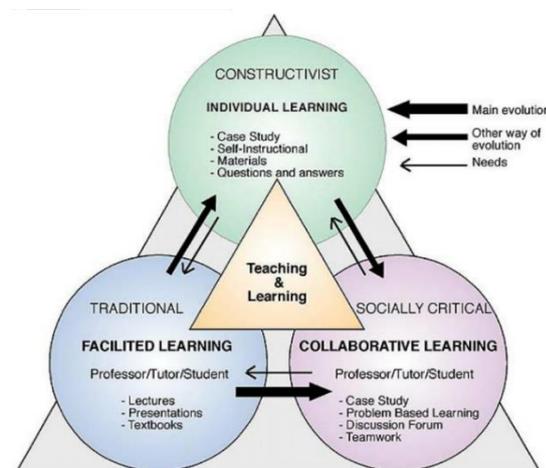
Fig. 1.6. Three main pedagogical approaches in learning [23]

When designing a learning program, the various methods can be and should be used in combination. The challenge is to find the right balance, the optimal combination and in each element fitting to purpose of learning and the characteristics of learners.

Considering professional development programs, our target group means adult learners. According to the highly recognised "Fater of Andragogy", Malcolm S. Knowles, adult learners are typically self-directed/autonomous, relevancy- and goal-oriented, they prefer utilizing knowledge & life experiences and inspired for collaboration [26, 27]. These characteristics fit well to the collaborative and constructivist approach, however this age group is less flexible to accommodate to unusual learning situation, more resistant to change [28]. However, we have

to be aware that applying this approach is much more demanding and time-consuming for the teachers. They cannot rely on their teaching ruteen and they may be facing unexpected routes and outcomes of the learning process, to be handled, as learners may have very diverse previous knowledge and experiences. In our special case, where an international training program seems to be delivered, a special difficulty may occur in acquisition of knowledge, as well as in collaboration. Overcoming these difficulties, multilingual glossary and extended usage of communication tools and team-works can be useful elements of the course.

Finally, in the era of the Information Age, four key qualities are considered (the 4C): Be Creative, efficient Communicator, Critical thinker and Collaborator – achieving these key qualities the importance and benefits of the socially critical, constructivist and collaborative pedagogic approach should be again underlined. Regarding engineering education, a recent and relevant UNESCO report includes the following statements:

> Training engineers for the implementation of the SDGs (Sustainable Development Goal) not only requires new competencies of creative learning and thinking, complex problem-solving, interdisciplinary and international cooperation and an ethical attitude, it also requires **a change in engineering education itself, shifting from an academic technical knowledge-focused path to a much broader interdisciplinary approach to learning, and from a teacher-centric focus to one that is more student-centred and problem-based**. It will require building a structured approach, with related quality assurance and accreditation, to promote lifelong learning and professional development. (UNESCO 2021) [29]

1.2.3. Blended learning

Application of the optimal combination of different pedagogical approaches as well as meeting the needs of different learners' groups for flexibility and efficiency, wide variety in combination of learning scenarios and education tools can be considered. The widely used term applied to the practice of organizing the learning process through some combination of both face-to-face and technology-mediated learning is blended learning, but also hybrid or mixed-mode learning expressions are used.

The key benefits of blended learning are identified as follows [30]:

1. Opportunity for collaboration at a distance: Individual students work together virtually in an intellectual endeavor as a learning practice.
2. Increased flexibility: Technology-enabled learning allows for learning anytime and any-where, letting students learn without the barriers of time and location but with the possible support of in-person engagement.
3. Increased interaction: Blended learning offers a platform to facilitate greater interactivity between students, as well as between students and teachers.
4. Enhanced learning: Additional types of learning activities improve engagement and can help students achieve higher and more meaningful levels of learning.
5. Learning to be virtual citizens: Learners practice the ability to project themselves socially and academically in an online community of inquiry. Digital learning skills are becoming essential to be a lifelong learner, and blended courses help learners master the skills for using a variety of technologies.

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There are endless variations how we organise the sequence or the mix of different learning activities in different – f2f or online – format, synchronous or asynchronous mode. One of the recently popular forms of blended learning is the flipped classroom, "where students are introduced to content at home and practice working through it at school. This is the reverse of the more common practice of introducing new content at school, then assigning homework and projects to completed by the students independently at home." [31]

Practically, students are asked to view online video lectures at home, and then they discuss the problems/solve the tasks and exercises in the class. Learners may consequently work on problem solving with others, thus applying higher level thinking skills rather than just passively listening to a lecture in class. Among the advantages we may consider that it doubles student access to teachers–once with the videos at home, and again in the classroom, increasing the opportunity for personalization and more precise guiding of learning. In the flipped classroom model, students practice under the guidance of the teacher, while accessing content on their own, allowing them also to pause, rewind, rewatch, looking up glossaries or further resources, etc. This methodology can be useful for international courses as well, where students learn in a foreign language.

1.3. Accessibility and Openness

The third important pillar of educational innovation is improved accessibility and openness. At the end of the 90s, most of digital learning materials were delivered on CD-ROMs. The high cost of course development was typically paid by the customers, and the product was profitable only in popular topics.

As online distribution became more common, access to content became technically much easier and faster, but to recoup development costs, developers restricted access with passwords and made it payable. However, the WEB 2.0 concept resulted in the emergence of an increasing number of content developers who have developed educational content on a non-commercial basis and made it available for free without password protection – leading to a real breakthrough in the wider uptake of online education.

In a wider term 'Openness' movement is based on the idea that knowledge should be disseminated and shared freely through the Internet for the benefit of society as a whole. The two most important aspects of openness are free availability and as few restrictions as possible on the use of the resource, whether technical, legal or price barriers. [32]

Three types of "open" educational content represents a huge potential in digital education, widely known as OCW, OER and MOOC.

OCW stands for Open Course Ware and considered to be nucleated in 1999 in Germany, when video-lectures of a university program were published online. Soon after highly prestigious US universities made their course materials available - the most famous initiative was the MIT OpenCourseWare at the Massachusetts Institute of Technology (MIT); it is still in operation since 2002. [33]

OER stands for Open Education Resources, and means the "wide range of learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others" [34]. Its history also goes back to the last years of the 90s. Two important barriers had to be overcome: financial support for the production of educational content and finding the legal form, a license for free and open content as an alternative to full copyright. [35] The term OER was first introduced by UNESCO in 2002.

MOOCs (Massive Open Online Courses) are free online courses without formal entry requirement nor participation limit. They are operable courses, including interaction, feedback and assessment (via automated quizzes or peers) but typically do not lead to official credentials/ do not currently earn credits. While attending the course is free, generally you have to pay if you wish to get a certificate about your attendance. These typically short online courses designed for large numbers of participants, in versatile topics, not necessarily university level and offer a full/complete course experience online for free. Regarding the history of MOOCs, the term was used first in 2008, but the great breakthrough happened in 2012, which was called "the year of Moocs", giving great publicity for the movement in mass-media. However, there were several predecessors of MOOCs, many of them in Europe – in the mid 90s, the Learning North East project of the University of Sunderland offered short free distance learning courses as "tasters" for learning, generally in printed format. Based on their concept and experiences, an EU supported MINERVA project – titled as "e-Taster", 2004-2006 - developed 12 non-accredited, short, self-standing "taster" courses to be offered on-line, free of charge for general public. [36] As a special feature, these bite-sized courses were offered in a multilingual format, where learners were free to select the "master" language of the course and all other language versions were simultaneously available - paragraph by paragraph - in the further languages (EN, HU, RO, LT, BG, PL, D, F, IT, ES, SK).

By now, MOOCs have arrived their maturity period, showing really impressive statistical data of improved accessibility for high quality of learning – see statistics of the year 2021 in Fig. 1.7.
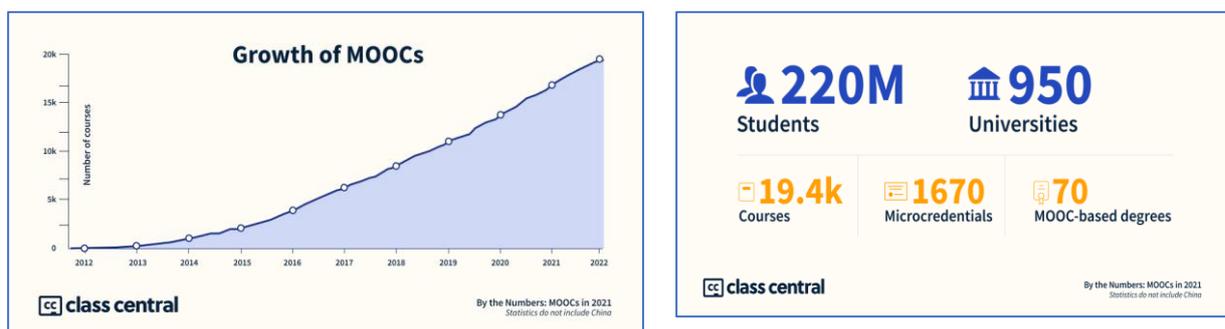

Fig. 1.7. Statistics of MOOCs in 2021 [37]

It is also useful to analyse the course distribution data by subjects [37], as shown by Fig. 1.8.

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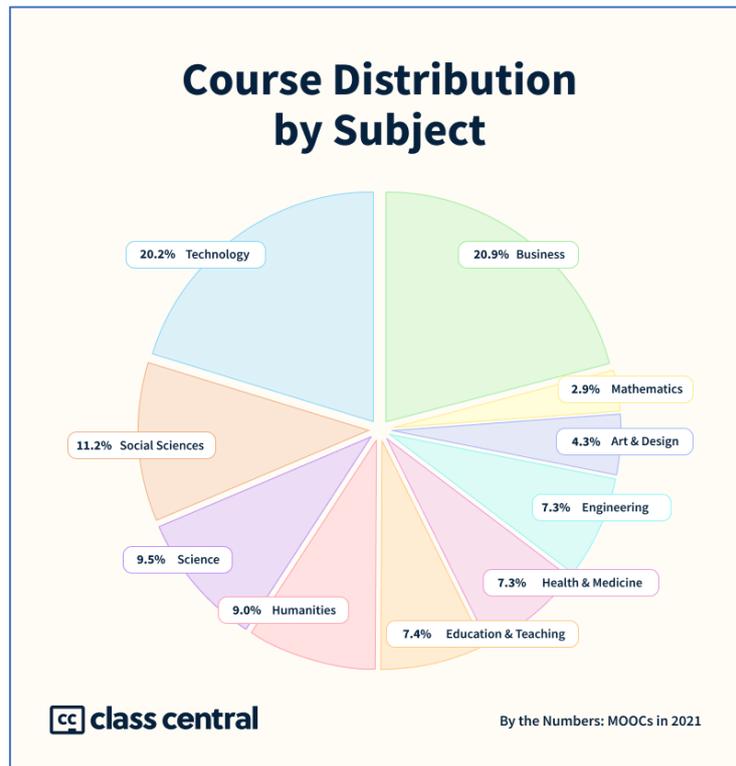
Fig. 1.8. Thematic distribution of MOOCs courses [37]

The main interest in OERs and in MOOCs arises from their perceived potential to improve access to higher education and lifelong learning by both improving the quality of education available (especially in developing countries) and also to provide higher education at a cost greatly below the cost of conventional higher education. [38]

Expectations were impressively high regarding the democratization of education by MOOCS, at the same time this kind of on-line education can be an important tool to connect and strengthen specific cultural or language communities.

"However, based on student population figures so far, most students already had access to higher education before, many do already have a HE degree. Very few students (relatively) come from regions that have less access. Next, students need good internet connection, language skills (most MOOCs are in English), to understand global practices (hardly local cases…), etc. Moreover, MOOCs and most OER are non-formal learning. I.e., for now, they are situated outside the formal Higher education system. Students can obtain a badge or certificate of completion but rarely they are recognised as a formal credit in an accredited curriculum. Hence, MOOCs provide only access to information and knowledge derived out of regular HE-system. Moreover, some state that openness as with most MOOCs does not contribute to public case, that it is hard business and new western imperialism. Only the rich can provide free OER and free courses (someone has to pay for it). Present MOOC providers only work with top universities, MOOCs is a business for getting the best students on campus HE (selection mechanism), to improve education for on campus provision and/or for selection of new talents by companies. Social responsibility and openness have become terms to sell business, to get money". [38]

What is the difference between OCW, OER and MOOCs, which is good for what?

OCW offers university level course materials, but without any learning support services. Typically, OCWs are Creative Commons licenses, which allows the use, reuse and distribution of materials. OCW may support informal, self-standing learning or may complement formal education programmes in some specific topic, offering high-quality contribution to the formal program.

OER offers the most flexible potential for using by teachers in formal education system to integrate them as elements of their formal education program. At the same time learners may use them as complementary resources to their courses or their project work, or as elements of their informal learning, professional development. OER portals offer versatile types of resources, paying particular attention to describe precise open licensing rules to be applied. OER offers a cost-effective solution for enhancing the course materials by integrating high-quality elements (multimedia, video lectures of highly recognised experts, etc.)

MOOCs offer real learning experiences for free; students can obtain a badge or certificate of completion but rarely lead to formal credit in an accredited curriculum. Moreover, their content is typically not subject of an open licence, the most successful MOOCs are under the protection of copyright licences.

As we saw, open licensing is a core issue in the Openness movement, referring to a license that respects the intellectual property rights of the copyright owner and provides permissions granting the public the rights to access, re-use, re-purpose, adapt and redistribute educational materials. Such more flexible licensing options have become available as a result of the work of Creative Commons, a non-profit organization that provides ready-made licensing agreements that are less restrictive than the "all rights reserved" terms of standard international copyright.

Wishing to get personal experiences with MOOCs, one of the Coursera courses can be recommended, which possess the third position on the top list of MOOCs: "Learning How to Learn: Powerful mental tools to help you master tough subjects" – or just to have an insight into its topic, video-presentation of its author and lecturer worth to watch. [41, 42]

An attractive infographic titled Rise and rise of Digital Learning is recommended for getting insight the timeline and some statistical data on Digital Learning. [43]

Finally, as the most comprehensive and useful resource for improving our pedagogical approaches and teaching practice the book of Prof. Peter Goodhew can be proposed, titled *Teaching engineering*, accessible as an open educational resource [44].

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2. Improving effectiveness of learning *(N. Hajdú)*

Today, the difference between generations is a major challenge in the field of education, which is also reflected in the change of basic habits. While learning from books was taken for granted barely a decade ago, today the online world largely provides quick access to information. As Molnár [1] puts it, the difference between the students of the 21st century and those of the 20th century is not only that new demands are being placed on education, but also that these new demands are no longer feasible using traditional methods. By adapting to these changes, educators are increasingly concerned about how to effectively teach today's students.

Due to technological and technical change on one hand and generational differences on the other, education is constantly evolving. According to Crocket [2], 21st century students need to have the following skills to be successful in life: problem solving, creativity, analytical thinking, cooperation, communication, ethics, agency, and responsibility. Engineer students are required to have extra skills, like computer science skills, industry skills, pressure management knowledge, structural analytical thinking, attention to detail and data modelling competences [3].

The focus of development is on optimizing the curriculum, the teaching method, with the aim of ensuring an effective learning process. In the field of pedagogy, the term taxonomy is widely used. It means systematics, including the principles underlying the classification. The work of Bloom [4] and de Block [5], which is crucial to taxonomy. Bloom's taxonomy distinguishes three types of educational goals: cognitive, affective, and psychomotor. Cognitive goals are based on thinking. Therefore, a curriculum, lesson plan, teaching and learning process, and system of requirements must be developed to maintain student attention throughout the semester. The affective term refers to emotional, volitional actions, the way the student reacts to various events in the class, and evaluation; what attitude he or she develops in relation to the subject. The word psychomotor reflects the association of mental activity with physical action and movement. In De Block's taxonomy, there is another target area, transient activity [6].

In this chapter the following topics will be discussed:

- Difference between students according to Generation Theory and Brain Dominance,
- Essential Skills, Learning Outcomes and Teaching Methodology in case of Engineer Students,
- Motivation and Gamification in case of the Different Learning Scenarios.

2.1. Difference between students - Generation Theory and Brain Dominance

According to Strauss and Howe Generational Theory [7], there are recurring cycle called generations, whose consumer behaviour and patterns are similar. In the following part the difference will be shown between these generations.

2.1.1. Features of Gen X, Y, Z

The date range may vary in some years depending on the researchers, but they all identified the following generations.

2. 1. Table: Generations

Generation (years)	Birth years
Traditionalists	1920–1939
Baby Boomers, Prophets	1940–1959
Generation X, Nomads	1960–1979
Generation Y, Heros	1980–1995
Generation Z	1996–2007
Alpha	2008-

Source: Strauss and Howe, 1991 [7]

"Traditionalists value old-time morals, safety, security, and consistency. They have more respect for brick-and-mortar educational institutions and traditional lecture formats than online, web-based education and training. This generation favors conventional business models in the legal workplace and a top-down chain of command. Work ethic and reliability are important to them. Traditionalists are generally partners, managers, and senior support staff in the legal workplace, although some might sign on as part-time administrative staff just to keep busy after retirement" [8].

"Baby boomers got their name from a phenomenon known as the baby boom. This boom was a spike in birth rates after World War II. In the United States, around 3.4 million babies were born in 1946, more than ever before in United States history. While there is no one way to describe an entire generation of people accurately, here are some general characteristics that tend to be seen in baby boomers: Baby boomers value relationships, they are goal centric, self-assured and resourceful" [9].

„Generation X is a relatively smaller generation than those that surround it. Because of the size and influence of Baby Boomers and Millennials, Generation X is sometimes referred to as the forgotten middle child of the generations. They are independent, flexible, critical thinkers, and self-reliant" [10].

„Also known as Generation Y or Next, Millennials reached adulthood at the start of the new millennium. This generation has grown up during a period of rapid change, characterised by globalisation, the digital revolution and the great economic crisis of 2008. All these events have given them a set of preferences, attitudes and expectations that differ from those of previous generations. Generation Y is tech-savvy and they seek work-life balance"[11].

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Our current students in Higher Education belong to Generation Z, that is why the features of them will be most detailed than the previous generations.

„Generation Z has emerged as a population increasingly worthy of attention, especially now as its older members enter young adulthood. Born after 1995, Generation Z-ers made up one tenth of the 2020 electorate; and while they share a number of characteristics with Millennials, their formative years have been shaped by a drastically different world, resulting in key differences in attitudes, tendencies and outlook" [12].

The SWOT analysis of the Z generation summarizes the main characteristics.

2. 2. Table: Generation Z (1996-2007) SWOT

Strength	Weaknesses
• achievement motivated • digital natives, technology savvy • confident • better at multitasking • curious creators • realistic and resilient • acceptability of change • globally altruistic • collaborative • diversity • work-life balance	• minimal social skills • lack of face-to-face communication • hard to seek attention from them (<10 sec attention span) • difficult to motivate • continuously seek feedback, guidance, direction • wisdom (street smarts) • thoughtless actions → impulsive • technology reliant/dependent • prefers work from home • couch operators • lack of real-world experience • addiction to brand • budgeting money • narcissism
Opportunities	**Threats**
• entrepreneurship • social causes • future leaders • uniquely skilled • less risk averse • own their destiny • developing global markets (connection) • girl power	• screenagers • lack of social life as social media replaces it (exposed on social media) • vulnerable online • reality • not taken seriously by senior teams (relationship with immediate managers) • fear of being behind Gen Y • loss of skilled workers • mental and physical health (etc. food) • doubtfulness for a brand

Source: Own edition

Another usual classification of generations focuses on the characteristics of the different age-groups only from the viewpoint of their relationship to digitalisation, describing a generational divide between those who grew up after the technology boom in the 1980s and those who grew up before.

Prensky defined digital natives as those who were "born digital" and are "'native speakers' of the digital language of computers video games and the Internet". Digital immigrants, on the other hand, are those "who were not born into the digital world but have, at some later point in [their] lives, become fascinated by and adopted many or most aspects of the new technology." [13]
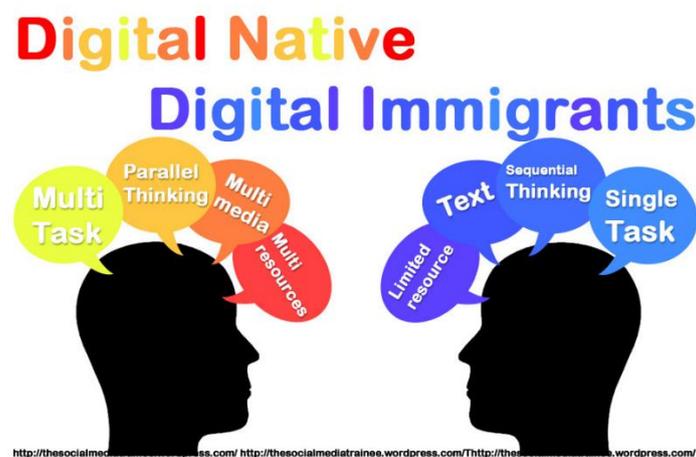

Fig. 2.1 Main characteristics of Digital Natives and Digital Immigrants

2.2. Essential Skills and Teaching Methodology

The students' skills differ, thus the teaching methodology should be adjusted to it. In this chapter the difference between left and right brain dominated students and the appropriate methodology will be overviewed.

2.2.1. Left or right brain dominance

„The brain consists of twin halves, a left hemisphere alongside a nearly symmetrical right hemisphere. Hemispheric lateralization is the idea that both hemispheres are functionally different, and that certain mental processes and behaviours are mainly controlled by one hemisphere rather than the other. The left hemisphere controls the right-hand side of the body and receives information from the right visual field controlling speech, language and recognition of words, letters, and numbers. The right hemisphere controls the left-hand side of the body and receives information from the left visual field controlling creativity, context and recognition of faces, places and objects". [14]

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"According to the left-brain, right-brain dominance theory the left-side of the brain is considered to be adept at tasks which are considered logical, rational, calculating. By contrast, the right side of the brain is best at artistic, creative, and spontaneous tasks" [15, 16].

Generally it can be claimed, that the most engineering courses fit to left brain students. The question arises how the left and how the right brain dominated students should be taught. Funderstanding provides a great help in this aspect and identify the appropriate teaching techniques [17].
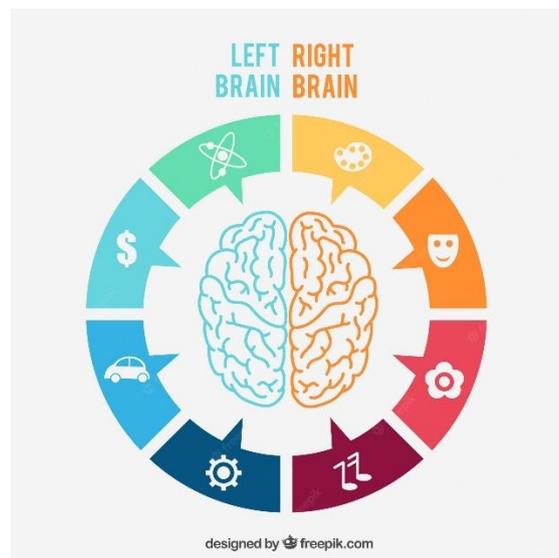
Fig. 2.3 Illustration for characteristics of left-brain and right-brain

„Left brain teaching techniques

- Write an outline of the lesson on the board.
- Go ahead and lecture! These participants love to listen to an expert and take notes.
- Discuss vocabulary words and create a crossword puzzle.
- Discuss the big concepts (abstract concepts).
- Assign individual assignments so participants may work alone.
- Ask the participants to write a research paper (detail and conceptual analysis).
- Keep the room relatively quiet and orderly.

Right brain teaching techniques

- Write the main points on the board or pass out a study guide outline that participants can fill.
- Use the board frequently to help the participants "see" and comprehend the points.
- Have some time for group activities.
- Let the participants create a project.
- Play music during the training.
- Use pictures, graphs, maps, etc."

2.2.2. Appropriate teaching methodology

„Project- based learning provides the contextual environment that makes learning exciting and relevant. It provides an opportunity for students to explore technical problems from a systems-level perspective and to develop an appreciation for the inter-connectedness of science and engineering principles.

For an engineer in industry, a project is a sequence of tasks required to reach an objective. Typically, the objective is to design a device or process that has value to a customer (user). The project begins by defining a performance problem associated with an application and ends with a design solution. The problem drives the learning required to complete the project. Managing the project requires the engineer to demonstrate effective teamwork, clear communication, and the ability to balance the social, economic and environmental impacts of the project. Project-based learning is based on the practice of solving problems." [18]

Problem-based learning regards a subset of project-based learning, but it is essential to feel the difference. „PBL can involve interdisciplinary work whilst PrBL is generally implemented in just one class and lasts a few days at most"[19].

Table 2.3. Difference between project-based and problem-based learning

Project-based Learning	Problem-based Learning
Project-based Learning begins with the assignment of tasks that will lead to the creation of a final product or artefact. The emphasis is on the end product.	Problem-based Learning begins with a problem that determines what students study. The problem derives from an observable phenomena or event. The emphasis is on acquiring new knowledge and the solution is less important.
• Students work on open-ended assignments. These could be more than one problem • Students analyse the problems and generate solutions. • Students design and develop a prototype of the solution • Students refine the solution based on feedback from experts, instructors, and/or peers	• Students are presented with an open-ended, authentic question. • Students analyse the question • Students generate hypotheses that explain the phenomena. • Students identify further follow-up questions • Students seek additional data to answer the questions.

Source: uvu.edu[20]

Problem-based learning is suitable for bridge the gap between theory and practice in case of engineer students. "A large engineering problem was introduced to the students in these classes, and then different pieces of the problem were solved concurrently in each of the classes. This created problem-solving opportunities on a small-time scale in the linked classes that were then connected to solve a significant engineering problem that would normally have taken a large amount of class time in the engineering course. In each class, group work with directed individual or interactive tasks was facilitated through teacher-guided discussions" [21].

In the problem-based curriculum, students in small groups (ideally 8-10 people) present a problem or case that essentially teaches real-world professional content. When working on a particular case study, teams appoint a team leader who is responsible for communication and liaison with faculty. During the collaborative problem-solving process, students are forced to work together as closely as possible because the practical grades they receive at the end of the semester depend on the team. The focus is not on the traditional transmission of information

and knowledge, but on solving a situation from the life of the company using a practical example.

2.3. Motivation and Gamification in case of the Different Learning Scenarios

Motivating students and keeping their attention is not an easy task. There are different learning scenarios, such as face-to-face learning, online learning, and a mix of both, called blended learning. The importance of online learning has increased in the wake of the pandemic, which has reformed and evolved the teaching methodology in a short period of time. Distance learning platforms have also made great strides.

The question arose as to what we should do differently in online teaching. The main difference is in the interaction. "In a classroom lecture, we are constantly monitoring student responses, interpreting them, and teaching accordingly. It does not work online, we are not connected. Problems cannot be solved immediately. Online teaching promotes demotivation and passive behavior" [22]. In the classroom, students mimic, body language can be observed. Teachers can see what part of the lesson material should be highlighted and clarified again. The virtual classroom requires students to be more self-motivated and disciplined in their learning.

In the following part new methods will be introduced to increase attention and motivate students. According to Weber [23] "the attention span of an educated adult is 20 minutes. It is significantly shorter the more information the brain has to process simultaneously and/or the more demanding the learning environment. Virtual sessions reduce this performance by 50%, or only 10 minutes. If these trainings, courses take place in a foreign language, the attention span is reduced by another 50%, i.e. only 5 minutes. When we multitask, we lose focus and attention". Weber [24] offers a solution to this problem, which she calls the "**Big 5 of motivation**," namely the following:

1) "**Purpose:** make clear the purpose of the content you are covering in the training.
2) **Appreciation:** mindset and heart attitude. (Feeling safe and accepted).
3) **Recognition:** acknowledge the attention, effort, and personal commitment. Show appreciation, recognition, and praise. (3 levels of difficulty: easy question - minimum requirement, so-so question - medium difficulty, stinker question - for outstanding performance or for those who love challenges).
4) **Rapport:** want, respect and appreciate, active participation
5) **Activation:** after 10-20 minutes the brain needs change"!

It is not the best option to convert classroom lecture into an online version. Weber [22] emphasized that the computer has a relaxing effect (TV). She summarizes the advantages of instructional videos, which are the following:

1. „They are time-independent (students can watch them when they are ready).
2. They can be paused and replayed (useful and motivating).
3. The information can be delivered in the best possible way.
4. It can be used in different ways".

Summarizing, virtual sessions are good for "introduction to the topic, presentation and discussion of results, giving feedback and making analysis, evaluation and round-off" [22].

However, the online environment, information technology, is an essential part of the development of new learning methods. Therefore, the use of gamification is a great opportunity in traditional education, where we often deal with unmotivated students, making it difficult for educators to engage them in learning activities [25]. Gamification is the use of game elements and techniques (not in a game context) to engage people and solve problems [26]. Gamification is not just a self-serving, fun leisure activity, but a potentially value-adding tool that can transform all areas of life, make them effective, and, not least, improve well-being and leisure mood [27]. This is exactly what is needed in 21st century education on a new foundation, namely easy learning when students are able to create interest, collaborate, and learn through play. In education, Prievara found that gamification can improve collaboration between students and between teachers and students [28]. According to Rab [29], the right approach to gamification in education can be based on changing attitudes. Fitz-Walter et al. [30] have shown that this method is extremely effective in engaging students in extracurricular activities.

Gamification can provide opportunity for engineer students to understand certain topics better. With the play the students will be involved and engaged, thus their concentration will increase. "Engineering courses are one of the hardest fields due to the complicated theoretical concepts, a deep level of complex calculation, and the difficulty of combining mathematic and theory to create products. As good engineers, they need to fully understand the related concept theory" [31].

Fig. 2.4 Gamification supports involvement and engagement

A popular example of gamification is the online quiz Kahoot. Kahoot is a free platform where students can learn through play. The teacher can be the game master who creates the test, which consists of a series of questions.

With crossword puzzles, we can create a topic-specific game for students, which can include definitions or specific words of the teaching material. Word Search Maker can work on the same principle. Definitions of the topic can be hidden, students have to find and clarify them.

The wheel of names can provide a solution for who to call in the classroom.

There are also some good programmes (Canva, Drawio, Mindomo) to improve visualisation when working with numbers, which is essential in the case of engineering students.

Overall, the consideration of different skills and abilities, the use of problem- and project-based learning, the application of gamification clearly differs from frontal teaching. The teacher actively engages students in the lesson, increasing engagement, attention, and learning effectiveness. Of course, this requires different skills and tasks from the teacher, for which more time must be spent in the initial phase. But it is worth starting.

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3. Innovative tools for synchronous and asynchronous online learning support *(G. Dinu)*

Computer-supported collaboration has been of interest for researchers and practitioners for decades already. Real-time remote dialogue (teleconferencing), computer-based instructional services, computer-based knowledge workshops, augmented workshops, computer-supported meetings and conferences were possible and used already in the early seventies [1]. Computer-Supported Collaborative Work (CSCW) emerged as research field and, later, Computer-Supported Collaborative Learning (CSCL) derived from it [2].

> *"The idea that collaboration is a basic form of human activity, essential for cultural development, and also a good way to learn, has been stressed by many writers throughout the history of psychology and education. [...] Nowadays, CSCL is an interdisciplinary research field focused on how collaborative learning, supported by technology, can enhance peer interaction and work in groups, and how collaboration and technology facilitate sharing and distributing knowledge and expertise"* [2].

Research shows that collaborative learners outperform individual learners [3], with better learning outcomes obtained in group work versus individual work [2]. Moreover, research suggests that, in classroom settings - and especially in Learning by Design approaches (LBD), discourse-based learning activities can (and should) be alternated with action-based learning activities, "in a variety of carefully constructed scripted activity structures and sequences (classroom scripts) designed to contextualize important skills" [4]. However, in the race to developing computer-supported learning materials and computer-supported learning platforms, the teachers, trainers and all kind of instructors, as well as the (e-learning) platform architects seem to have forgotten these important aspects of collaborative learning and action-based learning. Discourse-based learning activities is the norm in e-learning: the focus (in both the e-learning content and in the features of the e-learning software solution) is on discourse, in different forms and formats - mainly text content, graphic content, video lessons, with quizzes or assignments used for assessment, when necessary. But there is little emphasis in e-learning on collaboration, which is considered "a basic form of human activity, essential for cultural development, and also a good way to learn" [2]. But there is room for change, and in the following two sections we are going to take a look at two technological instruments that can help to bridge this gap between discourse-based, individual learning and action-based, collaborative learning: video-conferencing tools and collaborative digital whiteboard applications.

3.1. Video-conferencing – comparison of tools and functions

There is a plethora of video-conferencing solutions available on the market nowadays, varying from the basic but easy to use smartphone-based video calls (that can be one to one or in groups, using various apps like WhatsApp, Messenger, Telegram, Signal, and many others), to more advanced, professional solutions (Google Meet, Skype and Skype for Business, MS

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Teams, Cisco Webex Meetings, Zoom, GoToMeeting, and so on). In this section, we will present and compare three of the most popular video-conferencing solutions (Google Meet, MS Teams and Zoom), in the context of their usability and usefulness in a learning context.

3.1.1. Google Meet

Google Meet is the video-conferencing app from Google, with a clear mission to support Premium video meetings for everyone (Google, 2022).
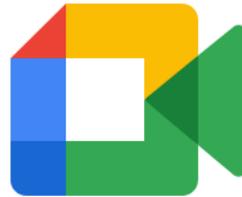
Google Meet is integrated with Google Workspace, and it's simple and intuitive as most Google products. It lacks some of the advanced video-conferencing features that dedicated software have, but it works very well for small or mid-size video-conference meetings. It comes with a free plan and two competitive paid plans. On the free plan, it can host up to 100 participants for maximum 60 minutes, or up to 24 hours for 1:1 meetings.

Fig. 3.1. Google Meet

Image source: google.com

It has many handy features for learning, from digital whiteboards (up to 3 editable jamboard whiteboards) but has breakout rooms available on the paid version only. It doesn't require to

download or install anything on devices – it works directly from the browser. Very useful in business or educational context if all users are on the same Google Workspace, but it allows for good usability for external users, too. Screen sharing and hand raising are standard features of both the browser version and mobile app. Live captioning works seamlessly in Google Meet. Meeting recordings are available just for paid plans.

3.1.2. MS Teams

With MS Teams, Microsoft helps its users make amazing things happen together at home, work, and school (Microsoft, 2022).
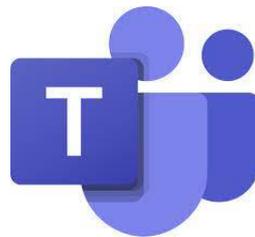
Teams is very Microsoft-centric and can be very effective in Microsoft-based IT corporate settings, with seamless integration with other Microsoft apps (especially the Microsoft 365 suite). The backend configuration can be a bit overwhelming though, particularly for administrators.

Fig. 3.2 MS Teams

Image source: microsoft.com

It offers live captioning and virtual backgrounds, as well as all the necessary features: screen sharing, breakout rooms, hand raising, calendar integration and meeting recording (paid plans

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only). Virtual whiteboards are also included as a standard feature, allowing for in-meeting collaboration (although this feature doesn't work for guest users).

3.1.3. Zoom

Zoom is built to enable the hybrid workforce, bringing together remote and in-person teams (Zoom Video Communications, 2022).

Zoom offers all the features expected from a leading video-conferencing solutions provider: screen sharing, webinars, virtual backgrounds, local and cloud recording (paid plans only), hand raising, whiteboards and breakout rooms.

Fig 3.3. Zoom

Image source: zoom.us

Unlike Google Meet that is Google-centric or MS Teams that is Microsoft-centric, Zoom offers more independence to its users, with plenty advanced features and options for scalability (500

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or even 1000 participants for Enterprise accounts, with add-ons for additional participants), and supports integration with external apps. It is arguably the best choice for meetings in which the participants don't rely on a specific corporate IT infrastructure.

3.1.4. Comparison of features

With no intention to decide a favourite of the three video-conferencing apps (there are different advantages and disadvantages of each of the three in different contexts), we are looking into a comparison of features and functions that are related to learning.

Table 3.1. Comparison of video-conferencing systems

Features	Google Meet		MS Teams		Zoom	
	Free	Paid	Free	Paid	Free	Paid
Free / paid plans	Y	Y	Y	Y	Y	Y
Paid plans starting at	$8 USD/month		$4 USD/month		$14 USD/month	
Dedicated plans and pricing for Education	Y		Y		Y	
Dedicated plans for personal / business	Y		Y		Y	
Max participants	100 (1h) 2 (24h)	Up to 500 (24h)	100	300	100 (40')	Up to 1000 + add-ons
Max duration	24h (1:1)	24h	60'	30 hours	30 hours	30 hours
Join from browser	Y	Y	N	N	Y	Y
Desktop app	Y	Y	Y	Y	Y	Y
Mobile apps	Y	Y	Y	Y	Y	Y
Calendar integration	Y	Y	Y	Y	Y	Y
Chat	Y	Y	Y	Y	Y	Y
Screen sharing	Y	Y	Y	Y	Y	Y
Hand raising	Y	Y	Y	Y	Y	Y
Virtual backgrounds	Y	Y	Y	Y	Y	Y
Whiteboards	Y	Y	Y (1)	Y (1)	Max 3	unlimited
Breakout rooms	N	Y	N	Y	Y	Y
Recording	N	Y	N	Y	N	Y
Integration with Moodle	Y	Y	Y	Y	N	Y (Business/ Educational plans only)

Based on data from: google.com (2022), microsoft.com (2022), zoom.us (2022), moodle.org (2022)

These leading video-conferencing apps presented above offer the necessary features to support great meetings, and some of the features (screen sharing, breakout rooms, chat, whiteboards) are particularly useful for learning environments, allowing for great learning experiences. Of course, mastering all the features and configuring everything for or during live training sessions requires time and exercise on the instructor / teacher side.

3.2.   Collaborative whiteboard applications

As seen in the previous section, all the video-conferencing apps (Google Meet, MS Teams and Zoom) have whiteboard functionalities included in the app. However, there are better options out there: dedicated digital whiteboard solutions. Two of the most popular whiteboard apps are Mural (mural.co) and MIRO (miro.com), and both can seamlessly support collaborative learning in digital, remote environments. The experience of using apps like Miro or Mural is transformative, and online collaboration in such apps is truly on the next level. The features in Miro and Mural can be used to facilitate (real-time) collaboration between students and / or between students and teachers, in both synchronous and asynchronous modes. Moreover, both Miro and Mural can also be integrated into Moodle lessons, as we will see below.

3.2.1. MIRO

Miro recommends itself as *the online collaborative whiteboard platform to bring teams together, anytime, anywhere* (Miro, 2022). It is one of the leading apps for online whiteboard collaboration, offering a myriad of features, templates and workflows that can help team members work together and contribute in real time on shared whiteboards.

Miro offers a free plans for individuals, freelancers and educators, as well as paid plans for teams and businesses.

Miro welcomes the user with templates on different topics and categories, from workshops and ideation to research or design, from trivial ice breakers to strategy and planning formats. And, if nothings fits the user's need, there's always blank whiteboards that can be organized by the user according to any particular needs, using the existing tools and also the apps that can be integrated into Miro.
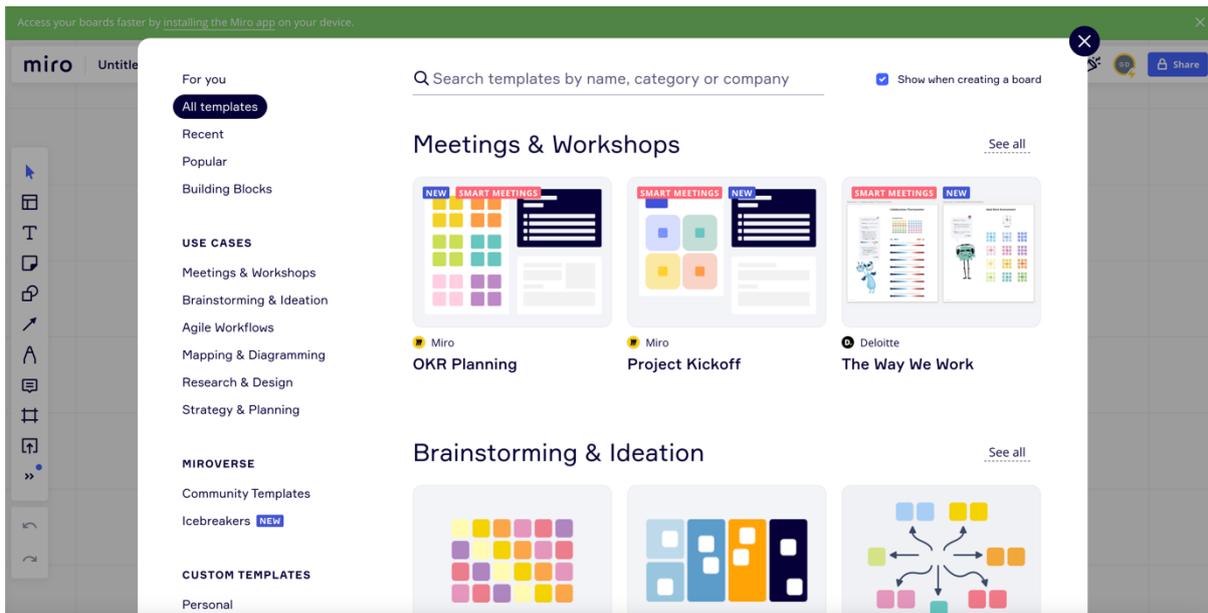
Fig. 3.4. Users can choose from the templates available in Miro

And, with no limits on creativity, Miro can be very useful for learning purposes, and the possibility to integrate (embed) Miro boards into other apps (including Mural) comes in very handy.

3.2.2. Embedding a MIRO board in a Moodle lesson

From a MIRO board, using the Export->Embed option, the code snippet can be copied and then included in a Moodle lesson by pasting the code using the HTML code editor. The step-by-step process is explained (visually) in the images below:
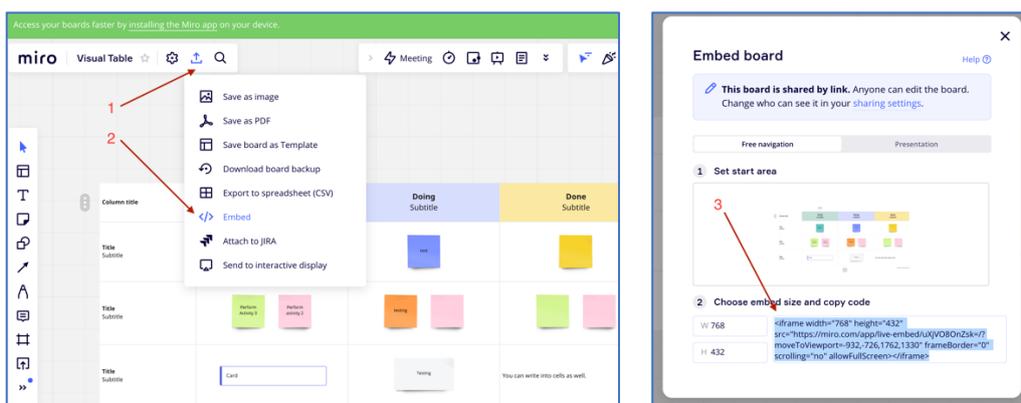
Fig 3.5. Getting the embed code from MIRO
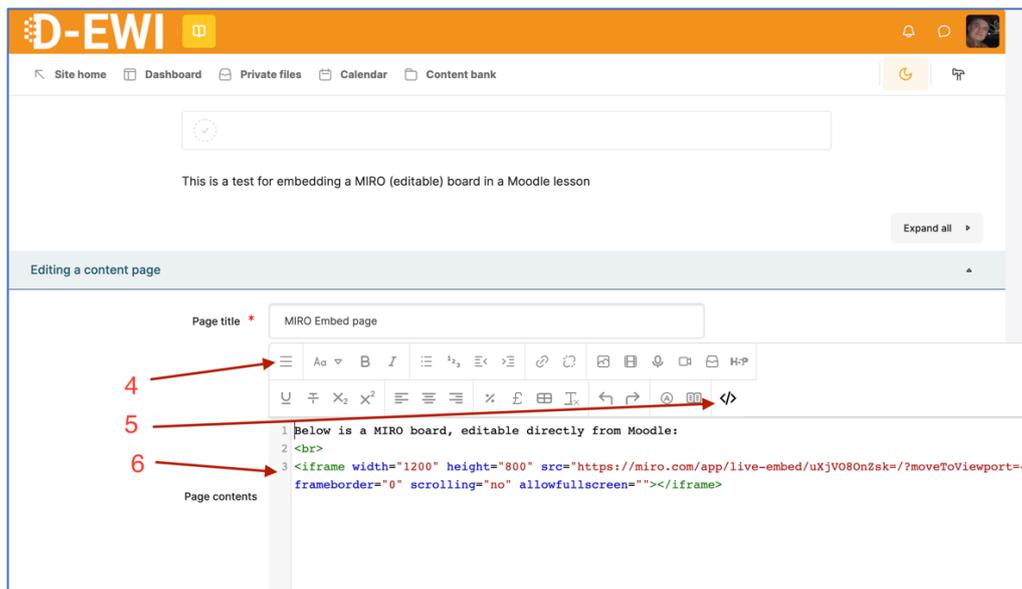
Fig. 3.6. Embedding thew MIRO code in Moodle

In the (animated) image below, we can see how modifications performed in Moodle (on the embedded MIRO board - left) can be observed in real-time on the MIRO board (right), and vice versa (modifications made on the MIRO board can be observed in real-time in Moodle).
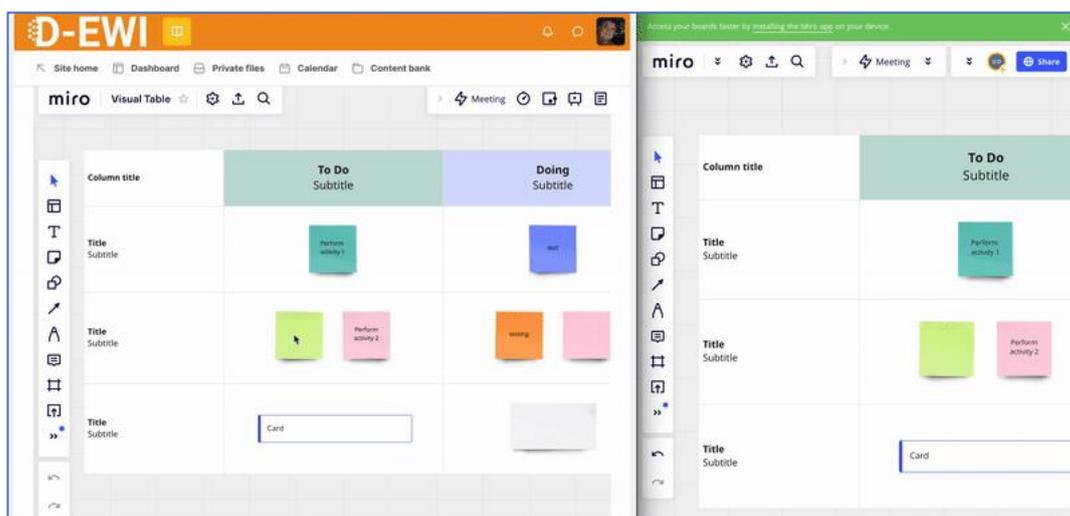
Fig. 3.7. Observing (in parallel) the real-time updates of the MIRO board to and from the Moodle course

Using the MIRO integration in Moodle, different collaborative exercises or workshops can be imagined and implemented, allowing students to participate in such exercises and collaborate effectively in both synchronous and asynchronous modes, since the board (if set as editable by "anyone with the link" in MIRO), can be modified by anyone having access to it, including by the students having access to the Moodle lessons in which the board is embedded.

3.2.3. Mural

Mural's aim is to *connect teams with a digital whiteboard and collaboration features designed to inspire innovation* (Mural, 2022). Similar to Miro, it offers infinite canvas space on digital whiteboards (murals), where the users can work and collaborate effectively online, in real time.
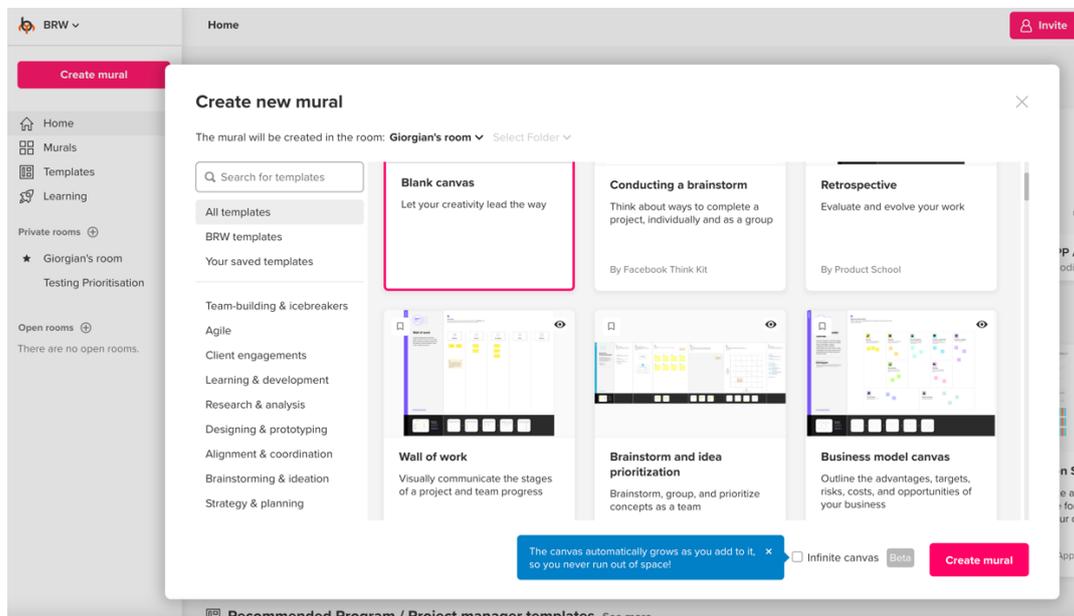
Fig. 3.8. Plenty of templates to choose from in Mural

With lots of templates to choose from, Mural is definitely one of the leading digital whiteboarding apps currently on the market, with competitive pricing (free plan available and discounted plans for education and nonprofits

3.2.4. Embedding a Mural board in a Moodle lesson

Similarly, from a Mural board, using the Share->Embed option, the code snippet can be copied and then included in a Moodle lesson by pasting the code using the HTML code editor. The step-by-step process is explained (visually) in the images below:
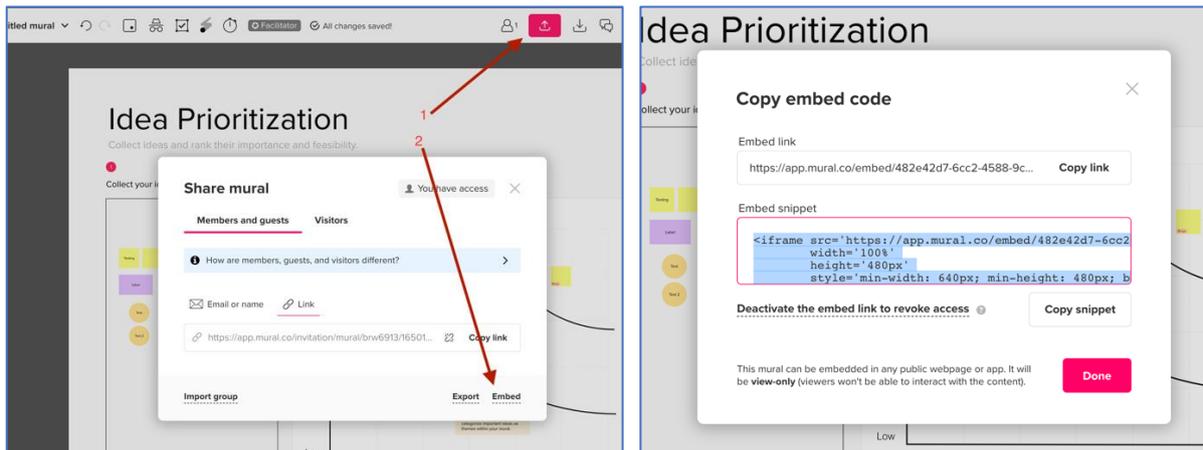
Fig. 3.9. Getting the embed code from Mural
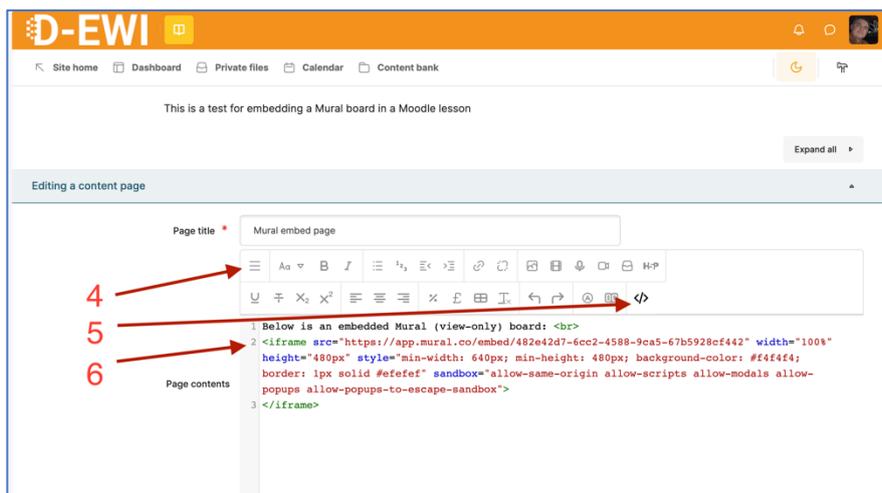
*Fig. 10. Embedding thew Mural code in Moodle*

In the (animated) image below, we can observe how modifications performed in Mural (right) can be seen instantly in Moodle (on the embedded Mural board - left). However, although modifications happen in real-time, the Moodle browser needs refreshing in order to observe the changes. Updates are not possible from Moodle on the Mural board (this is a Mural limitation).
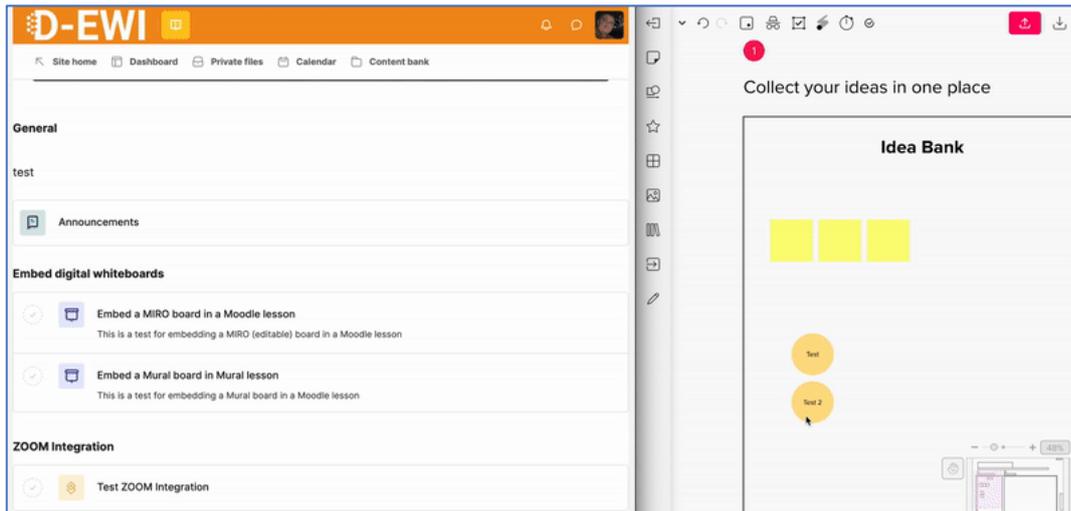
Fig. 11. Observing the updates of the Mural board reflecting in the Moodle course

It is important to note that the Mural embed option can only be used in view-only mode and limits the applicability of the Mural tool for collaborative learning scenarios. However, this can still be useful by allowing course creators to explain concepts and to update the Mural boards without intervening in the Moodle course content.

Overall, although the features of Mural and MIRO are similar, MIRO offers better collaborative features when used as an embedded board in Moodle.

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Available at: https://mural.co/
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4. Quick Guide for Moodle *(M. Kocsis Baán, M. Gáspár)*

Based on the information gained from the Training Needs Analyses, carried out in the framework of the project (see details in Appendix 2,) we concluded, that the course C1 should follow a pragmatic approach, supporting our partners to improve their e-learning skills, directly useful and usable in their course development and course management practice. Focusing not only on the application of advanced, attractive ICT tools, but also on developing pedagogically rich learning environment for their learners, we decided to offer a multi-level guidance in getting familiar with the Moodle Learning Management System, which has already been selected as the future learning environment of the D-EWI learning program. In this booklet, only a short overview of the Moodle tools is offered, as a starting point for educators to find the direction for the further steps – what tools can be used for different purposes. Step by step description of setting up and using each of these elements will be detailed in the series of ppt presentations, combined with acquisition of personal experiences in a "sandbox" Moodle course. Moreover, some examples for teaching engineering by complex Moodle applications will be demonstrated in video-tutorials.

4.1. Short introduction of Moodle

Moodle is the world's most widely used learning platform, offering a free, single robust, secure and integrated system to create personalised learning environments. Due to its open-source approach Moodle is continually being reviewed and improved by a huge international community of developers to fit to the evolving needs of its users. This highly flexible and fully customisable all-in-one learning platform provides the most flexible tool-set to support both blended learning and fully online courses.

Moodle is web-based and so can be accessed from anywhere in the world. With a default mobile-compatible interface and cross-browser compatibility, content on the Moodle platform is easily accessible and consistent across different web browsers and devices.

4.2. Roles in Moodle

Flexibility of Moodle refers also for defining different roles, providing versatile combination of permissions defining a specific user's ability to do something on any page. Here you can find the list and short description of the standard roles defined in Moodle.

- Site administrator - can "do everything" on the site
- Manager - a lesser administrator role
- Course creator - can create courses
- Teacher - can manage and add content to courses
- Non-editing teacher - can grade in courses but not edit them
- Student - can access and participate in courses
- Guest - can view courses but not participate

The most common and important roles are obviously the student and teacher role in the context of a course.

4.3. Moodle tools and functions

Huge number of useful tools are available for users, some of them are typically dedicated for teachers' functions – in the following pages we give an quick overview of them, grouped as follows:

- Basic functions for teachers in course management (Table 4.1)
- Content delivery / knowledge transfer (Table 4.2)
- Learning support for active learning (Table 4.3)
- Assessment (Table 4.4)
- Communication (Table 4.5)

Table 4.1. Review of Moodle tools - Basic functions for course management

Basic functions available for teachers in course management		
If your goal/problem is...	**...you want to achieve this outcome.**	**proposed Moodle tool**
Managing (add, remove) the participants attending your course	to keep only active learners in the course, to add new learners or non-editing teachers to your course	Course enrolment
Creating groups of learners to handle them separately	to filter those students whose activity is different	Grouping users
Text type content should be created within the course (e.g. Page, Book, and setting-up windows of several other tools.	Well formatted text-type content and embedded further elements (pictures, audio, video, hyperlinks, etc.) will appear in the course.	Editing text
Wishing to see on the course screen some useful information, e.g. Calendar, online learners, latest news, results, etc.	Selected, useful items in separate windows will occur on the side of the main learning area of the course.	Blocks
Some elements of the course should be reused without spending too much time for duplications	Duplications in a course or the whole course is easy and time-saving.	Reusing activities
Wishing to control the active participation of learners in the course, from the viewpoint of individual learners and the whole course	Versatile information for monitoring attendance and participation – viewing the progress of individual learners and the whole course.	Tracking progress • Logs, Live logs • Activity report • Course partici-pation • Activity com-pletion

Table 4.2. Review of Moodle tools – Content delivery

Content delivery		
If your goal/problem is...	...you want to achieve this outcome.	Proposed Moodle tool
Displaying (short) course content	Textual course materials with embedded pictures, videos, animations, hyperlinks, etc. to be appeared on a separate page	Page
Displaying course content in a book-like format	Course material displayed as well-structured, linked pages, which may be download (pdf) or printed entirely or by chapter.	Book
Offering existing learning content/useful information to the learners by leading them to external web-pages.	Access can be given to additional information, useful, relevant content without integrating into the course materials.	URL
Offering access to information/content as independent files, without changing, reediting its format.	Original information sources (e.g. publications, standards) are available for learners without any modification. Students can download an open by appropriate software.	File
Several external resources, files should be accessible in their original format, but without appearing as a long list of files in the course structure.	External resources as files are accessible in dedicated folders.	Folder
Students may have problems with too many items in a Topic and some guide can be useful for them.	Course content and different items available in a section of the course can be easily overviewed by the students.	Label

Course material contains special expressions, students may have difficulties to understand the terminology we use. Also international training may be delivered by foreign language, non-native learners may have difficulties with professional language used by the course.	Students may easily look up the meaning of special terms, international students may get language support for understanding foreign words, expressions. Students may be involved in building the Glossary and they may get points in their grading system as well.	 Glossary
We need a tool for enabling participants to create, maintain and search a bank of record entries. Students may be involved in the process of collecting such resources.	As an example, database of technical literature, publications can be generated by the students, in which different aspects can be followed in searching adequate items. Learners may receive points in the grading system.	 Database

Table 4.3. Review of Moodle tools – Learning support for active learning

Learning support for active learning

If your goal/problem is...	...you want to achieve this outcome.	Proposed Moodle tool
Learners should submit their homework in any type of digital file, grading and comments from teachers are necessary.	Learners will have clear description on what and how to submit as a homework and will receive feedback (grade, comments) from the teachers. Each student will see only his/her homework and result!	 Assignment
Learners should submit their homework, and then assess the homework of the other (selected) learners.	Students add submissions which are then distributed amongst their peers for assessment based on a grading scale specified by the teacher.	 Workshop
Learners may follow different pathway within the lesson, depending on the questions/tasks prescribed by the teachers	Offering some learning materials in an adaptive learning process, e.g. students may close up to the required level.	 Lesson

Table 4.4. Review of Moodle tools - Assessment

Assessment		
If your goal/problem is...	**...you want to achieve this outcome.**	**Proposed Moodle tool**
Using versatile, powerful assessment methods, with reusable elements offering automatic assessment and multipurpose analysis of results.	Assessment tool supporting self-assessment, grading, final exams based on mainly automatic operation, generating useful reports.	Quiz
Versatile question types for matching the needs of in-depth assessment in engineering learning programs.	Versatile question types for grading students' learning progress and offering feedback as well.	Question types • Multiple Choice • True/False • Matching • Essay • Drag and drop onto image • Select missing words • Embedded Answers (Cloze)
Possibility for analysing test results from different aspects.	Detailed reports, supporting versatile analysis, exportable for archiving.	Quiz reports
Quick overview of students' grades, including the possibility for manual modifications.	Collection of each grade of each student, received for different activities graded by the course	Grades

Table 4.5. Review of Moodle tools - Communication

Communication		
If your goal/problem is...	**...you want to achieve this outcome.**	**Proposed Moodle tool**
Allowing users to send and receive private messages via Moodle.	Fast, efficient communication possibility automatically showing the new messages when the user logs into the Moodle site.	Messaging
Allowing participants to have structured, asynchronous discussion.	Interaction between participants is encouraged for disseminating information, including attachments as files, images, sound or video as well.	Forum
Allowing participants to have a real-time synchronous discussion.	Users may share their opinion/experience/ideas in real-time discussions.	Chat
Important dates should be displayed in a calendar	Learners can find all important dates related to site, category or course, but also individual user may give entries for his/her own calendar.	Calendar
Alerting users (teachers, students) about events, activities to be done, etc.	UpToDate information provided to users.	Notifications
Asking a question and specifying a choice of multiple responses to consider the opinion/willingness of learners.	Getting quick answer of learners for making decisions, selecting one option from pre-defined possibilities.	Choice
General, standardised survey	Some questions may be exported to a customised Feedback survey	Survey
Collecting feedback information from students to evaluate the course or the teachers' performance.	Flexible survey based on self-developed questions	Feedback

4.4.   References and useful links for Chapter 4

[1] https://moodle.org/

[2] https://docs.moodle.org/400/en/Main_page

[3] https://moodle.academy/course/index.php?categoryid=2&lang=en_wp

[4] https://youtu.be/3ORsUGVNxGs

[5] https://www.youtube.com/playlist?list=PLxcO_MFWQBDc2eUh8b-sK2O-fNm_9WAvc

[6] https://moodletoolguide.net/en/

[7] https://ccweb.cc.sophia.ac.jp/admin/wp-content/uploads/2020/05/Moodle-Teachers-Manual_20200519.pdf

Annexes

Annex 1. Glossary

Ability	the physical or mental power or skill needed to do something (Cambridge Dictionary).
Andragogy	Andragogy refers to methods and principles used in adult education. The word comes from the Greek ἀνδρ- (andr-), meaning "man", and ἀγωγός (agogos), meaning "leader of". Therefore, andragogy literally means "leading men", whereas "pedagogy" literally means "leading children".
Badge	Badges are a good way of celebrating achievement and showing progress in learning.
Behaviourism	Behaviourism in general is a systematic approach to understanding the behaviour of humans and other animals
Brain dominance	The brain consists of twin halves, a left hemisphere alongside a nearly symmetrical right hemisphere (Gamma, 2021). Which we use more that hemisphere is the dominant.
CAI	Computer Assisted Instruction
CBI	Computer Based Instruction
CBT	Computer Based Training
Connectivism	Connectivism is a theoretical framework for understanding learning in a digital age. It emphasizes how internet technologies such as web browsers, search engines, wikis, online discussion forums, and social networks contributed to new avenues of learning.
Constructivism	Constructivism is a theory in education which posits that individuals or learners do not acquire knowledge and understanding by passively perceiving it within a direct process of knowledge transmission, rather they *construct* new understandings and knowledge through experience and social discourse, integrating new information with what they already know (prior knowledge).
Creative Commons	Creative Commons (CC) is an American non-profit organization and international network devoted to educational access and expanding the range of creative works available for others to build upon legally and to share.

Gamification	Gamification is the use of game elements and techniques (not in a game context) to engage people and solve problems (Deterding et al., 2011).
Generation	recurring cycle (Strauss and Howe, 1991).
Generation Theory	generations, whose consumer behaviour and patterns are similar (Strauss and Howe, 1991).
Flipped classroom	A flipped classroom is an instructional strategy and a type of blended learning, which aims to increase student engagement and learning by having pupils complete readings at home and work on live problem-solving during class time.
IBT	Internet-Based Training
LMS	Learning Management System is a software application for the administration, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, or learning and development programs.
MOOC	Massive Open Online Course is an online course aimed at unlimited participation and open access via the Web.
Motivation	enthusiasm for doing something (Cambridge Dictionary).
OCW	OpenCourseWare (OCW) are course lessons created at universities and published for free via the Internet.
OER	Open Educational Resources are freely accessible, openly licensed instructional materials such as text, media, and other digital assets that are useful for teaching, learning, and assessing, as well as for research purposes.
PBL	Problem-based learning. Problem-based learning regards a subset of project-based learning.
PrBL	Project-based learning. Project-based learning is based on the practice of solving problems. (Savage, Chen and Vanasupa, 2007)
SCORM	Shareable Content Object Reference Model is a collection of standards and specifications for web-based electronic educational technology (also called e-learning).
Skill	an ability to do an activity or job well, especially because you have practised it (Cambridge Dictionary).

STEAM	Science, Technology, Engineering, Arts, and Mathematics, as collective fields of study
SWOT analysis	SWOT analysis: Strength, Weaknesses, Opportunities, Threats
TEL	Technology-Enhanced Learning
VET	Vocational Education and Training is education that prepares people to work as a technician or to take up employment in a skilled craft or trade as a tradesperson or artisan.
VLE	Virtual Learning Environments
WBT	Web-Based Training

Annex 2. Training Needs Analysis – purpose, methodology and results

In the framework of D-EWI project, development of the IO1/C1 staff training program has been started with a Training Needs Analyses in order to get more information on the skill gaps of potential learners and their expectations related to the course. It was also considered that the learning materials to be developed in this staff training programme will be available as a free online course beyond the project lifetime for the general public as well.

The purpose of this survey was to analyse information on the previous experiences and attitudes of potential learners. Based on the results of this TNA we intended to determine the most important elements of the skill gap and compile the program of the 24 hours short course (C1) and further support materials, which will meet the needs of participants and will support the further phases of the project implementation.

The survey was carried out between 23 March – 20 April, 2022, based on the Google form available at: https://forms.gle/vHovYNHvPCNzXseA

The questionnaire included 16 questions, covering the following aspects:

- previous experiences of the participants
- expectations and attitudes
- e-learning tools known/used by the participants

By the deadline of 20 April, 15 answers were received, the database of answers was downloaded as an excel file, and diagrams were edited by excel, in more appropriate format for analysis, than the Google Form offered.

All diagrams and detailed conclusions can be found in the presentation of the 1st day of the C1 course, so here we outline only some of the most important aspects, and the decisions, drawn from these conclusions.

Regarding the previous experiences:

- A third of respondents have no previous experience of elearning, even as students,
- Also, a third of them has less than 5 years of experiences in teaching practice at all,
- In classroom teaching practice, all of them use more or less ICT tools, mainly ppt presentations, but a quarter of them widely use digital tools, videos and some interactive elements.
- 20% of them has no experiences in blended learning, but more than half of them use e-mails for communication with students, who can submit their project works, tasks online.
- **As it was expected, more than half of them had to change to online teaching just due to the COVID, and a further third of them had only some limited experiences in online teaching before the pandemic.**

- More than half of them has no any previous experiences with any learning management system, and the majority of the others have limited experiences in teaching with Moodle – see Fig. Q6 below.
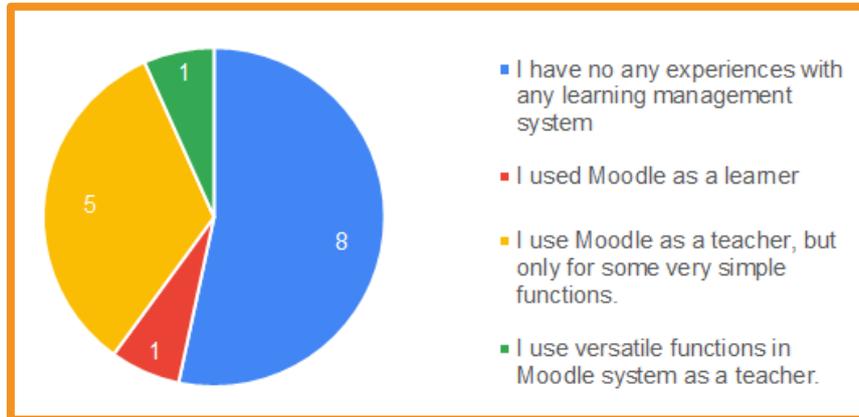

Fig. Q6. Answers for the question: *"What about your expertise in using Moodle learning management system?"*

Regarding the attitudes and expectations:

- Nearly all of them identified accessibility and flexibility as being the most important advantages of online/distance learning.
- *Short courses on online teaching tools* and *Video-tutorials on how to use specific tools* were identified by 80 % of them as the most helpful support for teachers to develop their skills in online teaching.
- As regarding the main challenges for teachers in switching to online/distance learning, nearly all of them mentioned the *Loosing personal contact with learners* and *Keeping all learners motivated and engaged*, but also *Converting activities and content into online and distance learning.*
- Their expectations with regarding the C1 course were also important information to be considered in defining the course structure, content and methodology: two third of them put *Learning Platforms & Tools* to the top of their priority list, in what sense they wish to improve their skills in applying digital tools for education. See detailed answers for this question in Fig Q10.
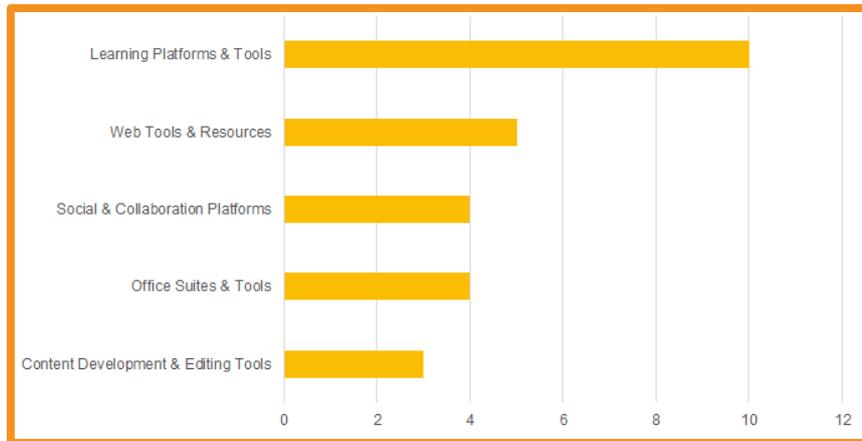
Fig. Q10. Answers for the question: "*In what sense do you think you wish to improve your skills in applying digital tools for education?*"

Based on detailed analysis of responses, the following conclusions were drawn and considered in compiling the content, the structure and methodology of the C1 short joint staff training course:

- Participants are open for innovative educational solutions, they have positive attitude and realistic, but high expectations.

- Our training program should strongly focus on Learning Platforms and tools, and especially on Moodle and the practical application of Moodle tools and functions, starting from the basics.

- As project partners are involved in the course development process as well, access to a Moodle platform in teacher role has been provided for partners from the very beginning - practice oriented approach in methodology, „learning by doing".

- Descriptions on the details of setting up different Moodle tools are provided in ppt presentations – presented during the course – but also further support materials and resources are offered.

- In order to give an orientation to the partners, for what purposes and how the different Moodle tools and functions can be applied for their further activities, examples of relevant course elements will be used for demonstration purposes, in a demo course and by video-tutorials.

Annex 3. Excerpts from D-EWI project partners' research reports

As described in the project proposal, IO1 focuses on preparing the Guide on implementing and using of e-learning digital tools. The activities and tasks are distributed in a balanced way between partners, according to their expertise and allocated budget, so that each of them will play a well-established role, without any overlapping of activities/responsibilities. In order to prepare the Guide on implementing and using of e-learning digital tools, joint activities started with *Task1*: Research activities on innovative Digital E-learning Tools to elaborate the educational materials, previous research activities will be performed in order to be updated with new trends in Digital Learning Tools in VET. Topics to be researched by the partners are the followings:

Organisation and course management - UoM

Setting up student groups and define tasks - UoM

Communication via the e-learning framework - CESOL

Defining the learning environment, class management - ISQ

Defining grades and feedback to students – IIS

Delivery of essays and feedback - ISIM

Monitoring attendance and participation - EWF

Monitoring and assessment of student progress – IIW

In the process of this research activity Partners followed different approaches, basically of two different concepts:

- some partners focused on the practical approach of introducing the appropriate Moodle tools and functions. So far these research results served as the basis of the further task of developing ppt presentation to be used during the C1 short course.
- some others followed a wider and more generic approach for exploring new trends in digital learning – their contribution to the learning material will not occur in ppt presentations, but as their values should not be wasted, here we will give a summary of them as sections of this appendix.

In this appendix excerpts from three of D-EWI project partners' research reports will be summarised:

A. *Digital tools for teachers to use in classroom – Research report of IIW*
B. *Online training: establishing conditions & procedures of assessment - Research report of EWF*
C. *Educational Technology Trends In 2020-2021 – Research report of IIS*

A. Digital Tools For Teachers To Use In Classrooms

Grabbing students' attention and keeping everyone active during the class is very important, but also very difficult to accomplish. In order to make classes more interactive, fun, and educative at the same time, teachers should pay attention to new teaching methods and tools. These tools can help both teachers and students, allow them easier access to learning materials, faster and more effective grading, etc. For those teachers that are looking for a new way to improve their class, here are 5 tools that should make their job easier and bring additional value to their students.

A/1. Google Classroom

This Google service allows teachers to organize their class, interact with students, grade their work, check on their progress, and much more. Because it's available on smart devices and only requires a Google account, Google Classroom brings in a certain amount of flexibility to both teacher and students alike.

It works pretty simply; the teacher creates a class and invites students to join by sending them an invitation via Gmail. The students then join the class and they have instant access to all the materials that the teacher provides. Moreover, the teacher is able to create quizzes, assign essays, tests, even create a class calendar with important dates, so students could always stay updated, etc. The teacher has access to students' ongoing work and has the ability to provide insightful feedback. In a word, this tool is a virtual classroom that's always open.

A/2. Editing Services

Some students are talented writers and have no problem with creating any type of written content. However, not all of the students are the future Hemmingway and often struggle with essays and other written assignments. Editing services can help students with their term papers, book reviews, research papers, proofreading, etc. These types of online services allow students to take some of the load off, in case they have too much on their hands. Additionally, the proofreading feature allows students to learn from their mistakes and get better at spelling and grammar.

However, this tool is not only for those that are not gifted writers. International students can also achieve more and progress faster with the help of online editing services.

A/3. ClassMarker

This simple tool allows teachers to create an online test that is instantly graded, which can save them a whole lot of time and allow them to focus on more important issues. What's really good about this tool is that it allows multimedia content, so teachers could add pictures or videos to the test sheet to make the whole experience even more attractive and interactive.

The teacher has the ability to create groups and give each group a separate test, but also has the option to create a single test and share a link to the test with the entire class via email. The students get the test results instantly, and all of the tests are stored in the teacher's personal database, which is a great way to keep track of each student's progress. Additionally,

ClassMarker allows setting a time limit for each quiz and availability dates, which can help teachers in case they have a large number of students to pay attention to.

A/4. Edmodo

Another useful tool that not only makes the teaching experience easier but also helps integrate teachers, students, and parents in the learning process. Edmodo allows teachers to create groups, quizzes, assign papers, manage students' progress, etc. It's also possible to connect Edmodo with your Google or Microsoft account and transfer files from one service to another seamlessly.

This tool is a great way to keep parents up to date with future events, current grades, progress, etc. Since teachers can allow access to both students and parents, each user has a certain level of access to Edmodo content. This way parents will be able to see where they should jump in when it comes to helping their children achieve better results.

Talking about achieving more, Edmodo also allows teachers and students from all over the world to share knowledge and resources with each other. One of the features of this tool is the ability to share any type of content with other users and get access to materials that others decided to share.

A/5. Kahoot

Did anyone say that games are not educational? Kahoot is a learning tool that allows teachers and students to create fun games in order to test knowledge and engage the entire class. There is virtually no limit to the number of questions or their format; you could place videos, images, and even diagrams to each question to make the game more interesting.

This type of learning experience can really keep the whole class engaged, as each student joins the game via their smart devices while the results appear on a shared screen for everyone to see. Forming multiple teams can build a competitive atmosphere which students would enjoy. In addition, the online nature of Kahoot allows you to include even those students that are unable to attend the class, but are willing to participate in the game. Furthermore, teachers could assign homework using this tool, and have instant access to results.

Conclusions

With the digital era taking over, it's important to include digital and online tools into the learning process. Students rely on smart devices and internet more than on conventional learning methods. Keeping up with this trend is what allows the teacher to better understand students and their needs. Additionally, these tools make the learning process more interactive and allow easier flow of information, which makes the teacher's job much easier.

B. Online training – establishing conditions and procedures of assessment

B/1. Establishing conditions for online training [1]

Before teaching, the teachers must do the following steps presented in the figure below.
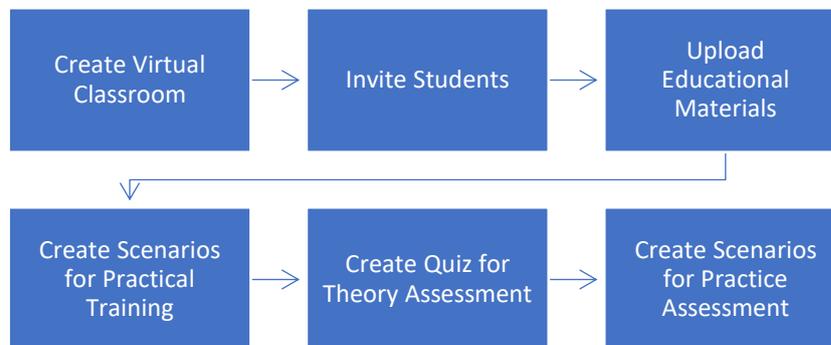
Fig. 1. Establishing conditions for online education

B/1.1. Create Virtual Classroom

The virtual classroom can be created using the tools from Google Suite by accessing **Google Classroom.** After login with teacher credentials, the teacher can create a virtual classroom by introducing at least the name of the course. In addition, the teacher can generate a **Google Meet** link that can be visible by the students that will allow them to connect with teacher during the teaching/assessment process.

B/1.2. Invite students

The students must be invited to join to the classroom created before. The invitation can be sent using classroom tools after adding the students to virtual classroom or by sending individual email with virtual classroom code using LMS. The figures below present both ways to invite students to join to virtual classroom (Fig. 2. a) and b))
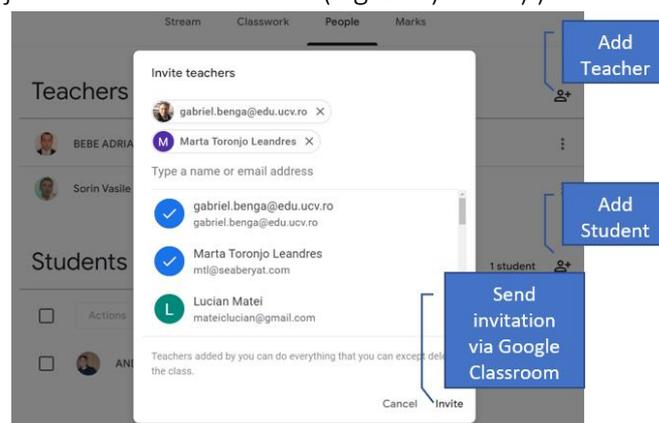

Fig 2. a) Methods to invite students to join virtual classroom - Google Classroom

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[1] [1] **Extracted from the Research undertaken in the scope of DRinVET project "Digital Reality the basis for Skills Training" – IO3 "How to…" Contribution from UCV – Research report from EWF**
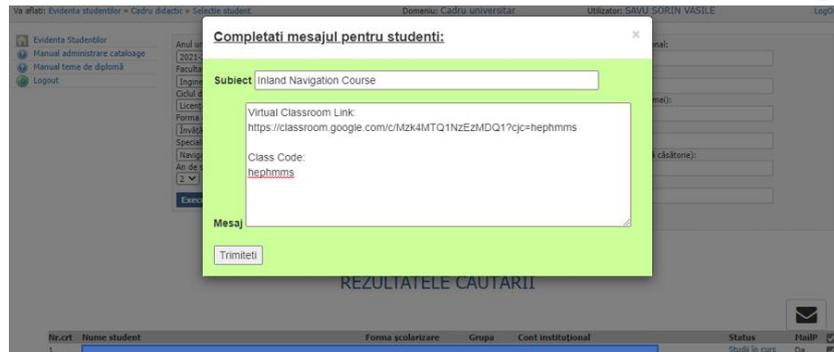
Fig. 2 b) Methods to invite students to join virtual classroom - using LMS

B/1.3. Upload Educational Materials

The educational materials should be in digital format in order to allow their upload on Google Classroom. Each teacher can choose what kind of digital educational materials will suit better to their teaching purposes. Based on this assumption and tools provided by Google Classroom, the teachers can prepare and upload the information and content of their disciplines as follows in figure below. The platform allows to upload even stand-alone applications similar with executable programme that is subject to practical training in inland and maritime navigation.
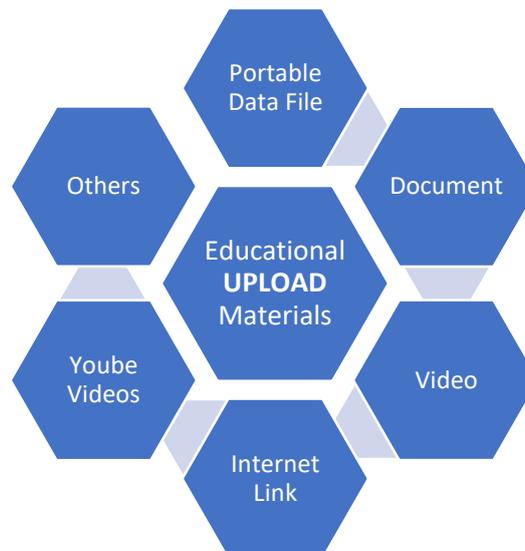

Fig. 3. Types of digital educational materials for virtual classroom

B/1.4. Create Scenarios for Practical Training

Practical training on inland navigation simulator is usually performed in laboratory conditions, but in special cases imposed by COVID-19 restrictions can be done at home. For practical training the students will have to accomplish the scenario and then to upload its work on the virtual classroom, in the *Assignment/Practice Module* category.
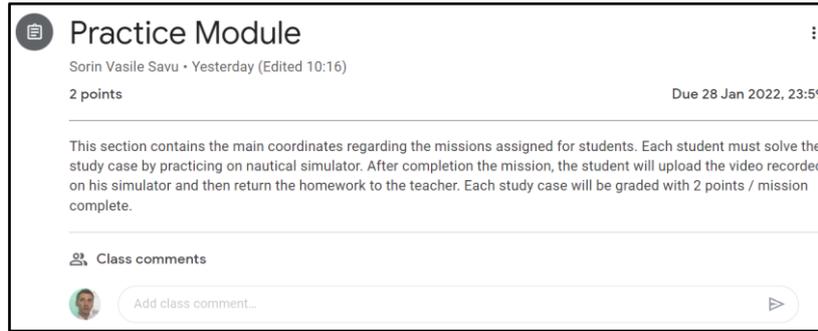
a.)
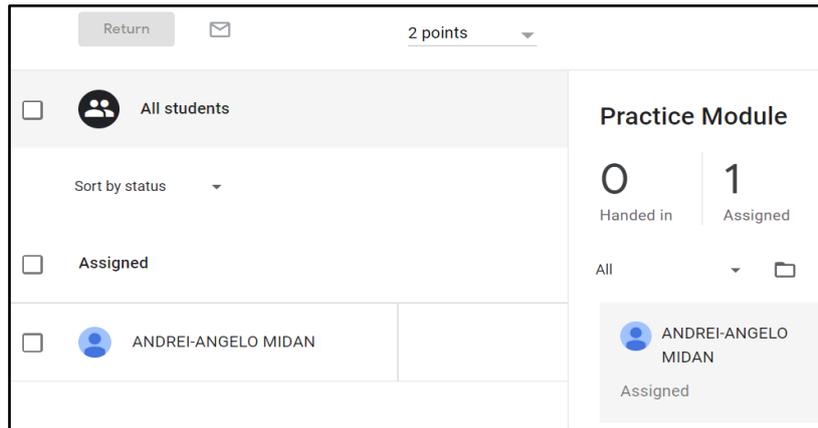
b.)

Fig. 4 Create practical training assignment for students
a.) mission description, b.) assignment homework for student

The teacher creates the scenarios for practical training using gamification tools.
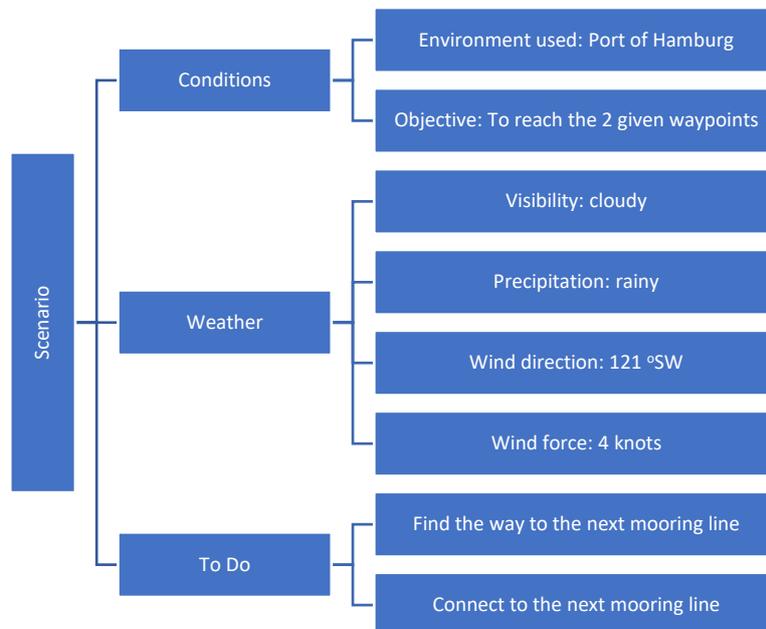
Fig. 5 Scenario for practical training on inland and maritime navigation simulator

B/1.5. Create Quiz for Theory Assessment

The assessment of theoretical aspects presented during semester will be performed using fast quiz with questions with multiple choice answers. Each question will be graded with 1 point, but all questions will be mandatory.
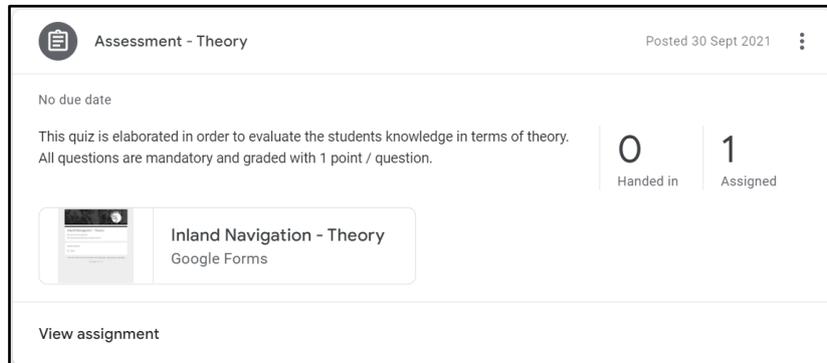
Fig. 6 Example of fast quiz assigned to the students

B/1.6. Create Scenarios for Practical Assessment

The assessment of the work done and grading the students for practical training will be performed using the following rubric:

- The student should be able to manage leaving from the dock and out of the terminal
- The student should be able to unload and then load the containers
- The student should be able to move down the river and then to the next terminal

The rubrics related to student's performance is well established by the teacher in discipline fiche. For both best practices the rubrics established are:

Table 1. Rubrics for summative and formative evaluation

Online/Blended Practical Training	Theory Quiz	Practical Examination	Total
10	10	10	10

The Google Classroom platform allows multiple grading for different assignments and a final grade for the student performance during assessment process. However, the teacher can modify the grades if he considers that the student worth more or less.

B/2. Establishing procedures to perform harmonized online assessment of learnings gained through virtual environment[2]

B/2.1. Assessment tools

A questionnaire on Online Assessment was open from the 28th of June until the 17th of September 2021 and gathered a total of 19 answers, from DRinVET project partners, Vocational, Education and Training (VET) schools, Training institutes and Universities. The goal of this questionnaire was to evaluate if online assessment was a current practice within VET partners organisations, and other educational establishments, as mentioned above.

As for the mapping of tools to support the performance of online assessment, almost equivalent mix between the most commonly used available options – **Microsoft Teams, Zoom, Google Meet, Google Forms and Microsoft Teams** – and some other interesting suggestions, such as: **Testmoz, Moodle, Vulcan, Wizer, Kahoot, Quizizz, Worldwall, Liveworksheets, LearningApps and eXaminer**

In this context, the best practices examples to perform online assessment were identified, referring to:

- Online quizzes;
- Essay questions;
- Drag-and-drop activities;
- Use tests for self-learning;
- Use tests to assess theoretical aspects;
- Use tests to receive feedback from learners (e.g., satisfaction test);
- MS Teams;
- To be able to review as many times as you want, viewing a video of the practice, the execution of the exercises that the student has done; To be able to propose individualised reinforcement activities;
- Online welding training courses; Online simulator training courses for spray painting technologies and abrasive blasting;
- Online training courses for electrical;
- Moodle;
- Merlin;
- Loomen;
- Moodle offers good evaluation functions;
- Google slide; Google document;
- Google forms.

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[2] **Extracted from the Research undertaken in the scope of DRinVET project "Digital Reality the basis for Skills Training" – I06 Guideline for Online assessment: Tools with procedures to perform harmonized online assessment of learnings gained though virtual environment**

The efficient online platforms to perform online assessment were: Google Forms; Microsoft Teams; Google Meet; Zoom; Moodle; Vulcan; Google Classroom; eXaminer; LearningApps, which will be described next.

Microsoft Teams

Microsoft Teams is available to everyone and allows people to interact at any time through chat or call with or without video. In this interactions, documents such as photos, videos, chat history and meeting notes are always available, making it easier to work together. Some functionalities that might facilitate training and assessment through this platform are the 24 bots available that offer different functionalities to help increase productivity (e.g., answering questions about Teams, do research and consult with colleagues, create and send periodic reports, among others); the ability to tag someone by drawing more attention to them specifically; share, through the chat, reminders or documents with the participants before the meeting, as well as record the meeting; raise a "virtual" hand when you have a question or doubt without interrupting the speaker, and the latter will be notified allowing you to speak when convenient; bring your physical board onto the screen if you have the Teams Room System content capture cameras ("magic whiteboard"); amongst others. MS Teams, also encrypts all data, in compliance with the standards, including ISO 27001, the LGPD, and GDPR, Europe's privacy laws. The platform is also part of Microsoft's global network of datacentres, which has a transparent operating model, ensuring that the data will be protected with the world's most advanced security measures.

Moodle

Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalised learning environments. You can download the software onto your own web server. Moodle delivers a powerful set of learner-centric tools and collaborative learning environments that empower both teaching and learning. A simple interface, drag-and-drop features, and well-documented resources along with ongoing usability improvements make Moodle easy to learn and use. Moodle is provided freely as Open Source software, under the GNU General Public License. Anyone can adapt, extend or modify Moodle for both commercial and non-commercial projects without any licensing fees. Moodle's multilingual capabilities ensure there are no linguistic limitations to learning online. Moodle provides the most flexible tool-set to support both blended learning and 100% online courses. Its modular set up and interoperable design allows developers to create plugins and integrate external applications to achieve specific functionalities. Committed to safeguarding data security and user privacy, security controls are constantly being updated and implemented in Moodle development processes and software to protect against unauthorised access, data loss and misuse. Moodle can be easily deployed on a private secure cloud or server for complete control. Moodle is web-based and so can be accessed from anywhere in the world. With a default mobile-compatible interface and cross-browser compatibility, content on the Moodle platform is easily accessible and consistent across different web browsers and devices.

Google

Google offers an assortment of useful tools that can be used not only for training but also for online assessment, such as: **Google Docs, Sheets and Slides**. These tools facilitate collaborative

work as multiple people can edit the same document at the same time and/or give instant feedback on the content that is being produced.

Another practical tool specially for online assessment is **Google Forms**, as this tool allows the creation of questionnaires from a range of question options (e.g., multiple choice to drop-down menus to a linear scale), add images and YouTube videos, or design more sophisticated surveys with page branching and question skipping logic. The answers are automatically collected and presented with information and in graphics that can be viewed in real time. In addition, you can also view all the data in Spreadsheets.

Google Classroom is another valuable tool that can be used to deliver and assess training as it allows teachers/trainers to track student progress, export scores and keep grading consistent and transparent with comments displayed alongside student work; store frequently used phrases in a customizable comment bank; prepare and schedule tasks, assignments, and quizzes across multiple classes and track how students/trainees are engaging with classroom tools; give students/trainees the ability to adjust accessibility settings so they can learn in the way that works best for them — even in multiple languages; keep everyone on track with to-dos and due dates that automatically appear on calendars when classwork is created; upload coursework documents automatically as templates; enable students/trainees to check their own work for recommended citations by scanning it against hundreds of billions of web pages and over 40 million books with originality reports; allow students/trainees to snap and submit a picture of their paper homework quickly and easily with improved image capturing. In terms of security, Classroom has rigorous standards for security and privacy — and is regularly audited by third-party organisations.

As for **Google Meet** this resourceful tool allows high quality, secure and accessible online meetings, since it provides instant captions created by Google's voice recognition technology.

LearningApps

This Web 2.0 app was created to support the learning and the teaching processes. Offers small interactive modules that can be used directly in learning materials but also for self-study. The goal is to collect reusable building blocks and make them available for everyone. The blocks (called Apps) do not include a specific structure or specific learning scenario. The blocks are therefore not suitable as complete lessons or tasks but should be incorporated into an appropriate teaching scenario.

Zoom

This tool can be used to manage classes (e.g., waiting rooms, customisable virtual seating chart, multi-fixing, multi-stacking, among others); increase engagement and participation through content sharing, annotation, digital sharing board, simultaneous classrooms, polling, feedback and hi-fi music mode; record lessons and lectures to allow students/trainees to learn at their own pace; personalize the learning/training experience by integrating LMS providers such as Canvas, Blackboard, Desire2Learn, Moodle, Schoology, Sakai and others, create custom integrations with Zoom's LTI Pro, and access to other educational apps with the Zoom App Marketplace; accessible through closed captioning, live transcription, keyboard shortcuts and other accessibility features give students access to the services they need. In terms of security Zoom provides classroom SSO, meeting security features and other measures to help protect and prevent disruptions as well as enable FERPA and GDPR compliance.

B/2.2. How to ensure the quality of the evaluation of digital learning outcomes
B/2.2.1. Student Progress Report and Tracking

In order for students to keep track of their own learning progress and easily identify which are the subjects they need to deepen their knowledge or focused in practicing more, a few examples of tracking features that can be used to enhance/facilitate this process are listed below:

- Grade book (e.g., using excel) to keep track of student progress, in the beginning of the course. This approach will allow the teacher/trainer to easily provide frequent feedback to the student/trainee on their work; facilitate the learning process and promote student/trainee motivation throughout the course. In line with this method, individualized feedback should also be given preference as it will foster motivation and optimize the student/trainee learning experience.
- Tools for course management system to keep track of student/trainee assessment therefore contribute to a more comprehensive evaluation, such as student assignments, discussion postings, presentations, quizzes and essays.
- Academic honesty/transparency promoted by asking deep thinking questions, taking preventive measures, utilizing plagiarism detection tools and features of course management systems. Teachers/Trainers should promote honesty from the beginning of the course by sharing the content, format, rules and honour codes with the students/trainees, in particular for summative assessment. This environment should also be reflected in the syllabus and course materials (e.g., statements about academic honesty, definitions of cheating/plagiarism and consequences of academic dishonesty).
- Use questions that can challenge students/trainees in their answers.

B/2.2.2. Quality requirements to conduct online assessment

Good assessment begins with the clear definition of learning objectives (e.g., intended instructional outcomes, that should be specific and measurable, as well as concerned with student learning). The assessment is used to contribute to the improvement of student/trainee learning and to identify students' strengths and weaknesses. By clearly defining the learning objectives and aligning your assessments accordingly, it is easier for students/trainees to prepare themselves for each stage of the assessment. Getting familiar with the writing style of the students/trainees can also be beneficial to understand the though process being a final paper. Establishing intermediate deadlines to submit drafts along with references might facilitate this and can also act as a mean of preventing cheating. Some suggestions of best practices for online assessment that teachers/trainers should implement are as follow:

- Ensure that the assessment is kept in line with the learning objectives and scope of the course, to guarantee it is relevant.
- Make sure when creating materials (e.g., case study projects, multiple choice questions, short essays) for online assessment that the How, When and Where are clearly identified and outlined. Followed by instructions on what to do if facing technical difficulties,

as a preventive way of diminishing the anxiety and stress caused by the assessment situation.

- Timed online tests (e.g., multiple choice, fill-in, and short answer); open book quizzes are also a great option.
- Use test security measures such as 1. issuing a password to access the test and using features of course management system such as locking down a browser to prevent printing, copying, going to another URL, or accessing other applications; 2. establish a limited time per question (e.g., 1 minute per multiple choice and 15 to 30 minutes per discussion questions/resort to management system features); 3. development of parallel forms of tests with randomizations of items; 4. create open book/notes tests and use items that require higher-order thinking so that answers cannot be easily copied and pasted from external sources.
- Attribute points to assignments/quizzes for completion.
- Assign low percentages of course grade to practice quizzes/tests.
- Use other methods besides online testing, such as essays, discussion participation, real time online chat sessions.
- Create a FAQ (Frequently Asked Question) section to respond to common and recurring questions.
- If you see students who are not actively participating, follow up with them through email.

Within the current EWF system, the assessment tools being used are in the form of case study projects, multiple choice questions and short essays.

C. Educational Technology Trends In 2020-2021

Big Data, Machine Learning, and the Internet of Things (IoT) were the biggest educational technology trends of 2019. However, distance learning has become the one trend that rules them all. The COVID-19 pandemic has drastically changed the way we teach and learn. Students now have to get used to distance learning via digital platforms due to social distancing. Even though some schools are reopening, this trend may continue until 2021. The latest EdTech trends in 2020, and further into 2021 are being revolutionized with a strong focus on connectivity, versatility, and student-centered learning. Let's take a look at the latest top 10 trends in educational technology Teaching And Learning Process Firstly, Educational Tech benefits how teachers teach, both online and offline. Not always having to go to a specific class at a specific time, students can learn whenever and wherever. Secondly, EdTech changes the way students approach learning. EdTech makes learning more fun and exciting for students. When we feel engaged in learning, we learn better, remember better, and also apply knowledge better to real life. Lastly, technology makes education smarter, more effective, thus, satisfying learners' needs more. True educators bring valuable knowledge to learners, both in theory and in real life. But smart educators are those who can create teaching from what learners want to learn.

To sum up, EdTech doesn't mean teachers have to become IT experts. But it's true that teachers can do these fascinating things only with technology, and that's why we need EdTech in life.

C/1. Top 10 Current Educational Technology Trends In 2020/2021

If you are an innovative educator, following the trends in education is probably not something new but rather essential. Even with this list, however, it is still up to you to choose the most suitable "trendy" aid for your teaching and training. Here we select the 10 latest educational technology trends that are must-know when diving into this industry.

C/1.1. eLearning

Distance learning became the top 2020 educational technology trend overnight because of the rapid spread of COVID-19 and school closures. This led to a rising demand for online educational platforms. eLearning is education or training delivered electronically. It can be slide-based online activities, or it can also be an online course that helps a business train employee in necessary skills.

With eLearning, educational content is delivered to learners through computers, laptops, tablets, or smartphones. Not only saving time but opening many doors for interactive learning. Rather than being in a passive experience, learners can choose what they need to learn quickly and easily, wherever they are. They also learn through interacting directly with on-screen information through, for instance, dragging content from one place to the next. Moreover, the decision-making scenarios in eLearning also encourage learners to make their own choices on what they will learn next.

In eLearning, learners just soak in knowledge through reading or viewing content, it changes the way education is delivered. Also, many eLearning courses include animation, podcasts, and videos that create a multimodal and practical learning experience.

The last point is, although eLearning has been around for a long time, it is staying green and continuously developing. Educators are using the advantages of technology to make learning more effective. That's why more and more online and blended learning courses are produced nowadays.

Variety is the outstanding feature of online learning platforms. You can teach your students in real time (synchronous) via live stream or group meetings using Zoom or Microsoft Teams, or you can use recorded (asynchronous) methodologies with a wide range of media and digital functions available to enrich lessons. A good online learning platform can also be combined with a Learning Management System (LMS) so you can keep track of your students' learning outcomes

C/1.2. Video-Assisted Learning

In recent years, video-assisted learning has become more and more popular as classroom displays. The "video day" is no longer a television on a trolley being wheeled into a class. With the internet and digital devices, every day can be a "video day."

This trend is also booming in distance learning conditions, which students learn through computer screens. Videos, especially animated videos, are extremely beneficial to enrich lessons and make content comprehensible. It improves students' outcomes and reduces teachers' workload.

C/1.3. Blockchain Technology

The Distributed Ledger Technology (DLT) from blockchain brings so many benefits to education, especially data storage. Every time new data is added, it adds another "block" to the system, so the storage is technically limitless. Simultaneously, the data will be encrypted and distributed across multiple computers in the system. It makes transacting data decentralized and transparent.

Blockchain technology is used in Massive Open Online Courses (MOOCs) and ePortfolios to verify skills and knowledge. The DLT systems will answer the problems of authentication, scale, and cost for eLearning agencies. Moreover, it can help student applicants publish their accomplishments during the job-seeking phase.

C/1.4. Big Data Will Get Bigger

To cater to learners' needs, the learning experience needs to be personalized. And with COVID-19 and online learning booming, we now have bigger data than ever before. Instructional Designers have relevant information about learners' experiences to customize and present the course in a suitable format. Some information you should look for is the course's topic, learner enrollment, learner performance (time per course, completion, test result), and learner feedback (rating, survey).

C/1.5. Artificial Intelligence (AI)

AI now is the "in thing" in the US EdTech market. People have predicted that through 2021, AI could become the primary trend and grow by more than 45%. So why is the trend booming in one of the world's largest markets for EdTech? First and foremost, AI can automate basic

activities in education, like grading. It's now possible for teachers to automate grading of the multiple-choice and fill-in-the-blank questions. Thus, automated grading of students' writing may not be far behind.

Furthermore, both learners and educators could benefit from AI. For example, students could get help from AI tutors when teachers are too busy to take care of everyone. Also, AI-driven programs can give both learners and educators helpful feedback. That's why some schools use AI systems to monitor student progress and to alert teachers when there might be an issue with students' performances. Therefore, it's not too far fetched that AI is a powerful assistant for in-class teaching. Meanwhile, why don't you help your learners get more out of the educational experience via AI?

C/1.6. Learning Analytics

The current landscape of learning analytics has dramatically expanded, especially for higher education. Learning analytics allows educators to measure and report student learning just by the web. From that, it's possible for them to better understand and optimize learning.

When teachers read insights from students' learning processes, they can improve the knowledge and skill acquisition of their students accordingly. For instance, teachers are able to see what type of information (text, images, infographics, or videos) that students enjoy most and use it more in their following lessons. Also, teachers are able to notice what pieces of knowledge weren't effectively delivered and enhance them next time. Moreover, learning analytics helps educators identify blocks of students who may have academic or behavioral challenges. From that, teachers could develop a way to help students reach their full potential.

C/1.7. Gamification

If you are looking for a way to turn learning into a more fun and engaging process, gamification is the most suitable educational technology trend. There is no reason for students not to be actively involved in classroom games. Students can learn and practice while they are joining in on exciting game activities. Gaming elements help create a funny and positive learning environment for learners.

The adoption of gamification is most popular in the K-12 education sector. It's because kids are quickly engaged in gaming videos or getting higher scores in a game. However, it doesn't mean that higher education or corporate training doesn't need fun elements to improve the engagement level of learners.

C/1.8. Immersive Learning With VR And AR

The class learning experience has undergone a tremendous change since Virtual Reality (VR) and Augmented Reality (AR) came to education. The rise in demand for experiential learning pushes forward the development of learning with VR and AR.

Learning has become much more interactive than traditional methods. While VR provides a constructed reality, AR gives an enhanced view of a real image. Thus, they help explain complex concepts that plain images or even a lab's hands-on experiments couldn't show students. For example, VR is pretty helpful when you are attending a medical training course. In detail, VR creates a chance for students to experience real-world surgeries in a low-risk environment.

C/1.9. STEAM

STEAM-based programs are the new EdTech improvement over the STEM programs. This new trend of EdTech applies meaningful Science, Technology, Engineering, Art (the new element), and Math content to solve real-world problems through hands-on learning activities and creative design.

Concerning the advantages of STEAM, the first thing is that it helps students become increasingly curious about the world around them. Moreover, it also creates a safe environment for the learners to express and experience their ideas while thinking outside the box. The comfort of hands-on learning also helps students collaborate better with others.

C/1.10. Social Media In Learning

Have you ever thought that social media would be a part of the learning process? When every student, both young and mature, spends so much time on social media, why don't we turn it into a powerful tool to enhance learning?

It's how the idea to use social media for teaching came about. Many educational institutes have started using social media as a communication tool in which students can interact with others easily. Students can share study materials, discuss with others in a group, or easily comment on someone else's post. Even an animated learning video could go viral on social media. And TedEd is the typical example of this trend! This organization creates lessons worth sharing and posts them on YouTube where people can easily access, find, and share the educational videos with their friends.

Social media is here to stay and build a culture of collaboration and sharing, leading to an improved learning experience.

C/2. Conclusion

Our internal surveys highlighted several gaps in the innovation process of our training services. In this period, to fulfill this research step required by the Project, we approached several sites that we believe to be very interesting. We believe that there may be many topics to be explored so we cite a very generic article but no less important for this.

In the end, we know that there is a lot to digest when we talk about educational technology trends. However, keep in mind that technology has seeped into education and renewed its whole teaching and learning process. Especially eLearning, an educational tool that not only increases the accessibility and convenience of education but also changes the learning behaviors and learners' desires for learning.

But here is good news, you don't need to go alone on this EdTech ship because you have us who will join you in bringing forth the true value of learning, inspiring learners, and making education more relevant and empowering.

Source: "Top Educational Technology Trends In 2020-2021" https://elearningindustry.com/