

Handbook for e-Learning Practitioners in Higher and Further Education

Version 1.0

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DRAFT MANUSCRIPT FOR DISCUSSION
AT ICICTE 2018

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Why there is a need for this handbook

In my 20+ years in education I have tried to promote the effective use of technology in teaching and learning with a small degree of success. I have come to realise that the major limiting factor was not technology per se, though there was a learning curve for teachers to harness the then new computer-based technologies. It was almost always the human factor. Some educators were afraid to depart from their tried-and-tested methods, while others feared the unknown. A few, armed with almost a never-ending supply of dedication and optimism, took the plunge.

Today I still meet educators who make superficial use of technology in education. For them e-learning is a the traditional approach with a smack of ICT on it. Old wine in new bottles. They have not realised that e-learning is a different drink, that requires a different approach and processing. At the end of the end, it's a nourishing drink, if you know how best to enjoy it responsibly.

The technology in education landscape has developed and now stretches beyond the simple use of a computer to prepare printed notes or attach to a screen to show a presentation in class. Augmented reality, virtual reality, Massive Open Online Courses, blockchain certificates, and artificial intelligence are but a few developments that are set to continue the disruption of education.

Educators can easily feel lost in this massive wave of technology, pushed by constant pressure to innovate and make use of these technologies. But where to start? This handbook is a timid attempt to support educators who want to upskill and upgrade their teaching to include online and blended learning. It's the result of all these years of observing failure and success, repetition of the same mistake but also shining examples of good practice, which fortunately is on the increase.

The suggestions in this handbook are no bible for online and blended learning, but an invitation to provide better teaching and learning online, for the sake of our learners.

Martin Debattista
February 2018

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Part 1 - The Digitally Literate Educator

Frameworks that identify the educator's competencies needed to conduct e-learning

Educators who want to provide online and blended learning must have a degree of technical proficiency that complements their pedagogical and academic competencies. However, this must be attained at a time where there is not yet wide consensus on a common definition of “digital” and what we understand by “digital education” or “electronic learning”, though there are common characteristics between different understandings.

In the educational context this is not easy, for “understanding the role of technology in pedagogy is more than the accumulation of technology skills, and that skilful teaching is more than finding and applying the right tool. In short, traditional methods of technology education miss the fact that teacher knowledge is complex” (Koehler & Mishra, 2005a). The rise in the opportunities for technology-enhanced teaching and learning has also raised the question of which technical/digital competences should educators possess to be able to successfully exploit technology in education.

This must be added to the fact that there are different interpretations and understanding of digital skills, digital competences and knowledge actually consist of. This is just one definition of digital competence used at EU level:

Digital Competence is the set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socialising. (Ferrari, 2012)

In recent years online learning has established itself as part of the formal and informal education landscape especially with the use of online learning management software, blended learning and the rise of massive open online courses (MOOCs) and other online courses provided for free. “Digital literacy” is the latest phrase, in a series relating to the ability to benefit from technology, that has been coined to encompass the knowledge, skills and competences needed to make meaningful and fruitful use of the digital technologies pervading our lives.

These frameworks share similar characteristics but “importantly, no framework focuses on a single skill or approach” (Alexander, Adams Becker, Cummins, & Hall Giesinger, 2017, p.4).

This has sparked a debate on what kind of competences should an educator has to be able to provide online tuition. It is quite an irony that, according to the OECD, “on average, workers in the education sector are 15 percentage points less likely to have

good ICT and problem-solving skills than those working in the professional, scientific and technical activities sector, which includes scientific research and development and legal and accounting activities. Therefore, although education can be considered as a high-performing sector for ICT and problem solving, it still lags behind some very skill-intensive activities ... New generations of teachers who are better trained and who participate in professional development activities throughout their careers will probably be able to adopt innovative practices that are more suited to 21st century learning environments” (OECD, 2016, p.76-77).

However a gap has been identified between the expectations of learners, especially the younger generation born and bred surrounded by digital technology, and the delivery of educators from older generations (Brook, Grajek & Greeves, 2015). Measures have been identified on how to support faculty in upgrading its digital skills and exploit digital tools for online learning. These include building on successful industry-education projects, open online courses for educators, and using digital learning tools that foster the exchange of effective digital pedagogies enable innovation across the sector to be more productive and to develop more rapidly (Laurillard, Derrick & Doel, 2017, p.23).

The ongoing research and resulting debate have led to the creation of various frameworks that identify the competencies that educators need in order to provide quality and meaningful online teaching and learning. This document will refer to four of them: the [Digital Competence Framework for Educators \(DigCompEdu\)](#) of the European Commission, the [ISTE Standards for Educators](#), the [UNESCO ICT Competency Framework for Teachers](#), and iNACOL’s [Blended Learning Teacher Competency Framework](#). A brief overview of these frameworks is provided below.

Digital Competence Framework for Educators (DigCompEdu)



Fig.????????? The DigCompEdu Framework (Redecker & Punie, 2017)

The updated DigCompEdu framework (Redecker & Punie, 2017) proposes six areas with 22 competences:

Area 1: the professional environment;

Area 2: sourcing, creating and sharing digital resources;

Area 3: managing and orchestrating the use of digital tools in teaching and learning;

Area 4: digital tools and strategies to enhance assessment;

Area 5: the use of digital tools to empower learners;

Area 6: facilitating learners' digital competence.

To encourage take-up, the proficiency levels have been mapped with the Common European Framework of Reference for Languages (CEFR), ranging from A1 (Newcomer) to C2 (Pioneer):

“Newcomers (A1) have had very little contact with digital tools and need guidance to expand their repertoire.

Explorers (A2) have started using digital tools without, however, following a comprehensive or consistent approach. Explorers need insight and inspiration to expand their competences.

Integrators (B1) use and experiment with digital tools for a range of purposes, trying to understand which digital strategies work best in which contexts.

Experts (B2) use a range of digital tools confidently, creatively and critically to enhance their professional activities. They continuously expand their repertoire of practices.

Leaders (C1) rely on a broad repertoire of flexible, comprehensive and effective digital strategies. They are a source of inspiration for others.

Pioneers (C2) question the adequacy of contemporary digital and pedagogical practices, of which they themselves are experts. They lead innovation and are a role model for younger teachers.”

The ISTE Standards for Educators

The International Society for Technology in Education (ISTE) has issued [standards](#) that “define the new skills and pedagogical insights educators need to teach, work



and learn in the digital age” (ISTE, 2017).

Fig.???? The ISTE Standards for Educators (ISTE, 2017)

The seven standards are:

1. Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning.
2. Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning.
3. Educators inspire students to positively contribute to and responsibly participate in the digital world.
4. Educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems.
5. Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability.
6. Educators facilitate learning with technology to support student achievement of the ISTE Standards for Students.
7. Educators understand and use data to drive their instruction and support students in achieving their learning goals.

UNESCO ICT Competency Framework for Teachers

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 2011 published an [ICT Competency Framework for Teachers](#) with the support of Microsoft. It is a “framework that outlines the competencies that teachers need to integrate Information and Communication Technologies (ICTs) into their professional practice”. Though it mainly addresses K-12 compulsory education

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANIZATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organizations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

teachers, it can be adapted to higher education.

Figure????: UNESCO ICT Competency Framework for Teachers (Hine, 2011)

UNESCO insists this framework goes beyond teachers having ICT competencies and passing them on to learners: “Teachers need to be able to help the students become collaborative, problem solving, creative learners through using ICT so they will be effective citizens and members of the workforce. The Framework therefore addresses all aspects of a teacher’s work” (Hines, 2011, p.3).

The iNACOL Blended Learning Teacher Competence Framework

The International Association for K-12 Online Learning (iNACOL) has adopted this definition of blended learning by the Christensen Institute: “A formal education program in which a student learns: at least in part through online learning, with some element of student control over time, place, path, and/or pace; at least in part in a supervised brick-and-mortar location away from home; and the modalities along each student’s learning path within a course or subject are connected to provide an integrated learning experience” (Powell, Rabbitt, & Kennedy, 2014).



Fig.???? : iNACOL Blended Learning Teacher Competency Framework (Powell, Rabbitt, & Kennedy, 2014).

MINDSETS	<p>What Core values or beliefs that guide thinking, behaviors and actions that align with goals of educational change and mission</p> <p>How Understood, adopted, and committed to</p>
QUALITIES	<p>What Personal characteristics and patterns of behavior that help an educator make the transition to new ways of teaching and learning</p> <p>How Coached, encouraged, and reinforced</p>
ADAPTIVE SKILLS	<p>What Higher complexity that are generalized across domain/jobs. Help people tackle problems and tasks where the solution might be unknown or that require organizational learning and innovation</p> <p>How Developed through modeling, coaching, and reflective practice</p>
TECHNICAL SKILLS	<p>What Skills that are known and specific to task and domain. Observable "know-how" and basic mechanics and expertise helpful for execution and implementation of day-to-day job (for teachers instruction)</p> <p>How Acquired and mastered through instruction, training, and practice</p>

Fig.???? : An explanation of the domains in the iNACOL Blended Learning Teacher Competency Framework (Powell, Rabbitt, & Kennedy, 2014).

Part 2 - Instructional Design

Instructional design refers to the all the processes needed to deliver quality teaching and learning. There are varying approaches and different interpretations but there is consensus that the ultimate goal in instructional design is that learners learn what they are meant to learn.

The development of e-learning has benefitted from research in the cognitive process of the human brain and how learning takes place. Clark & Mayer (2016, pp.7-8) insist that technology adds a new dimension but does not take over the cognitive aspect: "Instructional methods that support rather than defeat human learning processes are an essential ingredient of all effective e-learning courseware. e most appropriate methods depend on the goals of the training (for example, to inform or to perform); the learner's related skills (for example, whether they are familiar with or new to the skills); and various environmental factors, including technological, cultural, and pragmatic constraints."

This section of this handbook suggests approaches and good practice for instructional design in e-learning based on academic and scientific research. This [webpage](#) provides a list of "top" 100 e-learning books.

What neuroscience tells us about learning how to learn

The following table is an attempt to apply neuroscience to education (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013).

Technique	Explanation	Utility	Effectiveness
Elaborative interrogation	Asking "why" rather than "what"	Moderate	
Self-explanation	Learners explain the process they used	Moderate	
Summarisation		Low	Good for learners who need to generate information and not multiple-choice questions exam type.
Highlighting	Learners highlights text	Low	Ineffective, especially when overdone.
Keyword mnemonic	Learner associates concept to words and imagery	Low	Good for short term memory only.
Imagery of text	Learners creates	Low	Ineffective while

learning	mental images while reading		reading, more effective while listening.
Re-reading	Reading again the same text	Low	More effective over a long period of time only.
Practice testing	Learners is tested on what should have been learned.	High	Very effective for recall. Very effective when learners creates the questions. Cornell University note-taking system is effective. http://lsc.cornell.edu/wp-content/uploads/2015/10/Cornell-Note-Taking-System.pdf
Distributed practice	The spacing of the learning in a timeframe	High	Best spacing is 10-20% of the time, i.e. if a learner wants to remember something for a year the studying should be done every month or so.
Interleaved practice	Learner jumps from one topic to another that is not directly connected in a haphazard fashion	Moderate	Effective for motor learning (using the environment) and cognitive learning (math).

Table????????: based on Dunlosky, J., Rawson, K., Marsh, E., Nathan, M., & Willingham, D. (2013).

The following table, spread over 5 images, is taken from Howard-Jones, P. (2014a).

Table 3: Neurocognitive processes and their potential educational application

Ratings for the strength of evidence for their educational effectiveness and their distance to application are provided, following the criteria in Table 1 and Table 2

Topic	Neurocognitive processes	Educational application	Strength of evidence for educational effectiveness (low, medium, high)	Distance to application (near, moderate, distant)	Page Number
1. Mathematics – Non-symbolic and symbolic representation of number	Neuroscience has helped reveal the importance of both non-symbolic and symbolic representation of quantity in both the earliest and later stages of mathematics education. Students must learn to link these representations.	Reflective of the emergent state of understanding in this area, mixed results have been obtained from the studies attempting to train children's non-symbolic representations, with some studies also reporting impact on symbolic representation and transfer to other numeracy skills.	Medium	Moderate	13 - 16
2. Mathematics – Finger gnosis	Fingers may have a special relationship with concepts of number.	An intervention study showed that finger gnosis training can improve some aspects of early number development.	Medium	Near	
3. Mathematics – Mental rotation skills	Mental rotation skills predict maths and science achievement and these skills are amenable to training, including by the playing of action video games.	A longitudinal study showed STEM benefits from spatial training amongst undergraduates.	Low	Distant	
4. Mathematics – Maths anxiety	Maths anxiety interferes with neurocognitive processes crucial to learning, with effects mediated by an individual's recruitment of cognitive control networks.	A study reported that the effects of teenage maths anxiety can be reduced by writing about it.	Medium	Near	

5. Reading	<p>Children begin to learn to read by mapping letter symbols to sounds.</p> <p>As well as converting written words and sentences to sound, children must learn to comprehend meaning. Many sub-skills contribute to fluent reading.</p>	<p>Computer-based training focused on phonological skills has helped those experiencing difficulty to develop their reading skills.</p> <p>Several multicomponent interventions have also been successful, emphasising the complex nature of the reading process and the potential value of considering individual differences in such interventions.</p>	Medium	Near	17 - 18
6. Exercise	<p>Exercise increases efficiency of neural networks that are important for learning.</p> <p>Episodes and regimes of exercise can improve cognitive function and memory.</p>	<p>Almost entirely, exercise interventions have had either no effect or positive effects (in equal proportion) on learning, suggesting substantial likelihood of its academic value.</p> <p>The most important factors influencing the academic outcomes of exercise are still the subject of research.</p>	Medium	Near	19 - 20
7. Sleep, nutrition and hydration	<p>Sleep is important for rest and for consolidating the day's learning in long-term memory.</p> <p>Technology, caffeine, psychosocial factors and biological changes are known to disrupt sleep patterns, particularly in adolescents.</p> <p>Habitual ingestion of caffeine reduces cognitive function.</p> <p>Small amounts of dehydration can reduce cognitive ability.</p>	<p>Later starts in schools that begin the day early have been shown to improve attendance and engagement in lessons.</p> <p>Simply providing information to teenagers about sleep, including its chronobiology, raises awareness but fails to change habits.</p> <p>Great involvement of such interventions with home-life and culture has shown, tentatively, more promise.</p> <p>Studies assessing the effects of providing supplementary water suggest little educational benefits in UK schools.</p>	Low	Near	21 - 23

8. Genetics	<p>Genes have a major influence on brain function/structure, suggesting genetics can play an important role in the understanding of individual differences.</p>	<p>Some genetic markers already have current practical value in deepening our understanding of the effects of educational interventions.</p>	Medium	Distant	24
9. Embodied cognition	<p>Neuroscience has helped us understand that our body plays a crucial role in our cognitive processes (embodied cognition).</p> <p>Embodied cognition provides a theoretical basis for understanding how actions influence our learning (e.g. the enactment effect).</p> <p>Some of our neurons mirror the actions made by others (so-called mirror neurons) and these processes may inform an embodied cognition approach to understanding, for example, how a teacher's actions influence a student's learning.</p>	<p>Embodied cognition not only helps explain the well-established enactment effect, but may also provide insight into how students learn from the actions of their teachers.</p>	Medium	Moderate	25 - 26
10. "Brain training" of executive function	<p>Many studies exist demonstrating that the executive functions of adults and children can be trained, and there is clear potential for such training to contribute to education.</p> <p>However, there have been difficulties in replicating successful outcomes and there is debate regarding how far transfer can be achieved to tasks dissimilar to those used in training.</p>	<p>Results for impact on executive function are promising. However, there is currently a lack of good-quality evidence to indicate that this transfers to academic outcomes.</p>	Medium	Moderate	27 - 28
11. Spaced learning	<p>The spacing of learning sessions improves outcomes compared with massing sessions together.</p> <p>A neuroimaging study suggests the effect is due to enhanced maintenance rehearsal in spaced, as opposed to massed, presentations of learning material.</p>	<p>The spacing effect on memorisation is well established, and the benefits of spacing may extend to deeper types of learning.</p>	High	Near	29 - 30

12. Interleaving	Interleaving topics can increase the efficiency with which learned material is remembered and also the effectiveness of some other learning processes. Interleaving may operate by reducing the suppression of neural activity in memory regions that occurs when similar stimuli are repeatedly presented.	Though considerably less established than the spacing effect, a small number of studies reveal educational potential.	Medium	Moderate	31
13. Testing	It has been established, in a range of contexts, that testing can improve memory for learned material and may also improve some other types of learning. Currently, there are several candidate neural processes for the testing effect – all of which may contribute to outcomes.	Insight from neuroscience and psychology, particularly when combined with technology, may help improve application of testing in today's classroom.	High	Moderate	32
14. Learning games	Popular games provide rapid schedules of uncertain reward that stimulate the brain's reward system. The brain's reward response can positively influence the rate at which we learn. Beyond just the magnitude of the reward, a range of contextual factors influence this reward response.	Efforts to develop and implement learning games are already drawing on concepts about brain and mind, although there have been no rigidly-controlled comparisons of their effectiveness compared with other teaching approaches.	Medium	Moderate	33 - 34
15. Creativity	There is a burgeoning field of creative neurocognition that has provided insights into individual differences in creativity and creativity-fostering strategies.	The tasks used in laboratory studies do not closely resemble those assessed in education, but neuroscience is providing insights into strategies found to foster creativity in the classroom. At present, no attempt has been made to create novel classroom strategies arising from these insights.	Low	Moderate	35

16. Personalisation	Responding to learner preference does not automatically lead to improved learning. Cognitive neuroscience is providing insight into individual differences likely to influence learning outcomes.	It is known that providing choice can improve motivation, but little attempt has been made to inform such personalisation with insights from authentic neuroscience.	Low	Moderate	36
17. Neurofeedback	Neurofeedback enables individuals to alter their mind state by monitoring their own brain activity. It has been demonstrated as beneficial in studies of creative performance, although a full understanding of how this occurs is still emerging.	The technology to provide neurofeedback in classrooms is becoming more portable and affordable Its value in these contexts has been explored in a classroom study of children's music performance, although many questions remain regarding how implementation should be designed to ensure optimal outcomes.	Medium	Moderate	37
18. Transcranial Electrical Stimulation (TES)	Although a full scientific understanding of the effect remains elusive, applying small currents to the scalp can benefit some cognitive functions and learning processes.	Positive effects are now being reported for learning tasks relevant to education, but remaining questions regarding risk and ethics make TES classroom interventions unlikely in the near future.	Medium	Distant	38

Table 2: Neurocognitive processes and their potential educational application, from Howard-Jones (2014a)

Good and bad study habits according to neuroscience

Barbara Oakley, a professor of engineering at Oakland University (USA), is the tutor of one of the most popular MOOCs on the platform Coursera and author of the bestseller "A Mind for Numbers" which discusses education from a neuroscience point of view. Widely published, she has compiled the ["10 Rules of Good Studying"](#) and a complementary ["10 Rules of Bad Studying"](#) adapted from her book (Oakley, 2014).

A summary of the 10 Rules of Good Studying:

1. Use recall to remember the main ideas
2. Test yourself. On everything. All the time. Flash cards are your friend.
3. Chunk your problems. Chunking is understanding and practicing with a problem solution so that it can all come to mind in a flash.
4. Space your repetition, a little every day and regularly.
5. Alternate different problem- solving techniques during your practice. Never practice too long at any one session using only one problem- solving technique.
6. Take breaks. It is common to be unable to solve problems or figure out concepts in math or science the first time you encounter them. This is why a little study every day is much better than a lot of studying all at once.
7. Use explanatory questioning and simple analogies. Whenever you are struggling with a concept, think to yourself, How can I explain this so that a ten- year- old could understand it?
8. Focus. Turn off all interrupting beeps and alarms on your phone and computer, and then turn on a timer for twenty- five minutes. Focus intently for those twenty- five minutes and try to work as diligently as you can. After the timer goes off, give yourself a small, fun reward.
9. Eat your frogs first. Do the hardest thing earliest in the day, when you are fresh.
10. Make a mental contrast. Imagine where you've come from and contrast that with the dream of where your studies will take you. Post a picture or words in your workspace to remind you of your dream. Look at that when you find your motivation lagging. This work will pay off both for you and those you love!

A summary of the 10 Rules of Bad Studying:

Avoid these techniques—they can waste your time even while they fool you into thinking you're learning!

1. Passive rereading—sitting passively and running your eyes back over a page.
2. Letting highlights overwhelm you. Highlighting your text can fool your mind into thinking you are putting something in your brain, when all you're really doing is moving your hand.
3. Merely glancing at a problem's solution and thinking you know how to do it. This is one of the worst errors students make while studying. You need to be able to solve a problem step- by- step, without looking at the solution.
4. Waiting until the last minute to study. Your brain is like a muscle—it can handle only a limited amount of exercise on one subject at a time.

5. Repeatedly solving problems of the same type that you already know how to solve.

6. Letting study sessions with friends turn into chat sessions.

7. Neglecting to read the textbook before you start working problems. Would you dive into a pool before you knew how to swim? The textbook is your swimming instructor—it guides you toward the answers.

8. Not checking with your instructors or classmates to clear up points of confusion.

9. Thinking you can learn deeply when you are being constantly distracted.

10. Not getting enough sleep. Your brain pieces together problem-solving techniques when you sleep, and it also practices and repeats whatever you put in mind before you go to sleep. Prolonged fatigue allows toxins to build up in the brain that disrupt the neural connections you need to think quickly and well. If you don't get a good sleep before a test, NOTHING ELSE YOU HAVE DONE WILL MATTER.

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Definition of Online and Blended Learning

Rapid evolution and constant change contribute to different interpretations of e-learning, depending on the approaches and the perspectives taken. (Sangrà, Vlachopoulos & Cabrera, 2012; Clark & Mayer, 2016). However the element of technology and the physical distance between teacher and learner and its application to reach educational goals is a common factor (Moore & Kearsley, 2011). Clark & Mayer (2016) present three basic learning architectures and the potential for each in obtaining instructional goals. This can be applied to e-learning.

<i>Architecture</i>	<i>View</i>	<i>Behavioral Engagement</i>	<i>Used for</i>
Receptive	Information acquisition	Low	Inform training goals such as new hire orientation
Directive	Response strengthening	Medium	Perform procedure training goals such as software skills
Guided discovery	Knowledge construction	High	Perform strategic training goals such as consultative selling

Fig.?????: Three e-Learning Architectures (Clark & Mayer, 2016, p.21)

Clark and Mayer (2016, p.24) suggest the following checklist to design and evaluate e-learning courses:

“One or more of the unique features of e- learning are used:

- Learners can control their pacing through a lesson.
 - Engagement methods promote appropriate psychological processing.
 - Lessons include appropriate use of graphics and words to present content.
- Job- realistic scenarios are used as a context for learning.

The dominant architecture (Receptive, Directive, or Guided Discovery) is appropriate for the instructional goals.

- The instructional environment blends different media exploiting the strengths of each.
- Sufficient guidance is included to avoid discovery learning.
- The use and design of new approaches such as social media and games are appropriate to the learning goal.”

The following are some terms related to technology applied to learning, more particularly e-learning. For more definitions of terms see the glossary in this document.

Distance Learning	<ul style="list-style-type: none"> • Also known as e-learning or online learning, it is a form of education in which teachers and students are physically separated. Various Internet technologies allow for teachers and students to interact and communicate. Traditional distance learning focused on individuals in remote areas and it used to be via mail.
Blended learning	<ul style="list-style-type: none"> • Blended learning is a teaching and learning approach that demonstrates blend of different methods, technologies, and resources to improve student learning. Some examples of blended learning are flipped classroom, online interaction followed by face-to-face teaching, online learning supplemented by face-to-face practical, etc. • A formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path and/or pace, and at least in part at a supervised brick-and-mortar location away from home.
E-learning	<ul style="list-style-type: none"> • Learning supported by information and communication technologies (ICT). • An umbrella term that refers to the use of any digital device for teaching and learning, especially for delivery or accessing of content. Thus e-Learning can take place without any reference to a network or connectivity.

MOOC (Massive Open Online Course)	<ul style="list-style-type: none"> • Massive Open Online Course (MOOC) is an online course available for large enrolment on the open web, where open largely refers to open registration, and not necessarily courses in open licence.
Mobile learning	<ul style="list-style-type: none"> • Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school system

Instructional Design Process models

The Addie Model

Originating in the United States in the 1970s, it is one of the most referred-to models in instructional design, though there is a lot of literature discussing its shortcomings. There is no authoritative version of ADDIE but many adaptations (Molenda, 2003).

What is emerging in the recent literature is a tendency to accept the ADDIE term as an umbrella term, and then to go on to elaborate more fully fleshed-out models and narrative descriptions. However, it should be recognized that authors who do this are essentially creating and disseminating their own models, as there does not appear to be an original, authoritative version of the ADDIE model to be revealed and interpreted.

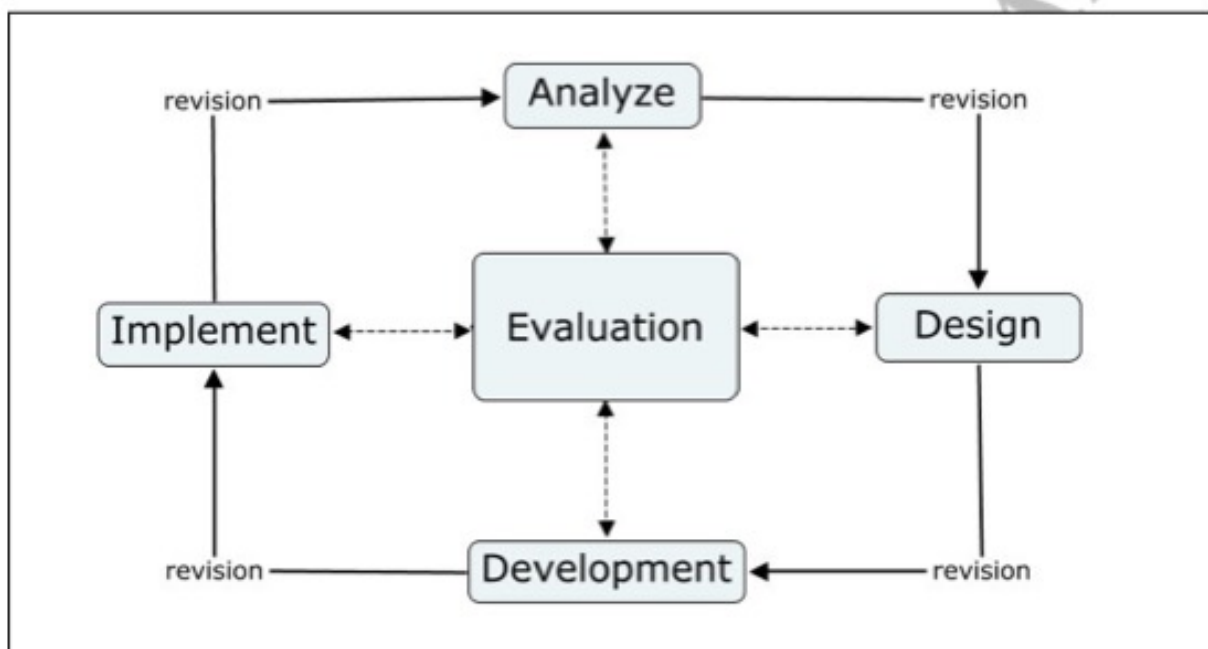


Figure: The ADDIE Model (Source: Wikipedia.org)

The IDOL model

Developed by Siragusa, Dixon and Dixon (2007), it incorporates 24 pedagogical dimensions in higher education. However, the author insists that "it is not designed to replace any particular instructional design model. It is designed to work alongside other instructional design models ... the IDOL model should not be considered comprehensive and complete. While the development and utilisation of online learning technologies continues to grow to include more sophisticated virtual environments for learning ... the pedagogical dimensions presented here will undoubtedly need ongoing revision that is informed by ongoing research into quality e-learning".

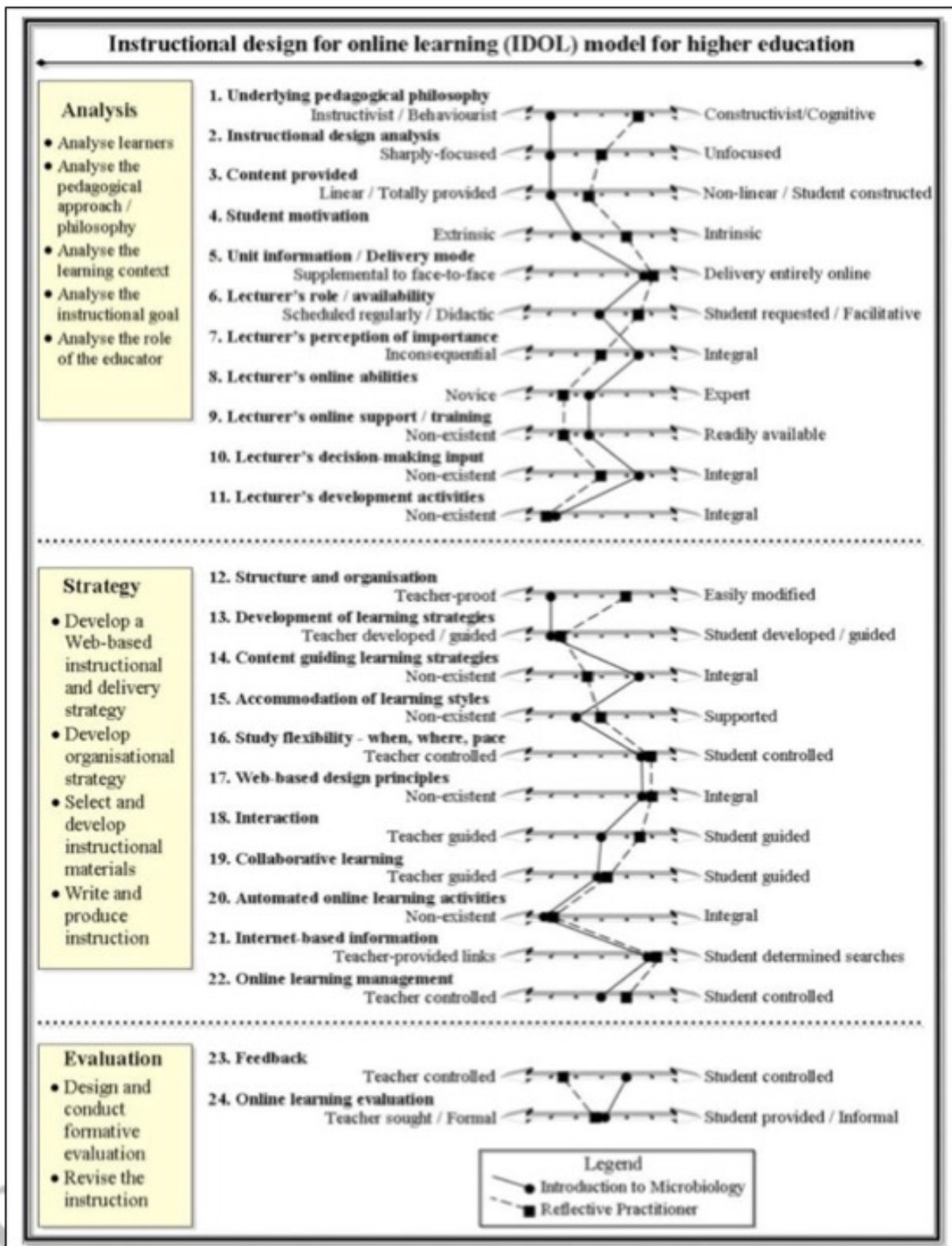


Fig.????: The IDOL Model of instructional design (Siragusa, Dixon & Dixon, 2005)

The Agile Model

Developed by the software ICT industry to speed up software development, Agile instructional design methods are increasingly being applied to non-ICT industry such as education. Research has revealed that agile methods “not only support current and emerging learning theories, they enhance constructivism by involving the learner in the curriculum development process ... The current set of linear based instructional design methodologies, though effective, is beginning to show signs of becoming obsolete. The next iteration of ID requires lower costs, faster implementation of new technologies and media sources, less ritual and greater learner involvement. An Agile Instructional Design (AID) methodology would meet the needs of this next iteration along with applying current learning theory more effectively” (Rawsthorne & Lloyd, 2005). It can “give curriculum designers increased productivity and improved motivation” (Willeke, 2011).

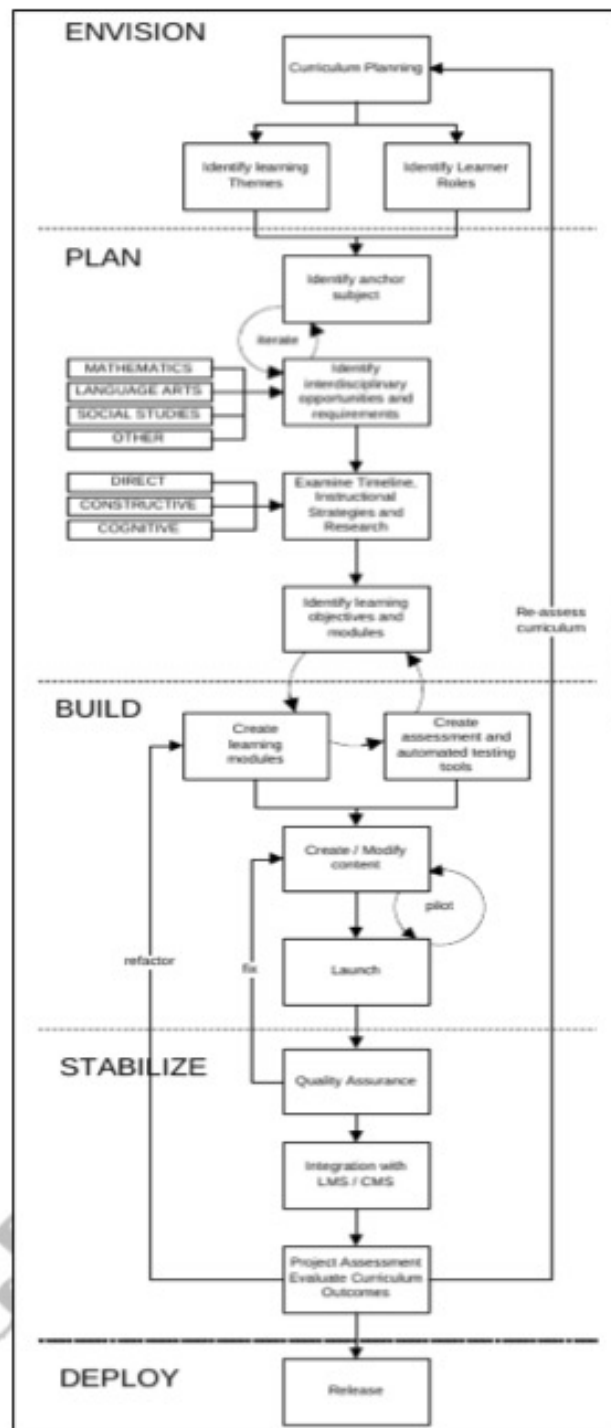


Fig.????: The AGILE Instructional Design Method Rawsthorne & Lloyd (2005)

Rawsthorne & Lloyd (2005) insist that “the strength of Agile Instructional Design (AID) will come from the early involvement of multidisciplinary teams; the ability of later stage tasks to change previous stage outcomes; the involvement of well defined learner roles; and the ongoing inclusion of emerging technologies and rich media”. It is spread over five stages: envision, plan, build, stabilise and deploy.

The 7 C's of Learning Design Framework

The 7Cs of Learning Design Framework pioneered by Grainne Conole “illustrates the key stages involved in the design process, from initial conceptualisation of a learning intervention through to trialing and evaluating it in a real learning context” Conole (2014).

The framework is divided into these seven stages¹:

1. **Conceptualise:** What is the vision for the learning intervention, who is it being designed for, what is the essence of the intervention, what pedagogical approaches are used?
2. **Capture:** What Open Educational Resources are being used and what other resources need to be developed?
3. **Create:** What is the nature of the learning intervention the learners will engage with? What kinds of learning activities will the learners engage with?
4. **Communicate:** What types of communication will the learners be using?
5. **Collaboration:** What types of collaboration will be learners be doing?
6. **Consider:** What forms of reflection and demonstration of learning are included? Are the learning outcomes mapped to the activities and assessment elements of the learning intervention?
7. **Consolidate:** How effective is the design? Do the different elements of the design work together?

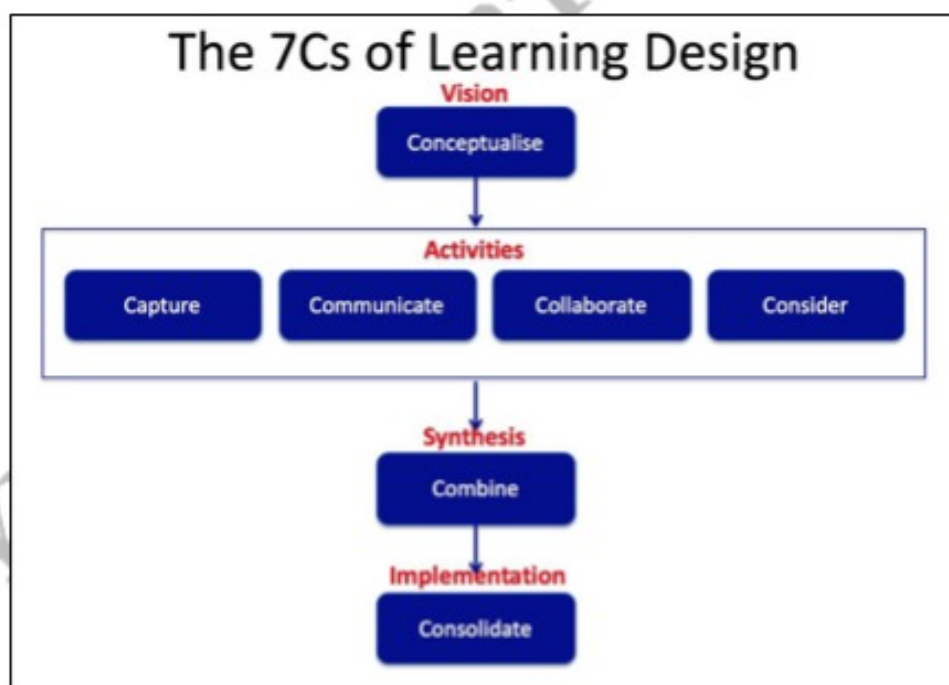


Fig.????: The 7Cs of Learning Design Framework (Conole, 2014)

¹ For an integrated set of resources go to <http://www2.le.ac.uk/projects/oer/oers/beyond-distance-research-alliance/7Cs-toolkit>

The MIT Instructional Design Toolkit for Online Courses

The Online Course Design Guide, accessible at <http://dltoolkit.mit.edu/> was produced by the Massachusetts Institute of Technology Office of Educational Innovation and Technology (MIT-OEIT), in collaboration with the New Media Consortium (NMC), “to support instructional designers, educators, and facilitators in the development and implementation of online courses. Each section of the guide contains critical information, recommendations, examples, checklists, and resources for further exploration to create and deliver effective online learning experiences” (Muramatsu et. al, 2014).

The online guide is designed around four stages and each stage has its own steps:

1. Pre-design
 - a. Readiness inventory
 - b. Learners analysis
2. Design and development
 - a. Objectives and Outcomes
 - b. Designing a Blueprint
 - c. Content Patterns
 - d. Creating content relationships
 - e. Lesson development with Media
 - f. Content Licensing
 - g. Designing Community
 - h. Designing Assessment
 - i. Course Launch Checklist
3. Facilitation: Communication and Community building
 - a. Instructor Presence
 - b. Learner Feedback
 - c. Time Management
4. Evaluation: Assessment and Feedback
 - a. Assessment
 - b. Reliability and Validity
 - c. Learning Analytics

Principles of Best Practice in Instructional Design

Graham et. al. (2001) refer to the "Seven Principles for Good Practice in Undergraduate Education" published in 1987 as a popular framework for evaluation traditional classroom-based education based on 50 years of research.

This framework is based on seven principles, each offering an adaptation for online education:

Principle 1: Good Practice Encourages Student-Faculty Contact

Lesson for online instruction: Instructors should provide clear guidelines for interaction with students (time and mode of accessibility, e.g. e-mail).

Principle 2: Good Practice Encourages Cooperation Among Students

Lesson for online instruction: Well-designed discussion assignments facilitate meaningful cooperation among students.

Principle 3: Good Practice Encourages Active Learning

Lesson for online instruction: Students should present course projects.

Principle 4: Good Practice Gives Prompt Feedback

Lesson for online instruction: Instructors need to provide two types of feedback: information feedback and acknowledgment feedback.

Principle 5: Good Practice Emphasizes Time on Task

Lesson for online instruction: Online courses need deadlines.

Principle 6: Good Practice Communicates High Expectations

Lesson for online instruction: Challenging tasks, sample cases, and praise for quality work communicate high expectations.

Principle 7: Good Practice Respects Diverse Talents and Ways of Learning

Lesson for online instruction: Allowing students to choose project topics incorporates diverse views into online courses.

Merrill's meta-review (2002, 2013) indicated that these fundamental principles underpin all contemporary instructional design models and theories. A systematic review of 22 contemporary instructional theories confirmed theoretical support for these principles (Gardner, 2011a). Merrill (2002) suggests that the most effective way to learn is based on solving problems as learners acquire skill in the context of real-world problems. Many contemporary learning theories and instructional models like e-Constructivism, Authentic Learning, Cognitive Apprenticeship, Situated Learning, Problem-based Learning, Expansive Learning, to name a few are premised on the idea that humans learn better when they are engaged in solving problems and

building knowledge than when they are presented with information they are required to memorise. Merrill uses the term 'problem' to denote 'a wide range of activities, with the most critical characteristic being that the activity is some whole task rather than only components of a task and that the task is representative of those the learner will encounter in the world following instruction' (ibid., p. 45). He contrasts problem-based instruction with topic-centred instruction where a subject is taught in isolation from the real-world tasks. Instructional effectiveness of a course will be enhanced if the learning activities in the course give learners an opportunity to solve real-world problems, working through a progression of interrelated tasks, from the least difficult to the most difficult, that reflect the complexity of real-world settings.

Merrill (ibid.) suggests that the most effective way to learn is based on solving problems and involved four phases of learning: activation, demonstration, application and integration.

Activation: Learning is promoted when learners activate existing knowledge and skill as a foundation for new skill.

Demonstration: Learning is promoted when learners observe a demonstration of the skill to be learned. This principle highlights the importance of showing learners what they could do to apply the new information or skill in new situations rather than merely presenting them information about what to do.

Application: Learning is promoted when learners apply their newly acquired skill to solve problems.

Integration: Learning is promoted when learners reflect on, discuss, and defend their newly acquired skill.

The First Principles of Instruction listed above focus on learning activities. These are augmented by a set of five further principles abstracted from the literature focusing on learning resources (such as course materials, or people that learners draw on to carry out learning activities) and learning support (processes and procedures such as expert feedback that assist learners in carrying out learning activities) (Margaryan et al., 2015, p.79).

6 Collective knowledge: learning is promoted when learners contribute to the collective knowledge.

7 Collaboration: learning is promoted when learners collaborate with others.

8 Differentiation: learning is promoted when different learners are provided with different avenues of learning, according to their need.

9 Authentic resources: learning is promoted when learning resources are drawn from real-world settings. 10 Feedback: learning is promoted when learners are given expert feedback on their performance.

[A Comprehensive Rubric for Instructional Design in e-Learning](#)

Debattista (2018) develops a synthesis of rubrics from four different institutions in higher education around the world to come up with a comprehensive set of standards to support instructional design in e-learning. These standards are reproduced here:

10 Main Standards and Specific Standards

1. Instructional Design – An analysis of the learning needs and the use of appropriate strategies and methods to meet them

1. Structure of Learning.
2. Learning Aims & Objectives - What the instructor needs to achieve with the learning process.
3. Learning Outcomes - What learners need to achieve to have successfully completed the learning process).
4. Instructional Strategies and Methods.

2. Course Opening – Welcoming learners

1. Accessibility – The instructor gives clear instructions on how to access all elements of the online learning environment.
2. Role – The instructor gives clear information about his professional role in the learning environment.
3. Description - A course description with pre-requisites (if any), clear learning outcomes and what is expected of the learners is provided.
4. Behaviour - The learners are made aware of regulations, policies and ethics that govern the course.
5. Integrity - The instructor is aware of the academic integrity needed to facilitate learning.
6. Technical Competences - The learners are made aware of the technical competences needed to successfully reach the learning outcomes.
7. Ownership – The instructor gives learners the opportunity to share their own learning goals.

3. Assessment of Learning – Determining what the learner has learnt and subsequent accreditation

1. Goals and Objectives – The learners are aware of what is expected of them when they are assessed.
2. Strategies – Clear, well-defined and measurable assessment of learning outcomes suited to the level of the learners.
3. Grading – Grades are given in a fair and transparent manner through appropriate assessment instruments sanctioned by the institution.

4. Feedback – Both instructor and learners are given the opportunity to provide feedback related to grading.
5. Management – Learners have access to their grades and feedback at all times so that they can track their learning progress.

4. Interaction and Community – The exchanges between instructor and learners that build a community that supports teaching and learning

1. Fostering – The instructor welcomes learners and gives them the opportunity to communicate and create an online environment that fosters peer learning and engagement.
2. Management – Community-building is supported by clear instructions, rules and regulations. While the instructor facilitates engagement, learners are invested with the ownership of community-building.
3. Peer learning – Group work and other activities that foster peer learning are encouraged and structured not only to fulfil the learning outcomes, but also to present learners with an opportunity to learn skills and competences that go beyond such outcomes, e.g., digital literacy.

5. Instructional Resources for Teaching and Learning

1. Provision – Learning materials are either provided by the instructor or the learners are given enough time to procure such resources. The difference between compulsory and optional resources is to be made clear.
2. Application – The instructor clearly explains how the resources are going to be applied and utilised.
3. Entitlement – The instructor makes sure that the resources indicated to fulfil the learning outcomes are open and accessible by all the learners without unwarranted technical, financial or administrative barriers. The use of Open Educational Resources (OER) should be encouraged.
4. Variety – Learning resources are varied in terms of the multimedia content and multi-modal delivery channels to cater for the different learning preferences of learners.
5. Openness – The instructor should give learners the opportunity to suggest their own resources for adoption in the course.
6. Academic Integrity – The instructor promotes best practice in the use of third party resources, including anti-plagiarism practices and sound academic research/writing practices. The use and/or adherence to the Creative Commons licensing framework is encouraged.

6. Learner Support – Learners enabled to achieve their maximum potential

1. Instructional Support – The instructor explains his/her role in the process.
2. Academic Support – Learners know how to obtain such services as mentoring, advice and other skills that support them in achieving the learning outcomes.

3. Technical Support – Learners know how to obtain technical support to overcome potential issues in accessing the learning area and achieving the learning outcomes.
4. Administrative Support – Learners know how to obtain administrative support to overcome potential issues in accessing the learning area and achieving the learning outcomes.

7. Technology design – Technology is at the service of teaching and learning

1. Support – All the utilised technologies and resources support the achievement of the aims and objectives of the instructor and the learning outcomes for learners.
2. Centricity – All technologies and resources used support a learner- centric rather than an instructor-centric educational approach. The learners must be in control and technology must assist them in achieving the learning outcomes.
3. Openness – The technical infrastructure used to deliver the teaching and learning is procured and implemented according to open standards and formats that maximise the value for money and the range of options to fulfil the learning outcomes and the academic needs of faculty and learners.
4. Authentication – Authentication at different levels (device, software, virtual learning environment, specific course/learning area) should provide access to a safe and secure teaching and learning environment with the minimum number of steps possible to access the learning areas.
5. Access – The virtual learning environment/learning area is device/platform agnostic as much as possible, thus accessible over different software platforms, browsers and computing devices. The instructor provides alternative resources if any of these are not easily accessible for technical reasons related to special needs of learners.
6. Interface – The user interface and navigation in the learning area is simple enough to be conducive to teaching and learning without the need to possess advanced ICT skills and competences.
7. Investment – The technical requirements of the instructional resources and the virtual learning environment/learning space do not require learners to make any significant new investment in hardware, software and online services to be able to access and use these resources to fulfil the learning outcomes.
8. Management – Learners are aware of the rules, regulations and policies at institutional and at learning community level that govern the use of the technological infrastructure supporting e-learning.

8. Course evaluation – Feedback to improve teaching and learning

1. Entitlement – Instructors should give learners the opportunity to provide feedback on the whole learning experience. On the other hand, instructors should also be able to provide their feedback within their organisation.

9. Course Closing

1. Assessment – Learners should have access to their grades and the course material after the closure of the course (depending on the institution's access policies). The final grades should be provided within a reasonable timeframe after the closure of the course.
2. Resolution - All pending issues between the instructor and the learners are resolved.
3. Archiving – The instructor makes sure the course/learning area resources, texts, communication, etc., are backed-up or archived (in line with the institution's access policies) in a safe and secure way.

10 Instructional Design Cycle

1. Academic Review – The instructor and the organisation review the course description, the experience gathered, and the evaluation given.
2. Technical Review – The instructor, with the relevant technical unit in the organisation, reviews the performance of the technical infrastructure used to deliver teaching and learning.
3. Administrative Review – The instructor, with the relevant administrative unit/s in the organisation, reviews the administrative processes supporting the delivery of teaching and learning.

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This rubric published in the paper is available here:
<http://www.emeraldinsight.com/doi/full/10.1108/IJILT-09-2017-0092>

Writing aims, objectives and learning outcomes

When designing instruction at any level, the desired aims, objectives and/or outcomes of the teaching and learning have to be defined. While these three specifications are sometimes interchanged, they have different and specific meanings. Recently the term “learning outcomes” has become the focus of attention in the measurement of the success or otherwise of the education initiative. However aims and objectives remain an important element in the description and the design of any teaching and learning.

Aims (of study unit/module/programme/course)

- Broad general statements on the intentions of the academic delivering the teaching, covering the management and teaching aspects.
- Contrary to learning outcomes, aims are written from the educator's point of view.

Learning objectives

- Specification of learning outcomes to be achieved upon completion of an educational or learning activity. These encompass improving knowledge, skills and competencies within any personal, civic, social or employment related context. Learning objectives are typically linked to the purpose of preparing for more advanced studies and/or for an occupation or trade or class of occupations or trades.
- Written from an academic management point of view.
- Sometimes used instead of learning outcomes but learning outcomes should be preferred as the latter are from the learner's point of view.

Learning outcomes

- Statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning.
- Set of **knowledge, skills and/or competences** an individual has acquired and/or is able to demonstrate after completion of a learning process, either formal, non-formal or informal.
- Written from the learner's point of view.

Aims	Objectives	Learning Outcomes
More concerned with the teaching and the management of the learning event	The steps the educator will take to achieve the aims	What the learner is expected to achieve and how to demonstrate such an achievement
Broad statement	More defined than aims statement	Specific, clear, brief
Written from the educator's point of view	Written from the educator's point of view	Written from the learner's point of view
Successfully implemented through the learning outcomes	Consistent with the aims and learning outcomes	Consistent with the aims and objectives
Used by learners to what the learning unit/event is all about	Used by learners to what the learning unit/event is all about	Used by learners and educators to evaluate the success of the education
Example: "The aims of the study unit is to become aware of how tourism impacts the environment"	Example: "The objectives are to identify the positive and negative impact of tourism on the environment and come up with idea to mitigate the	Example: "By the end of this study-unit, learners will be able to list and describe the major issues related to the impact of tourism on the

	negative impact”.	environment and propose specific attainable solutions to mitigate the negative impact, with particular attention to the situation in the Maltese Island”.
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Table????????? The difference between aims, objectives and learning outcomes of a course/study unit.

Writing aims and objectives

SMART objectives

The mnemonic **S.M.A.R.T.** is associated with the process of setting objectives in this paradigm. "SMART" objectives are:

- Specific
- Measurable
- Agreed/Achievable/Attainable
- Realistic/Responsible/Receivable
- Time-bound

Writing Learning Outcomes

Learning outcomes come in different forms according to the format of the expected outcome:

•Knowledge-based (knowledge and understanding) - these outcomes describe the knowledge and/or understanding that students will be expected to have acquired by the end of their studies.

•Application-based (practical skills) – As well as being able to recall information and show understanding of it, learning outcomes should describe the kinds of application or transformation that students will be expected to make in relation to that information. Outcomes at higher levels should show that students should be able to engage with knowledge critically, to evaluate it, or to analyse or synthesise complex data.

•Skills-based (intellectual and transferable skills) – Learning outcomes should cover the development of skills as well as knowledge acquisition and application. If you intend to assess students' capability in a particular skill, think about how you express that as an outcome for the course (University of Hull, 2016).

Learning outcomes should deal with condition, behaviour and a criterion (University of Malta, 2009). A condition is an environment or situation in which the student will

perform the behaviour or the tools/information they will be given when they demonstrate their learning. Behaviour should include at least an action verb to describe what participants will be able to do as a consequence of a learning activity. The criterion describes the limits or range of an acceptable response, i.e. addressing the question of how well the learner has to perform for one to be able to say that the learning outcome has been achieved.

Taking the previous example “By the end of this study-unit, learners will be able to list and describe the major issues related to the impact of tourism on the environment and propose specific attainable solutions to mitigate the negative impact, with particular attention to the situation in the Maltese Island”, the following can be noticed:

Condition - tourism and the environment in the Maltese Islands

Behaviour - identify impact and propose solutions (the verbs are ‘identify’ and ‘propose’)

Criterion - a list with a solution to accompany each identified issue (the ‘list’)

These steps provide a guide to the definition of learning outcomes (University of Malta, 2009):

1. Identify the aims of the study-unit/programme
2. Classify the outcome (cognitive, etc.)
3. Identify the level of learning required of the student
4. Choose a specific action verb for each outcome
5. Decide how you will measure the achievement of the outcome
6. State success criteria

Higher education institutions provide a various suggestions on how to write meaningful learning outcomes. This is a collection of such suggestions from the University of Malta (2009), the Queen Mary University of London (2013), the University of Hull (2016), Columbia University (no date) and the University of Melbourne (2015).

Learning Outcomes should:

- Be written in terms of observable and measurable behavioural outcomes
- Be written in the future tense, e.g. “By the end of the study unit ...”
- Be succinct and concise
- Not pontificate, plagiarise or promote the instructor’s CV
- Contain only one action verb per learning outcome and target one specific aspect of expected performance

- Use a verb able to lead to assessment tasks suitable to reveal for any objective evaluator what the student knows or is able to do or demonstrate at the required level (e.g. define, describe, compare, apply, determine, demonstrate, explain, analyse, question, critique, create, design, assess, test, generate, devise etc.)
- Have a balance in the types of outcomes
- Be written in terms of what the learner should do and not what the instructor should do
- Avoid verbs susceptible to different interpretations of what actions they require. This type of verb indicates in general behaviours that cannot be objectively measured (e.g. know, cover, study, understand, become aware of, appreciate, learn, become familiar with/familiarise, think etc.)
- Include the process that learners should undertake
- Be realistic, taking into account prior knowledge, available time and learning opportunities
- Be clear and written in language that is understandable to students
- Be kept to a manageable (small) number
- Be aligned with the instructional activities and assessments
- Be written according to the appropriate level of the course
- Be in line the overall aims of the programme they form part of

The following list of items can be used to self-evaluate a list of intended learning outcomes (University of Melbourne, 2015):

- Learning outcomes are clearly stated, in clear and unambiguous language.
- All learning outcomes clearly indicate what the students should learn.
- All learning outcomes use one verb that is aligned to the level of the course/programme.
- The learning outcome is significant and meaningful in the long term.
- Learning outcomes provide a guide for the development of learning activities, teaching and assessment.
- All intended learning outcomes can be assessed effectively – you can envision assessment tasks able to achieve this.
- Learning outcomes are aligned to the level of study, faculty and university strategic priorities and values.

Keeping three key questions in mind when thinking about designing your curriculum and associated assessment:

- What should the students know or be able to do by the end of the course?
- Which methods and resources will I use in my teaching to encourage students to develop the knowledge, understanding and skills necessary to achieve these outcomes?
- Which assessment tasks and criteria will help me and my students know that they have met the intended outcomes? (University of Hull, 2016)

Taxonomies and Models for Learning Outcomes

Bloom's Taxonomy and Revised Digital Taxonomy

Bloom's Taxonomy is a categorisation of cognitive ability and is usually associated with writing learning outcomes. First developed by Benjamin Bloom in the 1950s, this taxonomy is regularly quoted in academic research and learning and has been revised to take into account the development of online learning. The action verbs associated with each category, ranging from the simplest of tasks being to gather knowledge and the most complex and demanding one being to create knowledge, are used in the articulation of the learning outcomes.

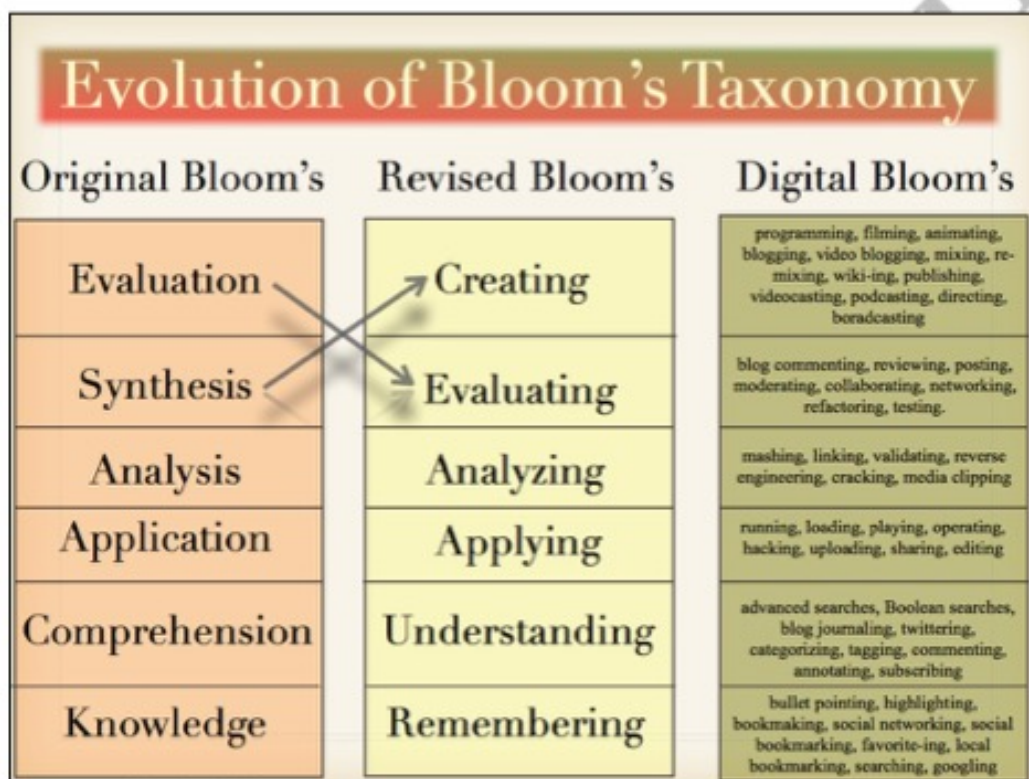
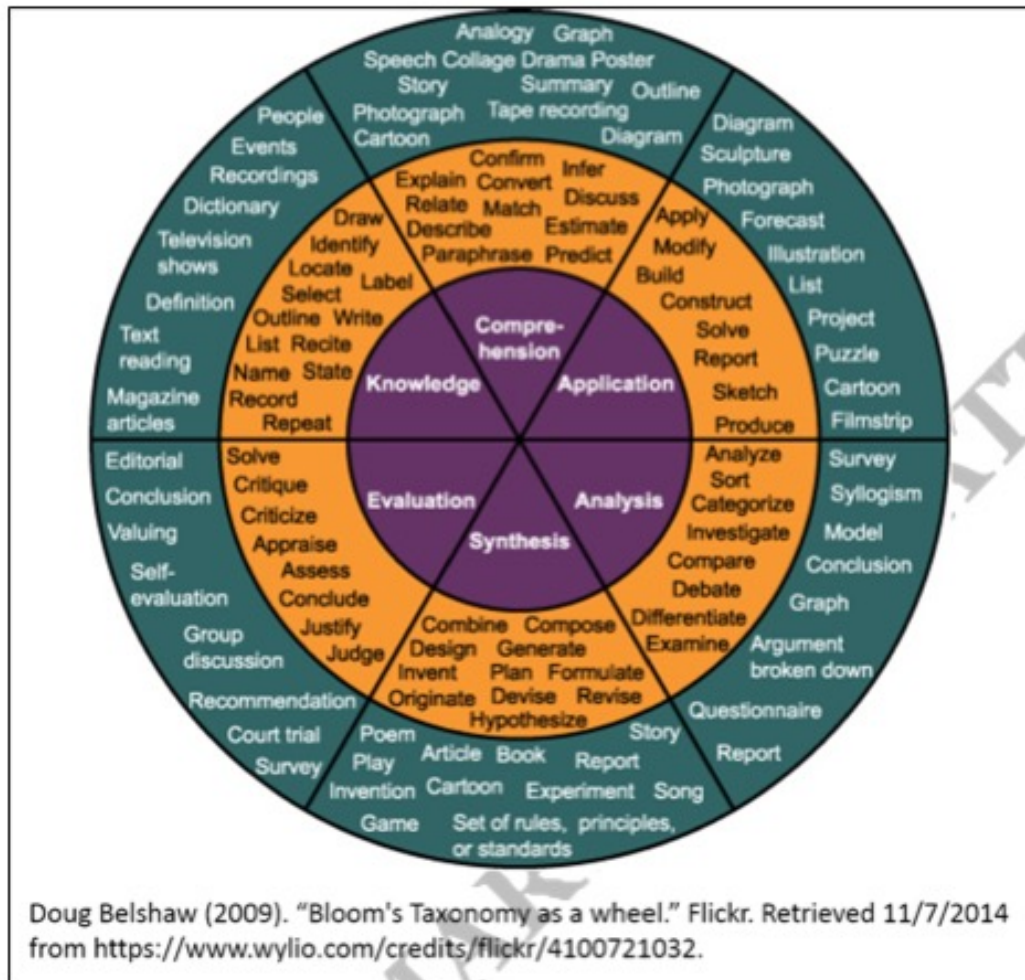


Fig:???? The Evolution of Bloom's Taxonomy (Retrieved from <https://www.adjunctnation.com/2016/01/19/how-blooms-toxonomy-can-make-you-a-better-teacher/>)



Fig????: Bloom's Digital Taxonomy and associated verbs for learning outcomes and relative assessment.

The Feisel-Schmitz Technical Taxonomy

The Feisel-Schmitz Technical Taxonomy is another categorisation used in education to define learning outcomes (Soderholm, 2005):

- Judge:** To be able to critically evaluate multiple solutions and select an optimum solution
- Solve:** Characterize, analyze, and synthesize to model a system (provide appropriate assumptions)
- Explain:** Be able to state the outcome/concept in their own words
- Compute:** Follow rules and procedures (substitute quantities correctly into equations and arrive at a correct result, Plug & Chug)
- Define:** State the definition of the concept or is able to describe in a qualitative or quantitative manner



Figure???: A more complex interpretation of Bloom's Digital Taxonomy that includes the Knowledge Dimension (Cole, 2016)



Fig.????
Bloom's Digital

Taxonomy Verbs (Global Digital Citizen Foundation, 2016)

The Pedagogical Wheel - Bloom's Digital Taxonomy, the SAMR Model and the TPACK Model

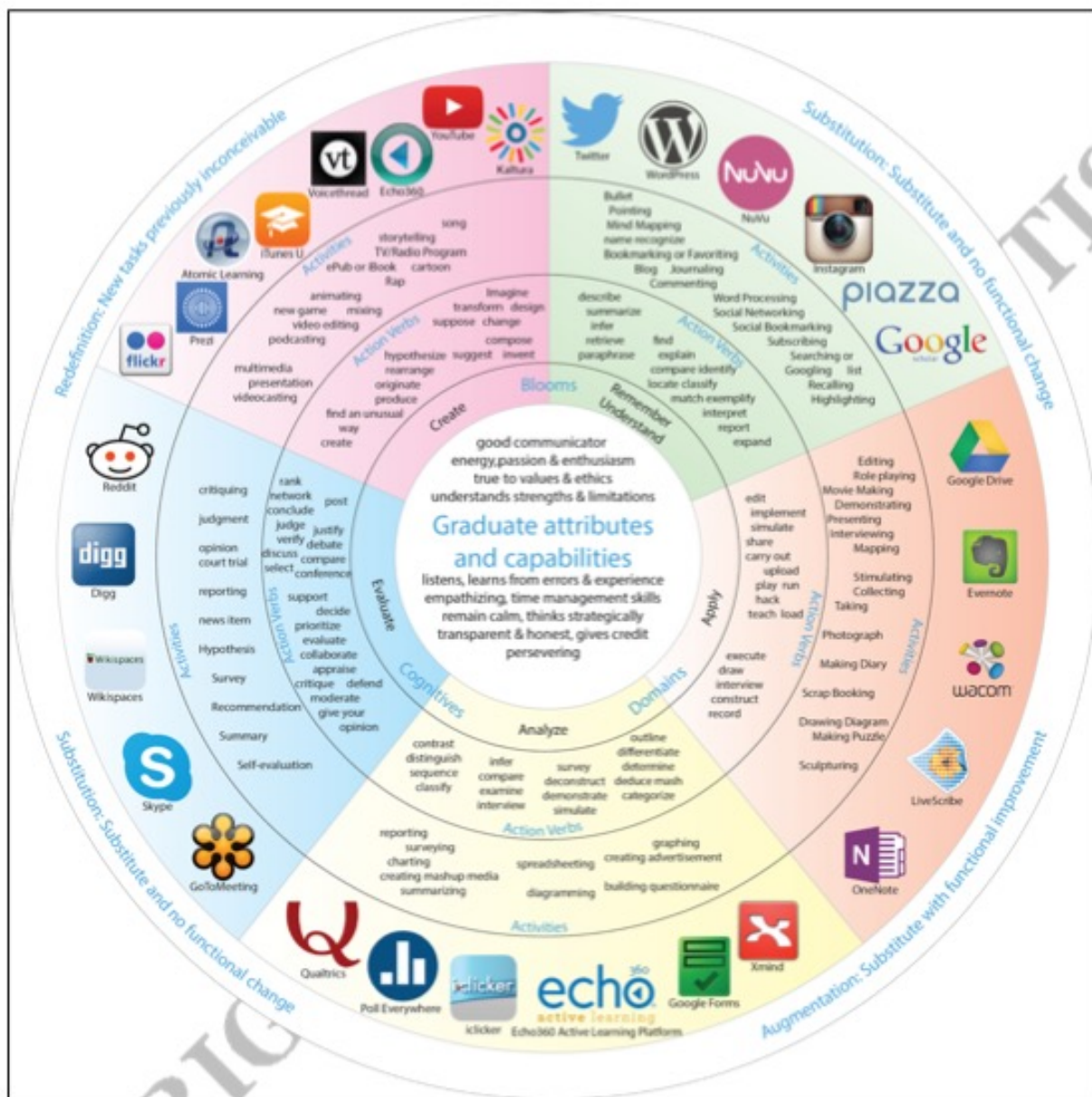
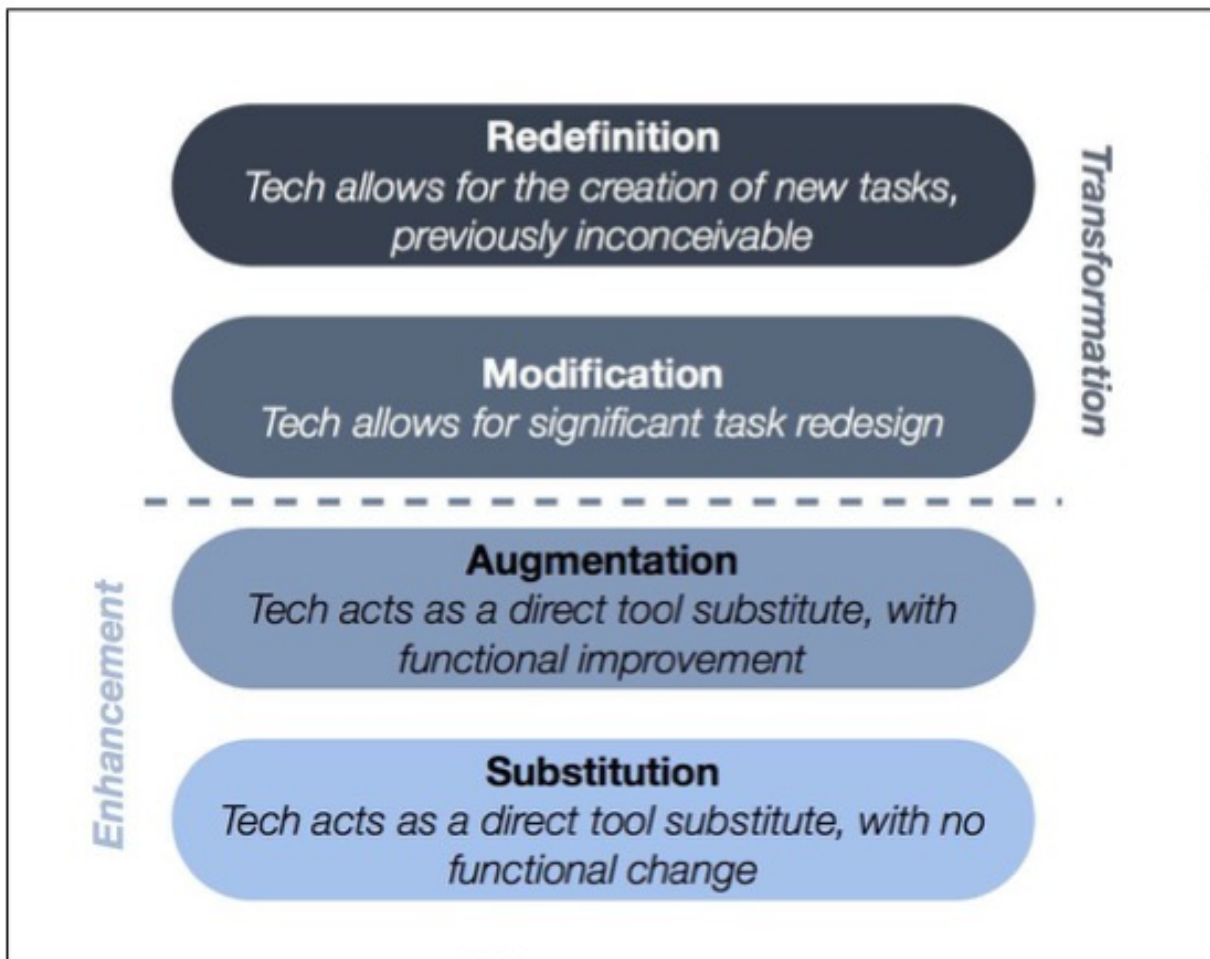


Fig.?????? The Pedagogical Wheel - Bloom's Digital Taxonomy, the SAMR Model and the TPACK Model Retrieved from <http://www.wit.edu/lit/engage/Pedagogy%20wheel.png>

The SAMR Model



Fig????: The SAMR Model (Puentedura, 2010)

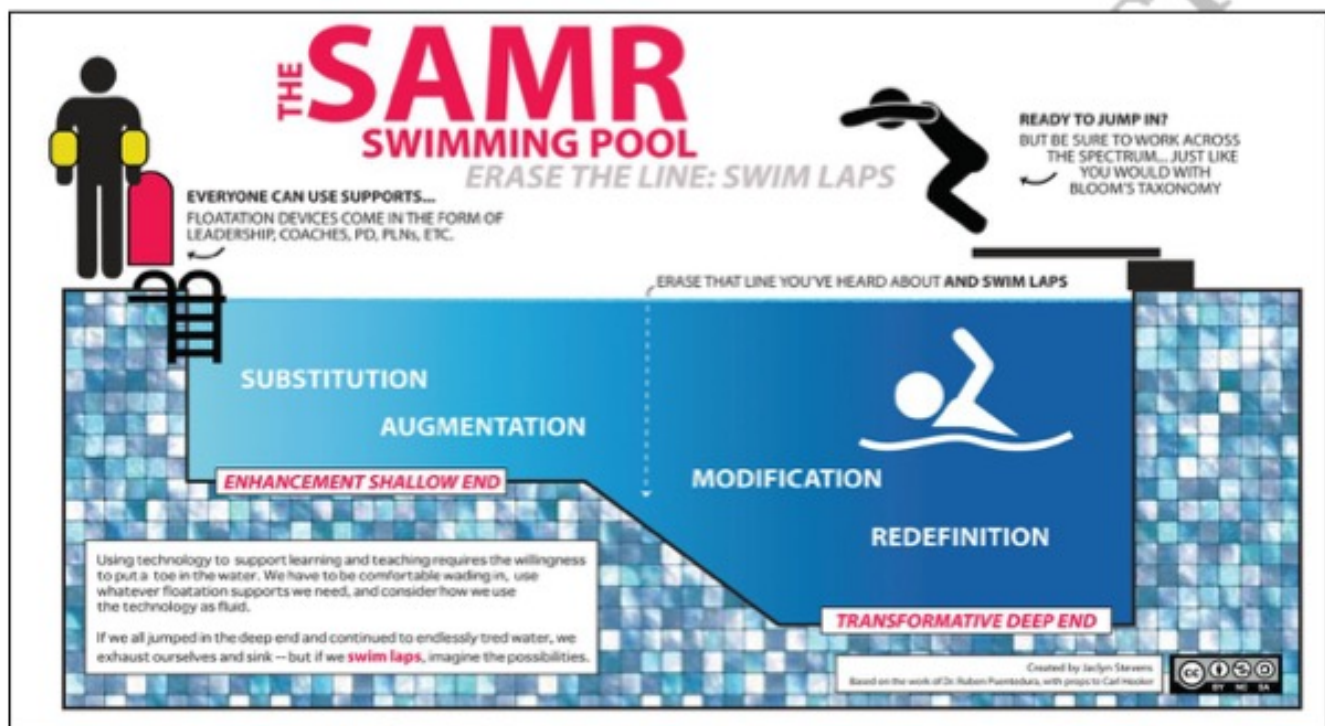
The SAMR Model is used to classify and evaluate the use of technology in education. The model was intended to encourage educators to significantly enhance the quality of education (Romrell, Kidder and Wood, 2014). Learning activities classified as substituting and augmenting learning are considered as enhancing learning, or doing the same activities but with modern technology. Activities that modify and re-define learning are considered as transformational and bringing out the true potential of technology for they allow tasks and learning that was not possible before (Puentedura, 2010).

Examples:

- **Substitution:** an educator used a computer to do word processing and then prints copies on paper for learners.
- **Augmentation:** using the dictionary function of a word processor and provide links to websites and external content, then sending the document by email to learners rather than printing.

- **Modification:** instead of doing a word document with just text, the educator uses a presentation, complete with images, audio and video, and then shares it online for students to watch.
- **Re-definition:** instead of the educator doing the presentation it's the learners themselves who produce the multimedia presentation, share it with mates and publish it to the outside world, and discuss it online and live in class.

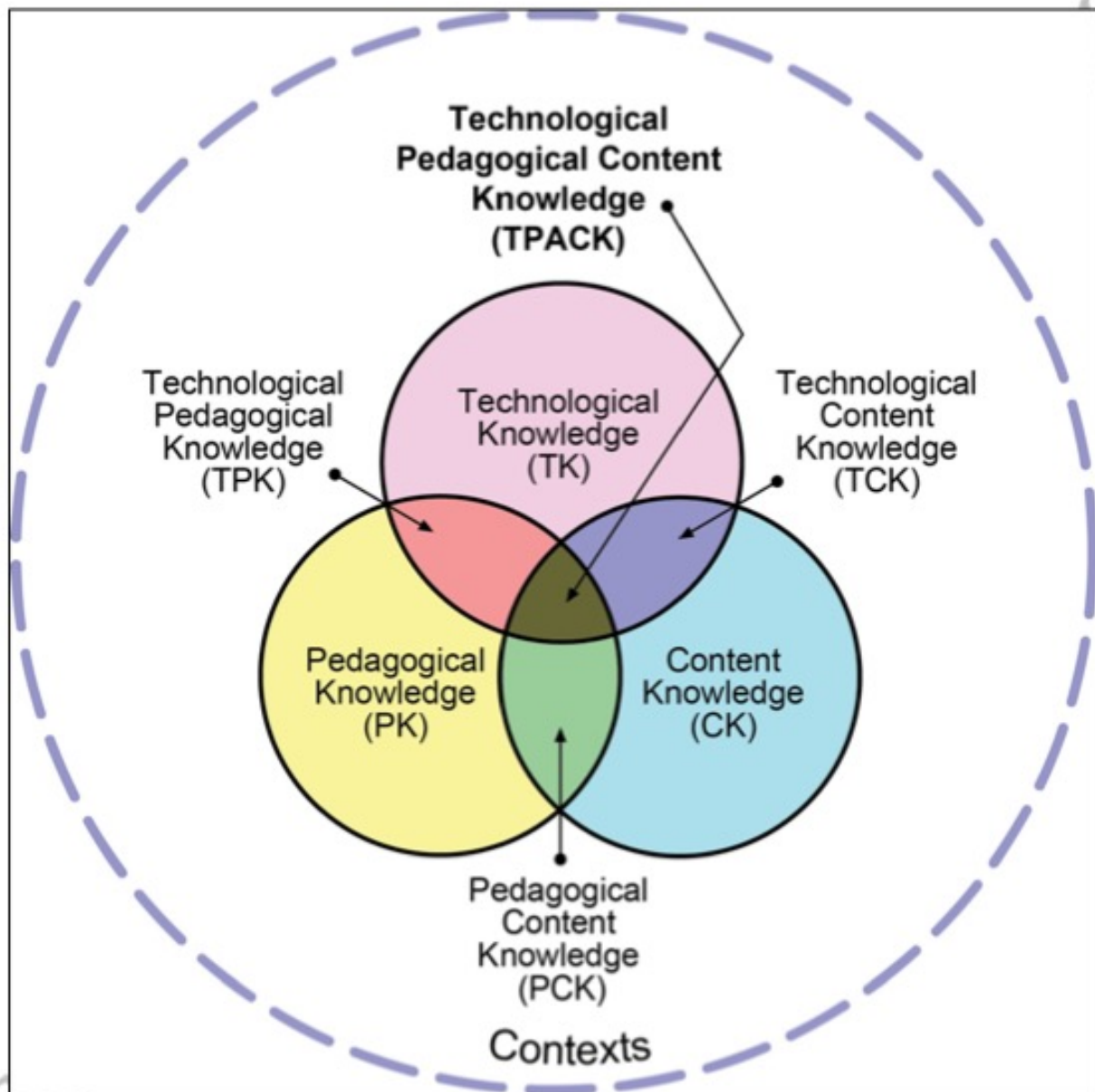
Educational technology does not need to be transformational or re-defining all the time to be effective, for in some instances a simple substitution or augmentation could be enough to reach learning outcomes. The following figure uses the "swimming pool" metaphor to further illustrate the SAMR model in practice.



Fig?????: The SAMR Swimming Pool (Retrieved from <http://pllc.fi.ncsu.edu/2015/12/14/a-perspective-on-the-samr-model-erase-the-line-and-swim-laps/>)

The TPACK Model

According to Koehler, & Mishra (2005b) "it is necessary to teach technology in contexts that honor the rich connections between technology, the subject-matter (content) and the means of teaching it (the pedagogy). By using the the learning by design approach "teachers are confronted with building a technological artifact while being sensitive to the particular requirements of the subject matter to be taught, the instructional goals to be achieved, and what is possible with the technology.



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The Flipped Classroom for blended learning

A definition of the flipped classroom or flipped instruction is that it is “a form of blended learning in which students learn new content online by watching video lectures, usually at home, and what used to be homework (assigned problems) is now done in class with teachers offering more personalized guidance and interaction with students, instead of lecturing. This is also known as backwards classroom, flipped classroom, reverse teaching, and the Thayer Method” (Nwosisi et al., 2016).

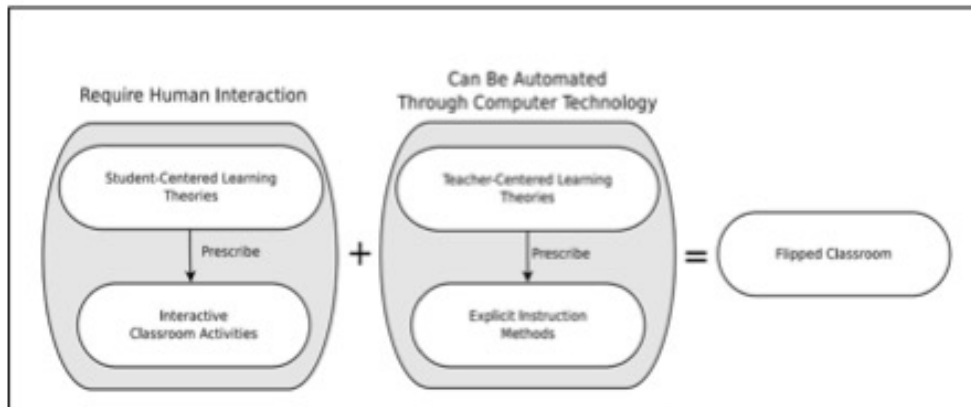


Fig.?????: The Flipped Classroom (Bishop & Verleger, 2013)

The potential of the flipped classroom is as such that “it represents a unique combination of learning theories once thought to be incompatible—active, problem-based learning activities founded upon a constructivist ideology and instructional lectures derived from direct instruction methods founded upon behaviorist principles” (Bishop & Verleger, 2013) (see fig.??????).

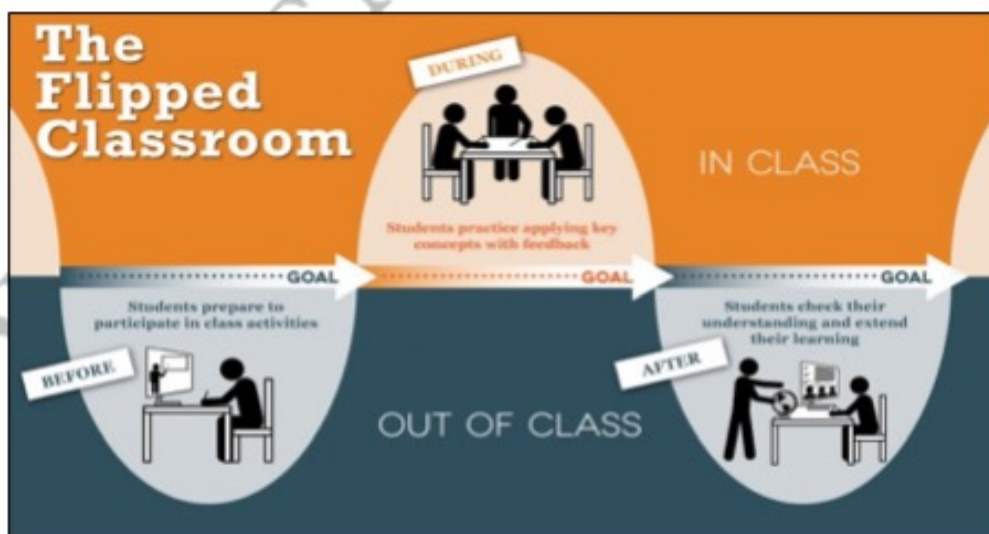


Fig.??????: The Flipped Classroom Flow Model (Retreived from <http://facultyinnovate.utexas.edu/ctl/teaching/flipping-a-class>)

Gamification of learning

Gamification of education is the process of applying environments and processes usually found in games to learning activities. Facilitated by technology, “it is a popular tactic to encourage specific behaviours, and increase motivation and engagement. Though commonly found in marketing strategies, it is now being implemented in many educational programs as well, helping educators find the balance between achieving their objectives and catering to evolving student needs ... For students, gamification serves the purpose of minimising negative emotions that they usually encounter in traditional forms of education. It lets them approach knowledge and skills, using the learn-by-failure technique that is popular in game-like environments, without the embarrassment factor that usually forms a part of classroom education. Instructors on their part can efficiently achieve their set objectives and use currency-based tracking mechanisms to get feedback on their students’ progress” (Huang & Soman, 2013).



Fig.?????: The Five-part gamification process (Huang & Soman, 2013)

Gamification does work and yields results (Hamari, Koivisto & Sarsa, 2014) but it’s a new methodology and need more research (ibid.), it has its caveats and it is not easy to implement without some effort (Huang & Soman, 2013).

“Gamification in e-learning platforms seems to have potential to increase student motivation, but it’s not trivial to achieve that effect, and a big effort is required in the design and implementation of the experience for it to be fully motivating for participants ... gamification can have a great emotional and social impact on students, as reward systems and competitive social mechanisms seem to be motivating for them ... On the other side, quantitative analysis suggests that cognitive impact of gamification over students is not very significant” (Dominguez et al., 2013).

Innovating Pedagogy

A series of reports by the Open University (Sharples et al., 2015) explores current trends in the use of technology and its impact on teaching, learning and assessment. The 2017 edition of the report (Ferguson *et al.*, 2017) presents innovative pedagogies, i.e. “novel or changing theories and practices of teaching, learning and assessment for the modern, technology-enabled world” (ibid., p.6) currently impacting education or which may influence practice in the near future.

This series of reports explores new forms of teaching, learning and assessment for an interactive world, to guide teachers and policy makers in productive innovation.

The innovative pedagogies highlighted in this sixth edition of the report “are addressing problems of today’s world, where learners are faced with fake news, pseudoscience, ‘post truth’ and increasing tensions between some communities. They are pedagogies that emphasise the importance and the roles of education in the world today” (ibid., p.6). The full list of pedagogies and themes is: spaced learning, learners making science, open textbooks, navigating post-truth society, intergroup empathy, immersive learning, student-led analytics, big-data inquiry, learning with internal values, and humanistic knowledge-building communities.

The 2017 edition suggests the following major trends:

1. Spaced Learning

Studies of human memory have shown that we remember more when learning is spaced over time rather than crammed together in a single session. Typically, these studies have focused on learning short items, such as words or phrases in a foreign language, with increasing spaces between attempts to recall the items. 90 minutes of spaced learning could have very similar outcomes to months of study.

2. Learners making science

Citizens need skills and knowledge to solve problems, evaluate evidence, and make sense of complex information. A strong understanding of STEM (Science, Technology, Engineering and Mathematics) topics can develop these. It can also address current demands for employees with STEM skills. When learners experience how science is made, they increase their subject knowledge and develop scientific skills. The experience can also contribute to their personal growth and help them to understand what it means to be a scientist.

3. Open Textbooks

The Open Educational Resources (OER) movement has been releasing educational content since 2001. This content is released with an open licence – usually a Creative Commons licence – that permits all aspects of reuse. This typically means that they can be reused, remixed, revised, redistributed, and retained. OER come in many different forms, but key to their definition is that anyone can freely take them, change them, and reuse them in education. A form of OER that has attracted interest, particularly in North America, is the open textbook. These books are released with an open licence so they can be modified and adapted by educators and students. The digital format is usually free, and the print version has a low cost.

The OER movement is well established, and open textbooks represent a form of OER that helps to resolve a specific problem, the prohibitively high cost of many textbooks. This has positive impacts for learners, including the immediate availability of textbooks for all who can access and download internet les. It is in the area of adaptation where there is the greatest potential for innovation in pedagogy, which requires the development of a new set of skills. The textbook still dominates many approaches to higher education, and open textbooks can change learners' relationship with these resources.

4. Navigating post-truth societies

Post-truth was 2016's Word of the Year, according to Oxford Dictionaries. Fake news and information bubbles are not new but awareness of their impact on public opinion has increased. People need to be able to evaluate and share information responsibly. One response is to integrate these skills within the curriculum. However, this raises a series of questions: What does truth mean? How can we tell what is true? How can we know which sources to trust? The ways in which people think about such questions are called 'epistemic cognition'. Researchers have developed ways of promoting learners' epistemic cognition. These include promoting understanding of the nature of knowledge and justification as well as fostering abilities to assess the validity of claims and form sound arguments. One approach engages learners in activities that involve conflicting accounts. These provide opportunities to make learners aware of their assumptions about truth, justification, and understanding. They also help learners to develop strategies for evaluating and constructing knowledge.

5. Intergroup Empathy

Online environments such as social media form global virtual spaces. In these, people from different backgrounds interact with each other, even if they come from countries or cultures that are engaged in conflict. This means that skills such as communication, teamwork, and empathy are important for constructive participation ... activities designed to promote intergroup empathy can provide effective responses and help to reduce tensions.

6. Immersive Learning

Immersive experiences transport us to another place, giving us a feeling of being in the heat of the action and having some control over what happens next. Reading an interactive novel is one such experience. Readers can choose how the action in the story will continue or what the characters will do. They may even be able to enter the story as one of the characters and get involved in the action. Using this approach, immersive learning allows people to experience a situation as if they were there, using their knowledge and resources to solve a problem or practise a skill. The learning is intensified by bringing in vision, sound, movement, spatial awareness, and touch. Participation in immersive learning is likely to be stimulating and memorable.

7. Student-led analytics

In the last decade, learning analytics have helped institutions, teachers, and policy makers to understand student learning and outcomes. These analytics make use of the data generated during study activity in order to enhance learning and teaching. They often focus on how teachers and institutions can help learners to pass a test, a module, or a degree. Student-led learning analytics enable learners to specify their

own goals and ambitions. They also support learners to reach these goals. This is particularly helpful for individuals who have little time to spare for study.

8. Bid-data inquiry: thinking with data

New forms of data, data visualisation and human interaction with data are changing radically and rapidly. As a result, what it means to be data literate is also changing. In the big data era, people should not simply be passive recipients of data-based reports. They need to become active data explorers who can plan for, acquire, manage, analyse, and infer from data. The goal is to use data to describe the world and answer puzzling questions with the help of data analysis tools and visualisations. There is a growing demand for data literacy in all disciplines and for data analysts in all sorts of industries and organisations. Understanding big data and its powers and limitations is important to active citizenship and to the prosperity of democratic societies. Today's students therefore need to learn to work and think with data from an early age, so they are prepared for the data-driven society in which they live.

9. Learning with internal values

Well-being in our networked society is related to our ability to learn and use technology as a resource for learning. We all navigate our learning according to our own needs and interests. We may want to learn the skills necessary for a new job, make an informed choice when we go to vote, and out which vaccinations our children should receive, or how to use a new piece of software. Throughout life, significant learning is triggered, monitored, and owned by us as individuals. Interest groups and learning communities help us to achieve our goals. This learning is rooted in our own needs and interests and shaped by our internal values. When learning is based on our internal values, we take ownership of our learning and are willing to put in the effort needed to learn.

10. Humanistic knowledge building communities

The goal of humanistic education is to help people become open to experience, highly creative, and self-directed. This is a person-centred approach. On the other hand, knowledge-building communities aim to advance the collective knowledge of a community. This is an idea-centred approach. When the two approaches are combined, they create a new one: humanistic knowledge-building communities (HKBCs). Research shows that students who participate in these develop their knowledge and selves in integrated and transformative ways.

Teaching and learning methods in online courses

Based on the University of Malta and the MIT Teaching and Learning Laboratory guidelines.

Online Synchronous (live contact between tutor and learner)

● Group discussion (online-live)
● Lecture (online-live)
● Performance (online-live)
● Seminar (online-live)
● Supervised peer collaboration (online-live)
● Tutorial (online-live)
● Office hours (online-live)
Online Asynchronous (contact between tutor and learner is not live)
● Dissertation (offline)
● Fieldwork (online)
● Fieldwork (offline)
● Group learning (online-async)
● Group discussion (online-async)
● Independent study (online)
● Independent learning (online)
● Lecture (online-on demand)
● Multimedia (online-on demand)
● Performance (online-on demand)
● Placement (offline)
● Practical (online)
● Practical (offline)
● Project (offline)
● Other (please specify)

Methods of Assessment in online courses

Based on the University of Malta and the MIT Teaching and Learning Laboratory guidelines.

Different types of assessment

In a pure online course the assessment has to be 100% digital. However in a blended course, some of the assessment can be offline (not digital).

● Assignment
● Analysis

• Case study (offline)
• Case study (online)
• Classwork
• Competencies
• Collaborative creative writing
• Digital artefact
• Dissertation
• Essay
• Examination
• Fieldwork
• Logbook
• Long essay
• Oral (live)
• Oral (on demand)
• Personal writing (online)
• Quiz/Q&A (live or on demand)
• Seminar Paper
• Placement (offline)
• Portfolio
• Practical (offline)
• Practical (online)
• Presentation (live)
• Presentation (on demand)
• Project
• Reflective diary
• Report
• Research paper
• Software development
• Thesis
• Transcript
• User generated content (online)

• Workbook
• Workshop (offline and online)
• Other (please specify)

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Measuring learning outcomes

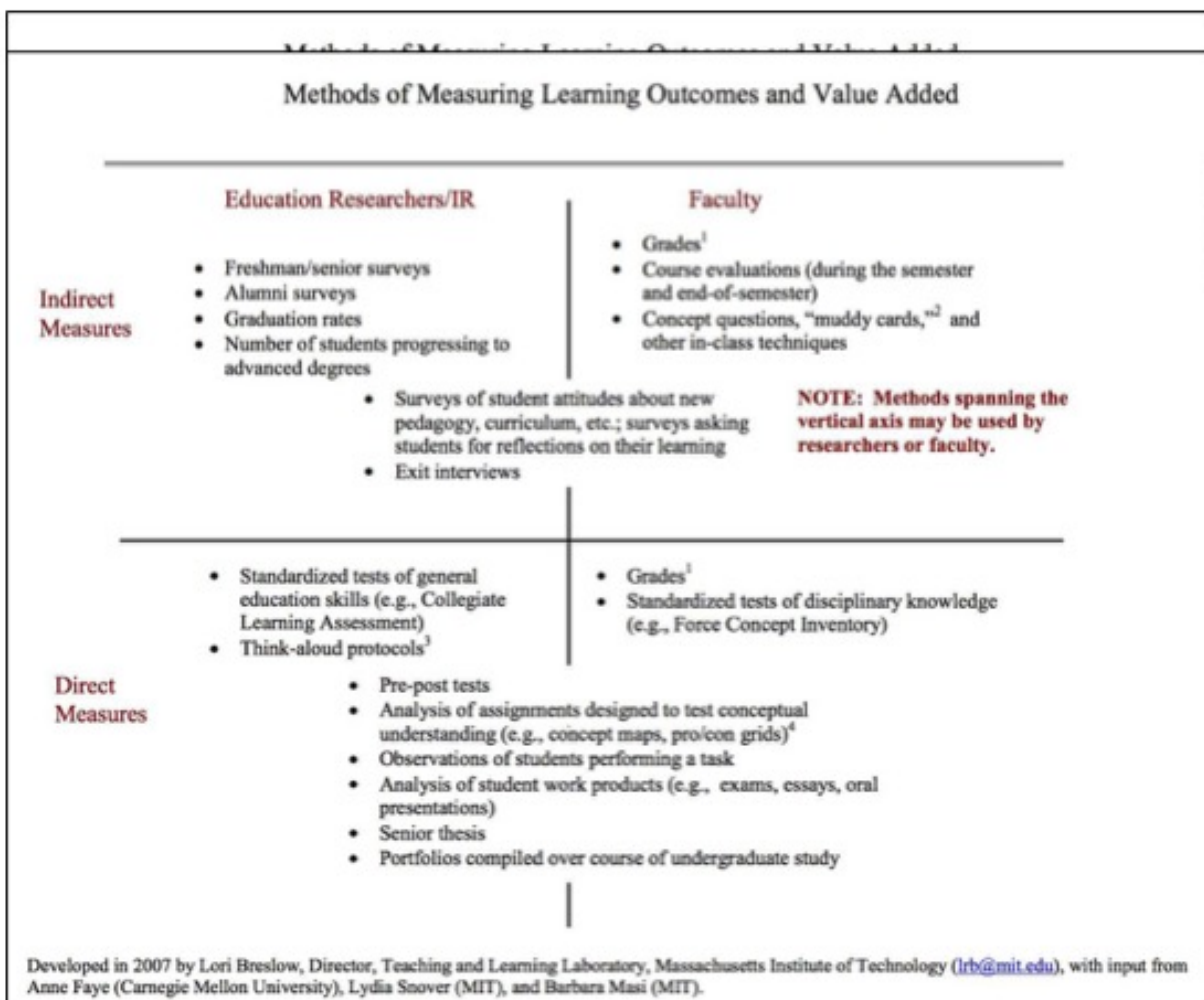


Fig.????: Methods of measuring learning outcomes (MIT Teaching and Learning Laboratory)

According to Giles (no date), assessment has to be:

- Valid
- Reliable, fair & equitable
- Purposeful
- Timely
- Demanding
- Efficient and manageable

VLE/LMS Interface Design Pedagogy

Table 1 A view of the overall framework for user-interface design and its pedagogy

User interface design framework	Sub-section		Icon	Functionality	Pedagogy	
1. Course module progress indicator	1.1	Completed	Yes	Learner dependent	Pacing effect	
	1.2	On-going				
	1.3	Incomplete				
2. Assessment and evaluation	2.1	Quiz	Yes	Time dependent	Knowledge testing	
	2.2	Assignments	Yes	Time dependent		
	2.3	Grade		Time dependent		
3. Content area	3.1	Animation/simulation area	No	Interactive (hyperlink)	Modality effect	
	3.2	Subtitle	Yes	Learner dependent	Contiguity effect	
	3.3	Practice test	Yes	Learner dependent	Personalization	
	3.4	Live webcast	Yes	Instructor dependent	Principle	
4. Student resources	4.1 Home	4.1.1	Yes	For reg. students	System generated assistance for users Conative category of cognitive science	
		4.1.2				On going
		4.1.3				Incomplete
	4.2 Student details	4.2.1	Name	Yes		For reg. students
		4.2.2	E-mail ID			
		4.2.3	Photo ID			
	4.3	Settings	Yes	For reg. students		
	4.4	Syllabus	Yes	For all		
	4.5	Discussion zone	Yes	For reg. students		
	4.6	Help	Yes	For reg. students		
4.7	Notice board	Yes	For reg. students			
4.8 Course repository	4.8.1	Video lectures	Yes	For reg. students		
	4.8.2	Presentations				
	4.8.3	Extra references				

Fig.???: Framework for user-interface design and pedagogy (Mandal, J. K., Satapathy, S. C., Sanyal, M. K., Sarkar, P. P., & Mukhopadhyay, A. (Eds.), 2015).

Moodle Tool Guide for Teachers



	What you want to achieve (pedagogy)	Information Transfer Is it a tool for disseminating information from you to your students?	Assess learning Will this tool allow you to assess your students' learning?	Communication & interaction Can it be used for communication & interaction among participants (you & your students)?	Co-create content Can you & your students collaborate & create content together?	Bloom's Allows what thinking order? *Remember *Understand *Apply *Analyse *Evaluate *Create
What you want to use (technology)	Ease of use How easy can this be set up by you?	Information Transfer	Assess learning	Communication & interaction	Co-create content	Bloom's
Add Resource Upload a file (Word Document/ PowerPoint)	Easy, like an email attachment. But can your disc stand on its own?	Yes. Only teachers can upload files to course site. So definitely a push-tool.	Maybe. Use to give task. Collect student files through Forum or Assignment.	No. It's a distribution tool. No option for interaction or communication.	Maybe. Use to give task. Collect student files through Forum or Assignment.	None. This is not a learning activity, but information transfer.
Add Resource Link to a web page	Easy. Find the web address (aka url - the bit that starts with http://), copy it, paste it.	Very easy way of leading students to information. Can link directly to database articles.	Not directly. Option is to link to external student e-portfolios or blogs.	Maybe. Link to external tools eg Google Calendar, groups, blogs or wikis.	Maybe. You can link to external collaborative sites e.g. Google Docs, wikis or blogs.	6/6. Can do all of the above, depending on where you link to.
News Forum Use to send out course announcements	Easy. It's a standard forum, already set up in your course.	Yes. Include course updates, encouragement, timely links, etc.	No. The News Forum is limited. Students cannot post new topics.	You can start new topics. Students respond. Great for establishing course rhythm.	Limited because students cannot start new topics. Tip: Set up another Forum.	2/6. Not strictly learning activity. Test readiness for next class? R & U
Discussion Forum Use for many types of learning activities *	Easy. Forum has usable default settings. A name & description is enough.	Share resources as links or files. High message volume? Risk of losing info.	Forum is versatile & allows this, e.g. design a formative assessment activity.	Yes. Students communicate with you & peers. Interact as a class or in groups.	Yes. Students can collaborate & explore topics, discuss them & write together.	5/6. Understand, Apply, Analyse, Evaluate, Create
Wiki Use for many types of learning activities	Tricky. Decide on individual & group settings. Has some quirks. Get some training.	Yes. Use as information site. Allow editing only by teachers or by any participant.	Wiki is versatile & allows this, e.g. design a formative assessment activity.	Not suited for discussions. Use in brainstorming, planning, collaborative writing...	Yes. Students can collaborate & explore topics, discuss them & write together.	5/6. Understand, Apply, Analyse, Evaluate, Create
Glossary Use for learning activities that gather resources or present info	Default settings are good. Try to set it so the author's name is shown.	Use glossary to define terms or present info. Better yet, let the students add to it.	Glossary is versatile & allows this, but you need to design the right learning activity.	Not suited for discussions. Students can read other entries & comment or rate.	Only original author can edit an entry. Class can collect reviews, resources, etc.	5/6. Understand, Apply, Analyse, Evaluate, Create
Quiz Use to assess learning, formative or summative.	Tricky & takes time. Set up quiz, then questions. Consider your categories.	The quiz is aimed at assessment, not as distribution channel. Tip: use as self-test.	Quiz can be timed & secure. Has essay, mc, true/false, matching, & other questions.	No. Tip: Use forums instead.	No. Tip: Use forums or wikis instead.	5/6. Can test all 6 but this requires you to be creative in your assessment.
Lesson Use for presenting branched info or testing	It can be tricky to set up, make sure you plan the lesson first. Worth the effort.	Great for presenting information in a branched, guided way.	Yes, allows grading. Use as branched quiz, scenarios, case study, role play.	No this is an individual activity, not a group activity.	No this is an individual activity, not a group activity.	5/6. Can test all 6 but this requires you to be creative in your assessment.
Assignment Use to collect, assess & provide feedback on assignments	Easy. Choose from 4 types. Both online & offline assignments are possible.	No. The assignment tool is not a distribution channel.	Yes. Set due dates & maximum grades. Collect assignments and provide feedback.	No. Only allows very limited interaction between teacher & student.	No. Currently it does not allow group assignments. Use forum or wiki.	6/6. Indirectly. Depends on your assessment design.
Database Allow students to collect, share & search created artifacts	Tricky to set up. Know what you want before you build. Get some training.	Can be used for teacher to present info, but better to let the students add to it.	Database is versatile & allows this. But you need to design the right learning activity.	Not suited for discussions. Students can read other entries & comment or rate.	Students can share info & files in searchable way. Create joint collections.	5/6. Understand, Apply, Analyse, Evaluate, Create
Great fit	How to use this guide Are you a teacher new to Moodle? Use this guide to pick the right tool for the job. *Know which tool you want to use? Follow its row across to see its strengths & weaknesses. *Know what you want to achieve? Pick a column and follow it to see which tool will help you do it.	*Be creative with Discussion Forums It doesn't always have to be an in-depth class discussion. Other activity ideas: class debate, team discussions, report weekly project findings, web quests, role play & feedback, gather resources & reviews, assessment support, Helpline, NZ's Got Talent (use the rating), rotated student-led discussions, weekly magazine...		Need more Moodle help? *Moodle community at www.moodle.org *Download Using Moodle book (it's free!) *@basic's 2 Minute Moodles videos *@moodleman Blog: www.moodleman.com *Go meet your friendly e-learning, flexible learning or educational technology team. Buy them a coffee!		



Joyce Seitzinger (@catspyjamasnz / www.cats-pyjamas.net) - May 2020

www.eit.ac.nz



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Fig.???: Moodle tool guide for educators (Seitzinger, 2016)

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Creation of Resources and Content



Fig.????????? A cartoon on the effective use of resources available online (undated, author unknown).

Open Content and Educational Resource (OER)

Defining the "Open" in Open Content and Open Educational Resources

There are various definitions of what constitutes openness but one of the most popularly accepted definition and framework was developed by David Wiley in 1998. This framework is available at <http://opencontent.org/definition/> and is reproduced below:

The terms "open content" and "open educational resources" describe any copyrightable work (traditionally excluding software, which is described by other terms like "open source") that is licensed in a manner that provides users with free and perpetual permission to engage in the '5 R' activities:

- **Retain:** the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage)
- **Reuse:** the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video)
- **Revise:** the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language)
- **Remix:** the right to combine the original or revised content with other material to create something new (e.g., incorporate the content into a mashup)
- **Redistribute:** the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend)

The Creative Commons Licensing Framework

The Creative Commons copyright licences have been developed to provide a more flexible tool than the "all rights reserved" notion of traditional copyright, thus making the creation and distribution of creative in digital format easier but nevertheless protecting the rights of the creator. The framework is free to use and can be accessed at <https://creativecommons.org/licenses/>

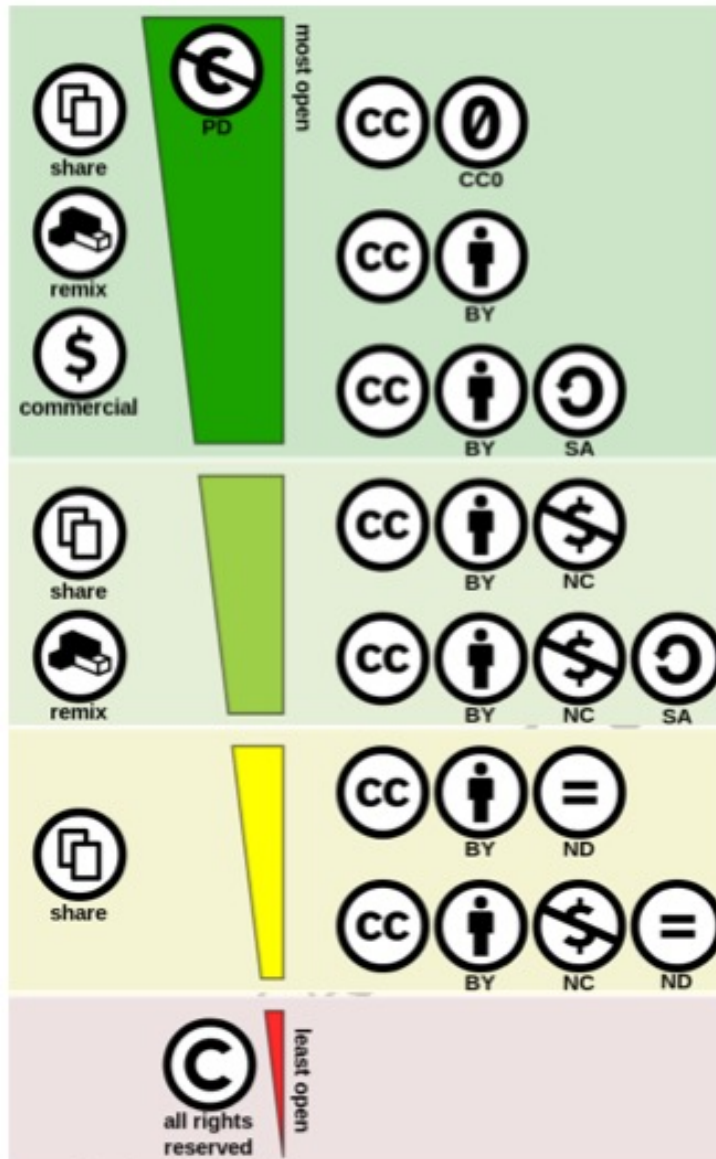


Fig.?????? The Creative Commons licences divided according to their degree of openness (Shaddim, CC, Retrieved from [https://commons.wikimedia.org/wiki/File:Creative commons license spectrum.svg](https://commons.wikimedia.org/wiki/File:Creative_commons_license_spectrum.svg))

Table 1 (continued)

User interface design framework	Sub-section	Icon	Functionality	Pedagogy
	4.9 FAQs	Yes	For all	
5. User control and timeline	5.1 Timeline and navigation buttons	Yes	For reg. students	Pacing effect

Tools for Creating Online Content

Muramatsu et al. (2014) suggest the following online resources to create and deliver content in online courses. Some are free and other provide a limited free trial: All the resources below are free or have a limited free trial.

Animation

- [Go!Animate](#)
- [Voki](#)
- [Xtranormal](#)

Audio Editing

- [Audacity](#)
- [Vocaroo](#)
- [Sound Cloud](#)

Blogging

- [Blogger](#)
- [Tumblr](#)
- [WordPress](#)

Bookmarking

- [Delicious](#)
- [Diigo](#)
- [Pinterest](#)

Copyright-Free Media

- [Creative Commons](#)
- [Jamendo](#)
- [Morguefile](#)

Desktop Publishing

- [Google Docs](#)
- [Open Office](#)
- [Zoho](#)

Image Editing

- [Gimp](#)
- [PicMonkey](#)
- [Sumo Paint](#)

Instructional Videos

- [Commoncraft](#)
- [TED](#)
- [YouTube/edu](#)

Learning Management Systems (LMS)

- [Edmodo](#)
- [Mighty Bell](#)
- [Schoology](#)

Mind Mapping

- [Bubbl.us](#)
- [Mindmeister](#)
- [Popplet](#)

Photo Sharing

- [Flickr](#)
- [Picasa](#)
- [Razzi](#)

Presentations

- [PowToon](#)
- [Prezi](#)
- [Sparkol VideoScribe](#)

RSS Aggregators

- [Feedly](#)
- [Netvibes](#)
- [RSS Owl](#)

Slide Sharing

- [SlideShare](#)
- [Slide Rocket](#)
- [Glogster](#)

Social Networking

- [Facebook](#)
- [Google+](#)
- [Ning](#)

Storage

- [Box.net](#)
- [Dropbox](#)
- [Google Drive](#)
- [OneDrive](#)

Surveys

- [Tricider](#)
- [Survey Monkey](#)
- [Wufoo](#)

Timelines

- [Dipity](#)
- [Timeglider](#)
- [Timetoast](#)

Video Editing

- [Animoto](#)
- [Camstudio](#)
- [Stupeflix](#)

Video Hosting

- [Viddler](#)
- [Vimeo](#)
- [YouTube](#)

[Breed/](#) is another excellent list and ranking of tools used in online instruction. [Best-of-](#)

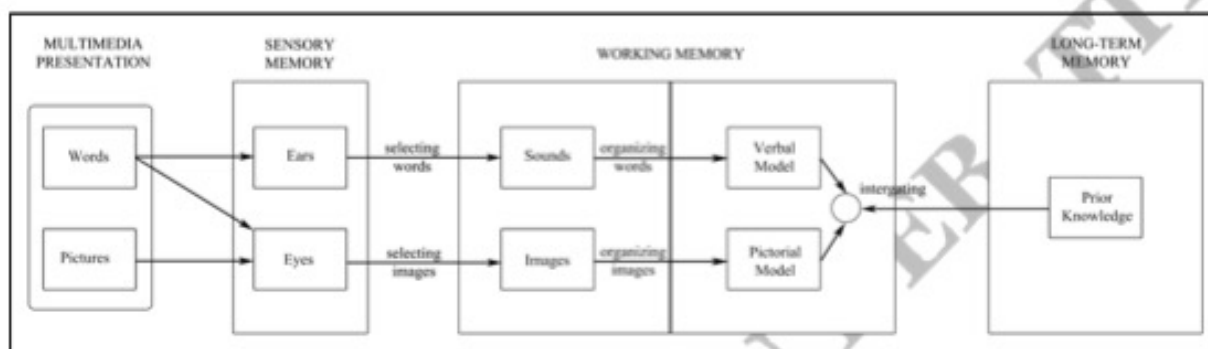
The utilisation of these tools must be aligned to the Pedagogical Wheel mentioned earlier.

Creating engaging multimedia content

Technology has made it possible not only to support distance learning but also make the traditional text-based learning richer with images, videos, animations and lately with augmented and virtual reality, backed by proof that it really supports the learning experience.

“Based on cognitive theory and research evidence, we recommend that e-learning courses include words and graphics rather than words alone. By words, we mean printed text (that is, words printed on the screen that people read) or spoken text (that is, words presented as speech that people listen to through earphones, speakers, or telephone). By graphics we mean static illustrations such as drawings, charts, graphs, maps, or photos, and dynamic graphics such as animation or video.” (Clark & Mayer, 2016, p.70)

One of the most prominent theories on the use of multimedia in e-learning has been put forward by Richard Mayer. His Cognitive Theory of Multimedia Learning covers



how the human brain processes words and images for learning (see figure?????)

Fig???: The cognitive theory of multimedia learning by Mayer (2005). (Figure by Stanislaus Erhardt)

Mayer (2005) proposes three “metaphors of multimedia learning” - response strengthening, information acquisition and knowledge construction. “If you view multimedia learning as response strengthening, then multimedia is a feedback delivery system. If you view multimedia learning as information acquisition, then multimedia is an information delivery system. If you view multimedia learning as knowledge construction, then multimedia is a cognitive aid” (ibid., p.10). Mayer admits he favours the knowledge construction view because “it is more consistent with the research base on how people learn” (ibid., p.12).

Mayer’s theories have been adopted widely by educational institutions and even commercial companies that develop multimedia software are inspired by his ideas. One of them is Articulate, which develops e-learning software, and which has come up with [this guide](#) for instructional designers. This [infographic](#) captures the salient points in visual format.

Part 3 - e-Learning Standards and Quality Assurance

The Malta Qualifications Framework

The [National Commission for Further and Higher Education of Malta \(NCFHE\)](#) is the regulator of the Malta Qualifications Framework (MQF) which in turn is aligned to the European Qualifications Framework (EQF) resulting from the so-called Bologna Process. All education institutions providing educational services in Malta need to be licensed by the NCFHE and their courses accredited by the Commission of self-accredited according to the Commission's regulations. All forms of learning - including electronic learning - are covered by this framework.

8	Doctoral Degree	
7	Master's Degree Post-graduate Diploma Post-graduate Certificate	
6	Bachelor's Degree	
5	Undergraduate Diploma Undergraduate Certificate	VET Higher Diploma Foundation Degree
4	Matriculation Certificate Advanced Level Intermediate Level	VET Diploma (iv)
3	General Education SEC Grade 1-5	VET Level 3 (iii)
2	General Education Level 2 SEC Grade 6-7	VET Level 2 (ii)
1	General Education Level 1 School Leaving Certificate	VET Level 1 (i)
B	Introductory Level B*	
A	Introductory Level A*	

* These are not yet included in legislation

Annotations

- A Full VET Level 1 qualification should enjoy the same parity of esteem as a Full Secondary School Certificate and Profile (SSCP) Level 1.
- A Full VET Level 2 qualification should enjoy the same parity of esteem as 4 Secondary Education Certificate (SEC) subjects at Grade 6 and 7.
- A VET Level 3 Qualification should enjoy the same parity of esteem as 6 Secondary Education Certificate (SEC) subjects at Grades 1 to 5.
- A VET Diploma should enjoy the same parity of esteem as the Matriculation Certificate.

Fig.????: The Malta Qualifications Framework to which all educational institutions operating in/from Malta must align to be licensed.

See Appendix I for figures and tables presenting the MQF in a visual way.

According to the NCFHE 4th Referencing Report (2016), courses that can be accredited as 'Qualifications' up to Level 7 need to fulfil the following criteria:

1. Learning must be in line with the level descriptor equivalent to the special qualification level targeted;
2. Learning must fulfil the number of credit required; and
3. In the case of IVET Qualifications, the number of credits includes the indicated percentage of the course dedicated to key competences, sectoral skills and underpinning knowledge.

A programme or course that fulfills all these criteria can be regarded a “Qualification”, if not then it is an “Award”. However, in the latter case the programmes needs to have learning outcomes that reflect the MQF Level it is pegged to.

Learners must be made aware of the MQF level, the number of credits and the learning outcomes related to the course/programme to ensure transparency.

Assigning Credits

A credit in traditional face-to-face teaching “will include an amount of direct contact teaching with the tutor as well as an amount of self-study and other forms of learning. In less traditional modes of learning, such as distance learning, work placements, practical sessions etc., it is important for course designers to ensure that regardless of the learning process adopted, each credit requires 25 hours of learning ... In Malta, for 1 credit to be assigned to a traditional course, it is to include a minimum of 5 hours of direct contact teaching hours” (NCFHE, 2016).

The NCFHE is more specific about online learning and its direction given on its application form for the accreditation of study units is that “synchronous and asynchronous learning activities under the direction and control of an instructor are

One Credit is considered to be equivalent to a workload of **25 hours** of learning. The term workload refers to an estimation of the time an individual typically needs to complete all learning activities such as lectures, seminars, projects, practical work, work placements and individual study required to achieve the defined learning outcomes in formal learning environments. In line with European tools, credits in general education and Higher education can be called ECTS. Credits in vocational education can be called ECVET. Both ECTS and ECVET in Malta are equivalent to **25 hours** of learning. This document refers to credits, with the understanding that these may be called either ECTS or ECVET.

1 credit = 25 hours of learning

(contact hours, practical sessions, mentoring, self-study such as reading, research, seminars, conferences, tutorials, assignments and assessments and related organised activities such as informal and non-formal learning)

considered as contact hours”.

Fig.????? The definition of One Credit by the NCFHE (2016)

Key Competences and Level Descriptors

The MQF highlights **key competences** that enable workers to move across the labour market. Competences are a combination of knowledge and skills that are implemented with varying degrees of autonomy at different levels. The eight key competences of the MQF include communication in the mother tongue and foreign languages; competencies in maths, science and technology; digital competence; learning to learn; and competencies related to living in a community and society (NCFHE, 2015).

Qualification levels on the MQF are specified through the Level Descriptors. These descriptors are stated in terms of knowledge, skills and competences and the consequent learning outcomes achieved. Subsidiary Legislation 327.431 'Malta Qualifications Framework for Lifelong Learning Regulations' establishes that qualifications forming part of the MQF shall be based on learning outcomes, and as such shall be expressed in terms of knowledge, skills and competences corresponding to the respective level descriptors (see appendices).

The NCFHE Referencing Report (2016) explains knowledge, skills, competences and learning outcomes as follows:

Knowledge involves the understanding of basic, factual and theoretical information and is normally associated with formal learning.

Skills involve the application of the acquired knowledge and understanding in different contexts. A skill may not necessarily be the result of formal learning and knowledge. It can also be learned in other settings, such as work.

Competences refer to a person's capability, such as whether one is competent to exercise skills with or without supervision, with or without autonomy and with or without responsibility.

Learning Outcomes are statements of what a learner knows, understands and is able to do on completion of a learning process."

Quality Assurance and the MQF

The NCFHE and the MQF are very specific regarding the accreditation of learning programmes and all forms of e-learning have to comply with the Commission's regulatory frameworks. These include processes for the design and approval of courses and programmes and some of the required criteria include the definition of the workload expected from students in terms of ECTS and ECVET credits, learner eligibility and selection criteria, define appropriate tutor-learner dynamics for the course level and content, indicate appropriate resources and forms of assessment, and are based on learning outcomes that distinguish between skills, knowledge and competences.

The [National Quality Assurance Framework](#), launched by NCFHE in 2015, provides the necessary guidelines for all accredited education institutions operating in Malta to provide quality teaching and learning.

To identify its goals in eLearning and its progress towards these, the University of the Southern Caribbean reported that it has based its QA framework on interrelated building blocks in the Sloan-C (now renamed the Online Learning Consortium) Five Pillars of Quality Online Education. These are: learning effectiveness, student satisfaction, faculty satisfaction, cost-effectiveness and access (Lorenzo & Moore, 2002). Bates (2010) was surprised by how often it is suggested that there are no quality standards for eLearning. As shown in Appendix V of this report, there are in fact some very useful systems and tools for judging quality in online and blended learning, which could be drawn upon to develop some overarching frameworks, as suggested by Ossiannilsson et al. (2015)

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Quality Assurance Standards and Guidelines from around the world

Quality assurance in e-learning is a new endeavour but in recent years there have been many attempts around the world to come up with a set of standards and guidelines that ensure quality learning through technology. The following list is a selection of such frameworks and guidelines from around the world:

African Virtual University: *Framework for Open, Distance and eLearning Programmes*. Accessible at:

http://www.avu.org/avuweb/wp-content/uploads/2017/07/QA_FRAMEWORK.pdf

ECBCheck - an online learning programme quality check initiative with a free digital tool for self-assessment. Accessible at: <http://www.ecb-check.net/>

European Association of Distance Teaching Universities (EADTU): *Quality Assessment for E-Learning: A Benchmarking Approach*. Accessible at:

http://e-xcellencelabel.eadtu.eu/images/documents/Excellence_manual_full.pdf

Online Learning Consortium (OLC): *OLC Quality Scorecard Suite*. Accessible at:

<https://onlinelearningconsortium.org/consult/olc-quality-scorecard-suite/>

Open Education Network: *Quality Assurance for OER: Current State of the Art and the TIPS Framework*. Accessible at:

https://www.openeducationeuropa.eu/en/article/Assessment-certification-and-quality-assurance-in-open-learning_In-Depth_40_1

Quality Assurance Agency: *The UK Quality Code for Higher Education*. Accessible at:

www.qaa.ac.uk/en/Publications/Documents/quality-code-brief-guide.pdf

Swedish National Agency for Higher Education: *E-learning Quality: Aspects and Criteria for Evaluation of e-Learning in Higher Education*. Accessible at:

www.hsv.se/download/18.8foe4c9119e2b4a60c800028057/0811R.pdf

Appendices

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Appendix I: The Malta Qualifications Framework (MQF)

The figures in this appendix can be

retrieved from the 6th edition of the NCF Reference Report 2016

The MQF

Exam s/Types of national qualification levels are the

8	Doctoral Degree Doctorate of Business Administration Doctorate in Pharmacy	
7	Master of Business Administration Master of Science in Computer Science and Artificial Intelligence Master of Science in Sustainable Infrastructure Postgraduate Diploma in Educational Leadership Postgraduate Certificate in Management	
6	Bachelor of Arts (Honours) in Anthropology Bachelor of Arts (Honours) in Spatial Design Bachelor of Engineering (Honours) in Mechanical Engineering Bachelor of Arts in Theology and Human Studies	
5	Higher Diploma in Administration and Management Diploma in Health Science with Environmental Health	Diploma in Public Management MCAST Higher Diploma in Financial Services Higher National Diploma in Events & Leisure Management
4 th	Matriculation Certificate Advanced Level Intermediate Level	Foundation Award in Customer Care MCAST Advanced Diploma in Manufacturing Diploma in Rooms Division Operations
3 rd	General Education SEC Grade 1-5 General Education Level 3	MCAST Diploma in Hairdressing – Women CIBTAC Level 2 Certificate in Nail Treatments Certificate in Travel and Tourism
2	General Education Level 2 SEC Grade 6-7 General Education Level 2	MCAST Foundation Certificate in Mechanical Engineering MCAST Foundation Certificate in Business Foundation in Hospitality & Tourism
1	General Education Level 1	MCAST Introductory Certificate in Animal Husbandry and Horticultural Skills Introduction to Health and Safety at Work Places Award in Personal Beauty Care
B	Introductory Level B*	
A	Introductory Level A*	

Level Descriptors in the MQF from Level A to Level 8

Introductory Level A		
Level Knowledge	--	Introductory Level A Demonstrate learning development to progress along a continuum that ranges from the participation in experiential situations to the achievement of basic tasks, with varying degrees of support.
Skills	--	Displays the basic skills required to participate in and understand main points of simple discussions/exchanges about familiar topics with another person in a familiar situation, with varying degrees of support.
Competences	--	With appropriate guidance begins to participate in similar and familiar activities.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and understanding; 2. Applying knowledge and understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Apply basic knowledge and understanding to carry out a part of a repetitive/rehearsed task, with varying degrees of support; 2. Follow instruction and apply repetitive/rehearsed steps needed to begin simple activities, with varying degrees of support; 3. Respond to the main points of simple discussions/exchanges in a familiar/rehearsed situation, with varying degrees of support; 4. With prompting is able to identify the completion of an assigned task; 5. Applies basic competences to carry out a familiar task, with varying degrees of support; 6. With appropriate guidance shows levels of participation in simple and familiar activities.

Introductory Level B		
Level Knowledge	--	Introductory Level B <ol style="list-style-type: none"> 1. Use basic knowledge and understanding to carry out simple and familiar tasks, with guidance. 2. Be aware of the steps needed to complete simple and familiar activities.
Skills	--	<ol style="list-style-type: none"> 1. Carry out with guidance, simple and routine tasks; 2. Apply rehearsed steps to complete familiar tasks and activities, with varying degrees of support; 3. Use basic tools and materials under supervision; 4. Take into account, with prompting, identified consequences of actions.
Competences	--	<ol style="list-style-type: none"> 1. With appropriate guidance begin to take responsibility for outcomes of similar and familiar activities; 2. Actively participate in similar and familiar activities.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and understanding; 2. Applying knowledge and understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Apply knowledge and understanding to complete a repetitive/rehearsed task, with varying degrees of support; 2. Identify the repetitive/rehearsed steps needed to begin simple activities, with varying degrees of support; 3. Produce and respond to a very limited range of simple communication in familiar/routine contexts; 4. With appropriate guidance is able to evaluate the completion of an assigned task; 5. Apply basic key competences to complete a familiar task, with varying degrees of support; 6. With appropriate guidance begin to take some responsibility for outcome of similar and familiar activities.

MQF Level Descriptors for Level 1		
Level Knowledge	<p>Level 1 EOF</p> <p>Basic general knowledge;</p>	<p>Level 1 MQF</p> <ol style="list-style-type: none"> 1. Acquires basic general knowledge related to the immediate environment and expressed through a variety of simple tools and context as an entry point to lifelong learning; 2. Knows and understands the steps needed to complete simple tasks and activities in familiar environments; 3. Is aware and understands basic tasks and instructions; 4. Understands basic textbooks.
Skills	<p>Basic skills required to carry out simple tasks</p>	<ol style="list-style-type: none"> 1. Has the ability to apply basic knowledge and carry out a limited range of simple tasks; 2. Has basic repetitive communication skills to complete well defined routine tasks and identifies whether actions have been accomplished; 3. Follows instructions and be aware of consequences of basic actions for self and others.
Competences	<p>Work Out or Study under Direct Supervision in a Structured Context.</p>	<ol style="list-style-type: none"> 1. Applies basic knowledge and skills to do simple, repetitive and familiar tasks; 2. Participates in and takes basic responsibility for the action of simple tasks; 3. Activities are carried out under guidance and within simple defined timeframes; 4. Acquires and applies basic key competences at this level.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and Understanding; 2. Applying Knowledge and Understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Has basic knowledge and understanding of textbooks and simple tasks while relating to the immediate environment; 2. Follows instructions and completes repetitive simple tasks in familiar contexts and under a quality controlled system; 3. Communicates basic information in familiar repetitive contexts; 4. Assesses and ensures that assigned tasks have been completed effectively; 5. Acquires and applies key competences to defined actions. 6. Takes some responsibility for completing simple tasks and exercises limited autonomy.

MQF Level Descriptors for Level 2		
Level Knowledge	<p>Level 2 EQF</p> <p>Basic factual knowledge of a field of work or study.</p>	<p>Level 2 MQF</p> <ol style="list-style-type: none"> 1. Possess good knowledge of a field of work or study; 2. Is aware and interprets type of information and ideas; 3. Understands facts and procedures in the application of basic tasks and instructions; 4. Selects and uses relevant knowledge to accomplish specific actions for self and others.
Skills	<p>Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools.</p>	<ol style="list-style-type: none"> 1. Has the ability to demonstrate a range of skills by carrying out a range of complex tasks within a specified field of work or study; 2. Communicates basic information; 3. Ensures tasks are carried out effectively.
Competences	<p>Work or study under supervision with some autonomy.</p>	<ol style="list-style-type: none"> 1. Applies factual knowledge and practical skills to do some structured tasks; 2. Ensures one acts pro-actively; 3. Carries out activities under limited supervision and with limited responsibility in a quality controlled context; 4. Acquires and applies basic key competences at this level.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and Understanding; 2. Applying Knowledge and Understanding; 3. Communication skills; 4. Judgemental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Understands and uses good knowledge for tasks, procedures or a field of work or study; 2. Follows instructions and completes a range of well-defined tasks; 3. Communicates basic information in unfamiliar contexts; 4. Selects and uses information for specified tasks and is pro-active; 5. Acquires and applies key competences to a range of actions. 6. Takes responsibility and exercises autonomy in well-defined tasks under a quality controlled system.

MQF Level Descriptors for Level 3		
Level Knowledge	<p>Level 3 EQF</p> <p>Knowledge of facts, principles, processes and general concepts in a field of work or study.</p>	<p>Level 3 MQF</p> <ol style="list-style-type: none"> 1. Understands the relevancy of theoretical knowledge and information related to one field of work or study; 2. Assesses, evaluates and interprets facts, establishing basic principles and concepts in a particular field of work or study; 3. Understands facts and procedures in the application of more complex tasks and instructions; 4. Selects and uses relevant knowledge acquired on one's own initiative to accomplish specific actions for self and others.
Skills	<p>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.</p>	<ol style="list-style-type: none"> 1. Demonstrates a range of developed skills to carry out more than one complex task effectively and in unfamiliar and unpredictable contexts; 2. Communicates more complex information; 3. Solves basic problems by applying basic methods, tools, materials and information given in a restricted learning environment.
Competences	<p>Take responsibility for completion of tasks in work or study and adapt own behaviour to circumstances in solving problems.</p>	<ol style="list-style-type: none"> 1. Applies knowledge and skills to do some tasks systematically; 2. Adapts own behaviour to circumstances in solving problems by participating pro-actively in structured learning environments; 3. Uses own initiative with established responsibility and autonomy, but is supervised in quality controlled learning environments, normally in a trade environment; 4. Acquires key competences at this level as a basis for lifelong learning.
Learning Outcomes	<p>Knowledge and Understanding;</p> <p>Applying knowledge and Understanding;</p> <p>Communication Skills;</p> <p>Judgmental Skills;</p> <p>Learning Skills;</p> <p>Autonomy and Responsibility.</p>	<ol style="list-style-type: none"> 1. Understands theoretical knowledge and information related to complex procedures in a field of work or study; 2. Follows instructions and carries out complex tasks systematically and in unfamiliar and unpredictable contexts; 3. Communicates complex information in unfamiliar and unpredictable contexts; 4. Assesses, evaluates and interprets facts related to a field of work or study and applies basic problem solving techniques; 5. Acquires and applies key competences as a basis for lifelong learning. 6. Takes agreed responsibility for completing complex tasks, and interacts with the immediate environment and in defined actions at one's own initiative.

MQF Level Descriptors for Level 4		
Level Knowledge	<p>Level 4 EQF</p> <p>Factual and theoretical knowledge within a field of work or study.</p>	<p>Level 4 MOF</p> <ol style="list-style-type: none"> 1. Understands broad theoretical knowledge and analysis of information related to a field of work or study; 2. Understands facts and establishes basic principles in broad contexts within a field of work or study; 3. Applies facts and procedures in broad contexts within a defined field of work or study; 4. Selects and analyses theoretical knowledge in broad contexts within a specific field of work or study.
Skills	<p>A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study.</p>	<ol style="list-style-type: none"> 1. Demonstrates acquired knowledge and the ability to apply a range of technical or academic skills to carry out multiple complex tasks; 2. Communicates theoretical and technical information in a work or learning environment; 3. Generates solutions to specific problems within a field of work or study.
Competences	<p>Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change. Supervise the routine work of others, take some responsibility for the evaluation and improvement of work or study activities.</p>	<ol style="list-style-type: none"> 1. Applies knowledge and skills to perform qualitative and quantitative tasks that require technical capacity normally associated with a technician's competence; 2. Supervises the quality and quantity of work of self and others' under quality assured structures with responsibility and autonomy; 3. Demonstrates an advanced level of key competences at this level as a basis for higher education.
Learning Outcomes	<p>Knowledge and Understanding;</p> <p>Applying Knowledge and Understanding;</p> <p>Communication Skills;</p> <p>Judgmental Skills;</p> <p>Learning Skills;</p> <p>Autonomy and Responsibility.</p>	<ol style="list-style-type: none"> 1. Understands and analyses broad theoretical, practical and technical knowledge related to a field of work or study; 2. Follows instructions and carries out defined theoretical, complex and technical tasks; 3. Communicates theoretical and technical information in a work or learning context; 4. Interacts with and generates solutions to problems within the immediate environment of a given field of work or study; 5. Applies key competences to defined actions and to a technical or academic field of work or learning context; 6. Exercises autonomy and takes responsibility for defined qualitative and quantitative tasks of self and others by completing complex tasks in a broad context under quality assured mechanisms.

MQF Level Descriptors for Level 5		
Level Knowledge	<p>Level 5 EQF</p> <p>Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundary of that knowledge.</p>	<p>Level 5 MQF</p> <ol style="list-style-type: none"> 1. Understands knowledge in a field of study that builds upon advanced general secondary education and is typically at a level supported by advanced textbooks leading to further studies to complete the first cycle; 2. Develops strategic and creative responses in researching solutions to well defined concrete and abstract problems; 3. Makes judgements based on knowledge of relevant social and ethical issues.
Skills	<p>A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.</p>	<ol style="list-style-type: none"> 1. Demonstrates transfer of theoretical and practical knowledge, in creating solutions to problems; 2. Conveys ideas, in a well structured and coherent way to peers, supervisors and clients using qualitative and quantitative information; 3. Has the ability to identify and uses data to formulate responses to well-defined concrete and abstract problems; 4. Evaluates own learning and identifies learning needs necessary to undertake further learning.
Competences	<p>Exercise management and supervision in contexts of work or study activities where there is unpredictable change.</p> <p>Review and develop performance of self and others.</p>	<ol style="list-style-type: none"> 1. Manages projects independently that require problem-solving techniques where there are many factors, some of which interact and lead to unpredictable outcomes; 2. Shows creativity in managing projects, manages people and reviews performance of self and others, trains others and develops team performance; 3. Expresses a comprehensive internalized personal world view reflecting engagement of solidarity with others; 4. Has the learning skills to undertake further studies with a degree of autonomy.
Learning Outcomes	<p>Knowledge and Understanding;</p> <p>Applying Knowledge and Understanding;</p> <p>Communication Skills;</p> <p>Judgmental Skills;</p> <p>Learning Skills;</p> <p>Autonomy and Responsibility.</p>	<ol style="list-style-type: none"> 1. Understands advanced textbooks which may lead to further academic or vocational learning and researches solutions to abstract problems; 2. Demonstrates operational capacity and management skills using creativity; 3. Interacts with others to convey abstract and concrete solutions to problems in a field of work of study; 4. Formulates practical and theoretical responses to abstract and concrete problems and makes judgements on social and ethical issues; 5. Evaluates own learning and can improve key competences for further learning and promotes team training. 6. Is responsible for the effective and efficient management of projects and people within agreed timeframes.

MOF Level Descriptors for Level 6

<p>Level Knowledge</p>	<p>Level 6 EQF</p> <p>Advanced knowledge of a field of work or study involving a critical understanding of theories and principles.</p>	<p>Level 6 MOF</p> <ol style="list-style-type: none"> 1. Understands knowledge that builds upon advanced general education and typically includes some aspects that will be informed by knowledge at the forefront of their field of study; 2. Uses detailed theoretical and practical knowledge which is at the forefront of a field of study and involves critical understanding of theories and principles; 3. Understands methods and tools in a complex and specialised field of work or study and innovation in terms of methods used; 4. Makes judgements based on relevant social and ethical issues that arise in a field of work or study.
<p>Skills</p>	<p>Advanced skills demonstrating mastery and innovation required to solve complex and unpredictable problems in a specialised field of work or study.</p>	<ol style="list-style-type: none"> 1. Applies knowledge and understanding in a manner that indicates a professional approach to work or study; 2. Communicates ideas, problems and solutions to both specialist and non-specialist audiences using a range of techniques involving qualitative and quantitative information; 3. Has the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues; 4. Devises and sustains arguments to solve problems; 5. Consistently evaluates own learning and identifies learning needs.
<p>Competences</p>	<p>Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study context. Take responsibility for managing professional development of individuals and groups.</p>	<ol style="list-style-type: none"> 1. Demonstrates administrative design, resource and team management and is responsible for work or study contexts that are unpredictable and require that complex problems are solved; 2. Shows creativity and initiative in developing projects in management processes, manage and train people to develop team performance; 3. Has developed those learning skills that are necessary to continue to undertake further studies with a high degree of autonomy.
<p>Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Knowledge and Understanding; 2. Applying Knowledge and Understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Understands professional theoretical and practical knowledge in a specialised field of work or study; 2. Demonstrates innovative theoretical and practical responses to work or study contexts; 3. Communicates ideas, problems, and solutions to both specialist and non-specialist audiences using a range of techniques involving qualitative and quantitative information to sustain arguments; 4. Makes professional judgements on social and ethical issues within the area of specialisation, masters problem-solving skills, and evaluates the management of projects and people; 5. Assesses own learning and can specialize in one more key competences for further learning. 6. Is responsible for the management of creative and innovative projects and the team's performance.

MQF Level Descriptors for Level 7		
Level Knowledge	<p>Level 7 EQF</p> <p>Highly specialised and is at the forefront of knowledge in a field of work or study as the basis for original thinking and/or research. Critical awareness of knowledge issues in a field and at the interface between different fields</p>	<p>Level 7 MQF</p> <ol style="list-style-type: none"> 1. Has comprehensive knowledge and understanding that is founded upon and/or enhances that knowledge typically associated with Bachelor's level; 2. Uses specialised or multi-disciplinary theoretical and practical knowledge some of which is at the forefront of a field of study. This knowledge forms the basis of originality in developing and/or applying ideas.
Skills	<p>Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields.</p>	<ol style="list-style-type: none"> 1. Demonstrates specialised or multi-disciplinary knowledge that include reflecting on social and ethical responsibilities linked to the application of one's knowledge and judgements; 2. Can communicate to specialist and non-specialist audiences clearly and unambiguously reach conclusions which may be the outcome of research, self-study or experience; 3. Performs critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar environments and produces original research; 4. Develops new skills in response to emerging knowledge and techniques and demonstrates leadership skills and innovation in complex and unpredictable work and study contexts.
Competencies	<p>Manage and transform work or study contexts that are complex and unpredictable that require new strategic approaches. Take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.</p>	<ol style="list-style-type: none"> 5. Creates a research-based diagnosis to problems by integrating knowledge from new or interdisciplinary fields and makes judgements with incomplete or limited information; 6. Manages people and projects and demonstrates the ability to respond to the fast changing business environment; 7. Demonstrates autonomy in the direction of learning and a high level of understanding of learning processes; 8. Has the learning skills to allow continuation to study in a manner that may be largely self-directed or autonomous.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and Understanding; 2. Applying knowledge and understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Has the comprehensive specialised or multi-disciplinary theoretical and practical knowledge which forms the basis of original research, which may contribute to social and ethical issues; 2. Demonstrates capability in using knowledge and skills, to adapt to the fast changing business environment and to manage people and projects efficiently; 3. Communicates with specialist and non-specialist audiences clearly and unambiguously reaches conclusions which may be the outcome of original research, self-study or experience; 4. Performs critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar contexts, and produces original research; 5. Makes assessments of personal continuous professional development, takes initiative to undertake self-directed study and may proceed to further specialisation; 6. Is accountable and responsible for the original research within a personal social responsibility and/or business context for one's operations and for adapting the management of people and projects reflecting the dynamic nature of the environment in which one operates.

MQF Level Descriptors for Level 8		
Level Knowledge	<p>Level 8 EOF Knowledge at the most advanced frontier of a field of work or study and at the interface between fields.</p>	<p>Level 8 MQF Has a systematic understanding of a highly specialised field of study which builds upon specialised or multi-disciplinary knowledge and understanding; Extends or redefines existing knowledge and/or professional practice.</p>
Skills	<p>The ability to apply the most advanced and specialised skills and techniques, including synthesis and evaluation, to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice.</p>	<ol style="list-style-type: none"> 1. Demonstrates mastery in skills such as the selection and analysis of research, writing, design, development and sustainability of the argument manifested in innovative scholarly research; 2. Responds to technological, social and cultural issues and addresses the needs of a knowledge-based society; 3. Communicates expertise to a wide audience including peers and the general public using different methods including national and international publications and participates in specialist fora; 4. Demonstrates expertise in critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar environments produces original research.
Competences	<p>Competence at the forefront in work or study including research contexts demonstrating substantial authority, innovation, autonomy, scholarly or professional integrity and sustained commitment to the development of new ideas or processes.</p>	<ol style="list-style-type: none"> 1. Demonstrates authority in a specialised field of work or study and makes judgements involving a multitude of interacting factors; 2. Promotes social, scientific and ethical advancement through actions; 3. Has a sustained commitment in the development of new ideas.
Learning Outcomes	<ol style="list-style-type: none"> 1. Knowledge and Understanding; 2. Applying knowledge and understanding; 3. Communication Skills; 4. Judgmental Skills; 5. Learning Skills; 6. Autonomy and Responsibility. 	<ol style="list-style-type: none"> 1. Has theoretical and practical expertise in a specialised field of knowledge which may contribute to social and ethical issues in a national and international dimension; 2. Demonstrates leadership and innovation in mastering research in work and study contexts; 3. Communicates expertise to a wide audience including peers and the general public using different methods, including national and international publications, and participates in specialist fora; 4. Demonstrates expertise in critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar environments, and produces original research; 5. Has a sustained commitment to generate new ideas and innovative projects related to technological, cultural and social development; 6. Is responsible for the leadership of a number of specialised projects and an authority in a specialised field of work or study.

Progression within the MQF - Knowledge, Skills, Competences

Learning Outcomes	Introductory Level A	Introductory Level B	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Knowledge and Understanding	Apply basic knowledge and understanding to carry out a part of a repetitive/rehearsed task with varying degrees of support.	Apply knowledge and understanding to complete a repetitive/rehearsed task with varying degrees of support.	Basic knowledge and understanding of textbooks and simple tasks while relating to the immediate environment.	Understands and uses good knowledge for tasks, procedures or a field of work or study.	Understands theoretical knowledge and information related to complex procedures in a field of work or study.	Understands and analyses broad theoretical, practical and technical knowledge related to a field of work or study.	Understands advanced textbooks which may lead to further academic learning and researches solutions to abstract problems.	Understands professional theoretical and practical knowledge in a specialised field of work or study.	Has comprehensive, specialised or multi-disciplinary theoretical and practical knowledge which forms the basis of original research, which may contribute to social and ethical issues.	Has theoretical and practical expertise in a specialised field of knowledge which may contribute to social and ethical issues in a national and international dimension.
Applying Knowledge and Understanding	Identify the repetitive/rehearsed steps needed to begin simple activities, with varying degrees of support.	Apply rehearsed steps to complete familiar tasks and activities, with varying degrees of support.	Follows instructions and completes repetitive simple tasks in familiar contexts and under a quality controlled system.	Follows instructions and completes a range of well defined tasks.	Follows instructions and carries out complex tasks systematically and in unfamiliar and unpredictable contexts.	Follows instructions and carries out defined theoretical, complex and technical tasks.	Demonstrates operational capacity and management skills using creativity.	Demonstrates innovative theoretical and practical responses to work or study contexts.	Demonstrates mastery of knowledge and skills, adapts to the fast changing business environment and manages people and projects efficiently.	Demonstrates leadership and innovation in mastering research, work and study contexts.
Communication Skills	Responds to the main points of simple discussions/exchanges in a familiar/rehearsed situation, with varying degrees of support.	Produces and responds to a very limited range of simple communication in familiar/routine contexts.	Communicates basic information in familiar repetitive contexts.	Communicates basic information in unfamiliar contexts.	Communicates complex information in unfamiliar and unpredictable contexts.	Communicates theoretical and technical information in a work or learning context.	Interacts with others to convey abstract and concrete solutions to problems in a field of work or study.	Communicates with specialist and non-specialist audiences clearly and unambiguously, reaches conclusions involving knowledge which may be the outcome of original research, self-study or experience.	Communicates with specialist and non-specialist audiences using a range of techniques of qualitative and quantitative information to sustain arguments.	Communicates expertise to a wide audience including peers and the general public using different methods including national and international publications, and participates in specialist fora.

Learning Outcomes	Introductory Level A	Introductory Level B	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Judgmental Skills	With prompting, is able to identify the completion of an assigned task.	With appropriate guidance, is able to evaluate the completion of an assigned task.	Assesses and ensures that assigned tasks have been completed effectively.	Selects and uses information for specified tasks and is proactive.	Assesses, evaluates and interprets facts related to a field of work or study and applies basic problem solving techniques.	Interacts with and generates solutions to problems within the immediate environment of a given field of work or study.	Formulates practical and theoretical responses to abstract and concrete problems and makes Judgments on social and ethical issues.	Makes professional judgements on social and ethical issues within area of specialisation. Masters problem- solving skills, and evaluates the management of projects and people.	Performs critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar contexts, and to produce original research.	Demonstrates expertise in critical evaluations and analysis with incomplete or limited information to solve problems in new or unfamiliar contexts, and to produce original research.
Learning Skills	Applies basic competences to carry out a familiar task, with varying degrees of support.	Applies basic key competences to complete a familiar task, with varying degrees of support.	Acquires and applies key competences to defined actions.	Acquires and applies key competences to a range of actions.	Acquires and applies key competences as a basis for lifelong learning.	Applies key competences to defined actions and to a technical or academic field of work or learning context.	Evaluates own learning and can improve key competences for further learning, and promotes team training.	Assesses own learning and can specialize in one or more key competences for further learning.	Makes assessments of personal continuous professional development, takes initiative to undertake self-directed study and may proceed to further specialisation.	Has a sustained commitment to generate new ideas and innovative projects related to technological, cultural and social development.

Learning Outcomes	Introductory Level A	Introductory Level B	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Autonomy and Responsibility	With prompting, is able to identify the completion of an assigned task.	With appropriate guidance, begins to take some responsibility for outcome of similar and familiar activities.	Takes some responsibility for completing simple tasks and exercise limited autonomy.	Takes responsibility and exercises autonomy in well-defined tasks under a quality controlled system.	Takes agreed responsibility for completing complex tasks, and interacts with the immediate environment and in defined actions at one's own initiative.	Exercises autonomy and takes responsibility for defined qualitative and quantitative tasks of self and others by completing complex tasks in a broad context under quality assured mechanisms;	Is responsible for the effective and efficient management of projects and people within agreed timeframes.	Is responsible for the management of creative and innovative projects and the team's performance.	Is accountable and responsible for original research within personal social responsibility and/or business context for one's operations and for adapting the management of people and projects reflecting the dynamic nature of the environment in which one operates.	Is responsible for the leadership of a number of specialised projects and an authority in a specialised field of work or study.

Learning Outcomes	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Knowledge	Basic general knowledge;	Basic factual knowledge of a field of work or study;	Knowledge of facts, principles, processes and general concepts, in a field of work or study;	Factual and theoretical knowledge within a field of work or study;	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundary of that knowledge;	Advanced knowledge of a field of work or study involving a critical understanding of theories and principles;	Highly specialised, some of which is at the forefront of knowledge in a field of work or study as the basis for original thinking and/or research;	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields;
Skills	Basic skills required to carry out simple tasks;	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools;	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information;	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study;	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems;	Advanced skills demonstrating mastery and innovation required to solve complex and unpredictable problems in a specialised field of work or study;	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields;	The ability to apply the most advanced and specialised skills and techniques, including synthesis and evaluation to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice;
Competences	Work or study under direct supervision in a structured context;	Work or study under supervision with some autonomy;	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems;	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others; take some responsibility for the evaluation and improvement of work or study activities;	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others;	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups;	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams;	Competence at the forefront in work or study, including research contexts demonstrating substantial authority, innovation, autonomy, scholarly or professional integrity and sustained commitment to the development of new ideas or processes;

Level Descriptors of the EQF

EQF Level	Knowledge	Skills	Competence
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields.	The most advanced and specialised skills and techniques, including synthesis and evaluation required to solve critical problems in research and/or innovation while extending and redefining existing knowledge or professional practice.	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research.
Level 7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields.	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields.	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles.	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study.	Manage complex, technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups.

EQF Level	Knowledge	Skills	Competence
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge.	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others.
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study.	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study.	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities.
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems.
Level 2	Basic factual knowledge of a field of work or study.	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools.	Work or study under supervision with some autonomy.
Level 1	Basic general knowledge.	Basic skills required to carry out simple tasks.	Work or study under direct supervision in a structured context.

Appendix II: Glossary of terms used in academia with special attention to vocational education and training and digital education

Term	Definition
Accreditation	The process by which a course or training programme is officially recognized and approved.
Adult education	Education specifically targeting individuals who are regarded as adults by the society to which they belong to improve their technical or professional qualifications, further develop their abilities, enrich their knowledge with the purpose to complete a level of formal education, or to acquire knowledge, skills and competencies in a new field or to refresh or update their knowledge in a particular field. It denotes all forms of non-vocational adult learning, whether of a formal, non-formal or informal nature
Aims (of study unit/module/programme/course)	<ul style="list-style-type: none"> • Broad general statements on the intentions of the academic delivering the teaching, covering the management and teaching aspects. • Contrary to learning outcomes that are written from the learner's point of view, aims are written from the educator's point of view.
Assessment	<ul style="list-style-type: none"> • The sum of methods and processes used to evaluate the attainments (knowledge, know-how, skills and competences) of an individual, and typically leading to certification. • All methods used to appraise performance by gathering evidence to determine whether learners, trainers, training methodologies, programmes and institutions have achieved the required standards.

Assessment for learning	See “Formative assessment”.
Assessment of learning	See “Summative assessment”.
Asynchronous learning	Learning online at different time and/or place using an online learning platform. Example of asynchronous learning is use of discussion forums and email for learning where the learner and the tutor are not in contact at precisely the same time.
Audit	An independent, objective assurance activity designed to add value and improve an organization’s operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to assess and improve the effectiveness of risk management, control and governance processes.
Badge	Recognition for learning usually awarded to non-formal and informal learning outside formal accreditation such as the EQF. This may include online courses such as MOOCs, voluntary work and on-the-job training.
Basic skills	The skills needed to live in contemporary society, e.g. listening, speaking, reading, writing, mathematics and ICT.
Benchmarking	The process of comparing an organization’s performance, practices and procedures with those of leaders in the same or a different field of activity, in order to identify areas for improvement.
Blended learning	<ul style="list-style-type: none"> Blended learning is a teaching and learning approach that demonstrates blend of different methods, technologies, and resources to improve student learning. Some examples of blended learning are flipped classroom, online interaction followed by face-to-face teaching, online learning supplemented by

	<p>face-to-face practical, etc.</p> <ul style="list-style-type: none"> • A formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path and/or pace, and at least in part at a supervised brick-and-mortar location away from home.
Capacity building	<p>The process by which individuals, groups, organizations, institutions and societies increase their ability to (1) Perform core functions, solve problems, define and achieve objectives and (2) Understand and deal with their development needs in a broad context and in a sustainable manner.</p>
Certification	<p>The formal acknowledgement of successful achievement of a defined set of outcomes.</p>
Course	<ul style="list-style-type: none"> • A structured and integrated programme of education or training, usually consisting of a number of modules (subjects) or shorter programmes, and leading to the award of a qualification. • A unit of instruction comprising a sequence of educational activities in a particular field or range of related fields of education. This can also be referred to as a 'module', 'unit' or 'subject'.
Competence	<ul style="list-style-type: none"> • The application of knowledge and skills in context which is described using learning outcomes. • The individual's ability to use, apply and demonstrate a group of related awareness, knowledge, skills and attitudes in order to perform tasks and duties successfully and which can be measured against well-accepted standards (levels) required in employment as well as assessed against provided evidences at

	<p>work location. The competency affects both individual's job responsibility and performance on the job and usually fall into two categories, namely technical and behavioral.</p>
Competency-based training	<ul style="list-style-type: none"> • An approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Competency-based training programs are often comprised of modules broken into segments called learning outcomes, which are based on standards set by industry, and assessment is designed to ensure each student has achieved all the outcomes (skills and knowledge) required by each module. • Training which develops the awareness, skills, knowledge and attitudes required to achieve certain competency standards (levels).
Credential	<p>Formal certification issued for successful achievement of a defined set of outcomes, e.g. successful completion of a course in recognition of having achieved particular awareness, knowledge, skills or attitude competencies; successful completion of an apprenticeship or traineeship.</p>
Credit	<ul style="list-style-type: none"> • Unit in which the successful completion of courses or modules is earned and documented during and at the end of an education programme. Credits express the volume of learning based on a typical workload needed to achieve the expected learning objectives. • A quantified means of expressing the volume of learning based on the achievement of learning outcomes and their associated

	<p>workloads</p> <ul style="list-style-type: none"> • 1 credit = 1 ECTS/ECVET
Credit transfer	The process by which credits gained in one institution or system may be recognised in another institution or system.
Curriculum	<ul style="list-style-type: none"> • The inventory of activities implemented to design, organise and plan an education or training action, including the definition of learning objectives, content, methods (including assessment) and material, as well as arrangements for training teachers and trainers. • The term curriculum refers to the design, organisation and planning of learning activities, while the term programme refers to the implementation of these activities.
CVET (Continuing vocational education and training)	A training process or activity which has as its primary objective the acquisition of new competences or the development and improvement of existing ones, and which is financed at least partly by the enterprises for their employees, who either have a working contract or who benefit directly from their work for the enterprise, such as unpaid family workers and casual workers. The training processes or activities must be planned in advance and must be organised or supported with the special goal of learning.
Cycle	The three sequential levels identified by the Bologna Process (first cycle, second cycle and third cycle) within which all European higher education qualifications (EQF) are located.
Digital Literacy	<ul style="list-style-type: none"> • Digital literacy refers to the skills required to achieve digital competence, the confident and critical use of information and communication technology (ICT) for work, leisure, learning and

	<p>communication.</p> <ul style="list-style-type: none"> • Digital literacy is the ability to use information and communication technologies to find, understand, evaluate, create, and communicate digital information, an ability that requires both cognitive and technical skills.
Diploma	An official document, issued by an awarding body, which records the achievements of an individual following an assessment and validation against a predefined standard.
Distance Learning	Also known as e-learning or online learning, it is a form of education in which teachers and students are physically separated. Various Internet technologies allow for teachers and students to interact and communicate. Traditional distance learning focused on individuals in remote areas and it used to be via mail.
Early school leaver	The percentage of the population aged 18-24 with only lower secondary education or less and no longer in education or training.
ECTS (European credit transfer and accumulation system)	A systematic way of describing a higher education programme by attaching credits to its components (modules, courses, placements, dissertation work, etc.), to: make study programmes easy to read and compare for all students, local and foreign; encourage mobility of students and recognition of formal, non-formal and informal learning; help universities to organise and revise their study programmes.
ECVET (European credit system for vocational education and training)	A device in which qualifications are expressed in units of learning outcomes to which credit points are attached, and which is combined with a procedure for validating learning outcomes. The aim of this system is to promote: <ul style="list-style-type: none"> –mobility of people undertaking training; –accumulation, transfer and validation

	<p>and recognition of learning outcomes (either formal, non-formal or informal) acquired in different countries;</p> <ul style="list-style-type: none"> – implementation of lifelong learning; – transparency of qualifications; – mutual trust and cooperation between vocational training and education providers in Europe.
Education	<p>Broadly speaking, education refers to any act or experience that has a formative effect on an individual's mind, character, or physical ability.</p> <p>In its technical sense, education is the formal process by which society, through schools, colleges, universities and other institutions, deliberately transmits its cultural heritage and its accumulated knowledge, values and skills to the next generation.</p>
Educator	<p>An inclusive term referring to teachers at schools; lecturers at colleges, traditional universities, comprehensive universities, and universities of technology; trainers in workplaces; facilitators, assessors, moderators, and people teaching, educating, training, facilitating or assessing learners across the board.</p>
E-learning	<ul style="list-style-type: none"> • Learning supported by information and communication technologies (ICT). • An umbrella term that refers to the use of any digital device for teaching and learning, especially for delivery or accessing of content. Thus e-Learning can take place without any reference to a network or connectivity.
E-learning platform	<p>A web-based software system that assists teachers to manage courses and deliver lessons online. It helps in administration, tracking and reporting of learning process. Also known as Virtual Learning Environment (VLE) or Learning Management System (LMS).</p>
Elective	<p>An elective course/unit/module is one</p>

	chosen by a student from a number of optional subjects or courses in a curriculum, as opposed to a required course which the student must take.
EQAVET (European quality assurance in vocational educational training)	Reference framework to help EU Member States and participating countries develop, improve, guide and assess the quality of their own vocational education and training systems.
EQF (European Qualifications Framework)	An overarching framework that makes transparent the relationship between European national higher education frameworks of qualifications and the qualifications they contain. It is an articulation mechanism between national frameworks.
Equivalency	The comparison of one qualification with another based on a curriculum comparison that enables the degree of similarity of the qualification to be established by a subject matter expert. Equivalency is typically determined by competent recognition authorities.
Evaluation	Evaluation is the systematic and objective assessment of an ongoing or completed policy, plan, or programme, including its design, implementation, and results. It aims to assess the relevance and fulfilment of objectives and strategies with the intention of informing decision-making. 'Formative' evaluation relates to ongoing activities and helps guide implementation. 'Summative' evaluation assesses the results of a particular initiative, after completion.
Flipped Classroom	Flipped classroom is a form of blended learning where learners read or watch online lecture materials at home, before participating in interaction in a classroom environment.
Formal education and training	Education or training provided in educational institutions, such as schools, universities, colleges, or off-the-job in a

	workplace, usually involving direction from a teacher or instructor.
Formative assessment	Assessment done during learning for learners to improve their work. Also known as “assessment for learning”.
Further Education	Post-secondary education, including higher education, adult education, and vocational education and training.
Gender equality	Boys and girls would experience the same advantages and disadvantages in educational access, treatment and outcomes. Insofar as it goes beyond questions of numerical balance, equality is more difficult to define and measure than parity. The achievement of full gender equality in education would imply: equality of opportunities; equality in the learning process; equality of outcomes; and equality of external results.
Generic skills	A skill which is not specific to work in a particular occupation or industry, but is important for work, education and life generally, including communication skills, mathematical skills, organizational skills, computer literacy, interpersonal competence and analytical skills.
Google Apps for Education	A suite of online apps, including email, calendar, office applications and web hosting, provided for free to educational institutions by Google Inc.
Hard skills	The technical and analytical competencies and know-how that allow the worker to perform the mechanical aspects of a job.
Higher education	Education at ISCED (International Standard Classification of Education) level 5 or above.
Human capital	Knowledge, skills, competences and attributes embodied in individuals that facilitate personal, social and economic well-being.

ICT (Information and Communication Technology)	Technology that provides for the electronic input, storage, retrieval, processing, transmission and dissemination of information.
ICT/digital competences	Digital competences involve confident and critical use of information society technology (ICT) in the general population and provide the necessary context (i.e. the knowledge, skills and attitudes) for working, living and learning in the knowledge society. Digital competences are defined as the ability to access digital media and ICT, to understand and critically evaluate different aspects of digital media and media contents and to communicate effectively in a variety of ICT influenced contexts.
ICT/digital skills	The skills needed to use efficiently the elementary functions of information and communication technologies (essentially word/image/data processing, Internet and e-mail).
Inclusion	Inclusion is seen as a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities, and reducing exclusion within and from education. It involves changes and modifications in content, approaches, structures and strategies, with a common vision which covers all children of the appropriate age range and a conviction that it is the responsibility of the regular system to educate all children.
Informal education/learning	Learning resulting from everyday activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective.
Internship	A student or a TVET Institution's graduate undergoing supervised practical training.

IVET (Initial vocational education and training)	A work-based training process or activity for apprentices/trainees. It leads to a formal qualification. The activities are often financed (partly or wholly) by the enterprise, but this is not a mandatory condition. Apprentices/trainees often have a special training contract.
ISCED (International Standard Classification of Education)	A statistical framework for organizing information on education maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO).
Key competences	<p>The application of universal knowledge and skills across a range of social, work, and geographical settings (Key competences are also referred to as critical cross-field outcomes, transferable skills and core competences). There 8 key competences:</p> <ul style="list-style-type: none"> • Communicating in mother tongue • Communicating in foreign languages • Mathematical, science and technology • Digital competence • Learning to learn • Interpersonal/intercultural/social/civic • Entrepreneurship • Cultural education
Knowledge	Knowledge is central to any discussion of learning and may be understood as the way in which individuals and societies apply meaning to experience. It can therefore be seen broadly as the information, understanding, skills, values and attitudes acquired through learning. As such, knowledge is linked inextricably to the cultural, social, environmental and institutional contexts in which it is created and reproduced.
KPI (Key Performance Indicators)	(also known as Key Success Indicator) Indicators help an organization define

	<p>and measure progress toward organizational goals. Once an organization has analyzed its mission, identified all its stakeholders, and defined its goals, it needs a way to measure progress toward those goals. Key Performance Indicators are those measureme.</p>
Learner	<p>An inclusive term referring to anyone learning, including pupils at school; students at colleges, traditional universities, comprehensives, and universities of technology; apprentices, learners in learnerships, interns; people undergoing training, and people learning non-formally and informally as well as people enrolled for particular qualifications or part qualifications.</p>
Learning	<ul style="list-style-type: none"> • Knowledge is central to any discussion of learning and may be understood as the way in which individuals and societies apply meaning to experience. It can therefore be seen broadly as the information, understanding, skills, values and attitudes acquired through learning. As such, knowledge is linked inextricably to the cultural, social, environmental and institutional contexts in which it is created and reproduced. • Learning is understood here to be the process of acquiring such knowledge. It is both a process and the result of that process; a means, as well as an end; an individual practice as well as a collective endeavour. Learning is multifaceted reality defined by the context. What knowledge is acquired and why where, when and how it is used represent fundamental questions for the development of individuals and societies alike.

<p>Learning objectives</p>	<ul style="list-style-type: none"> • Specification of learning outcomes to be achieved upon completion of an educational or learning activity. These encompass improving knowledge, skills and competencies within any personal, civic, social or employment related context. Learning objectives are typically linked to the purpose of preparing for more advanced studies and/or for an occupation or trade or class of occupations or trades. • Written from an academic management point of view. • Sometimes used instead of learning outcomes but learning outcomes should be preferred as the latter are from the learner's point of view.
<p>Learning outcomes</p>	<ul style="list-style-type: none"> • Statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning. • Set of knowledge, skills and/or competences an individual has acquired and/or is able to demonstrate after completion of a learning process, either formal, non-formal or informal. • Written from the learner's point of view.
<p>Levels</p>	<p>Represent a series of sequential steps (a developmental continuum), expressed in terms of a range of generic outcomes, against which typical qualifications can be positioned. A level descriptor describes such terms.</p>
<p>Lifelong Learning</p>	<p>This refers to all general education, vocational education and training, non-formal education and informal learning undertaken throughout life, resulting in an improvement in knowledge, skills and competences within a personal, civic, social and/or employment-related perspective. It includes the provision of</p>

	counselling and guidance services.
Literacy	According to UNESCO's 1958 definition, the term refers to the ability of an individual to read and write with understanding a simple short statement related to his/her everyday life. The concept of literacy has since evolved to embrace several skill domains, each conceived on a scale of different mastery levels and serving different purposes.
LMS (Learning Management System)	Often also called as course management system or virtual learning environment, is a web-based software system that assists teachers to manage courses and deliver lessons online. It helps in administration, tracking and reporting of learning process.
Low-qualified/qualification	Having qualifications at level 1 of the European qualifications framework (EQF) for lifelong learning, that is: basic general knowledge, basic skills required to carry out simple tasks, and competence to work or study under direct supervision in a structured context.
Low-skilled	Having qualifications, especially in literacy and numeracy, below ISCED level 3.
MOOC (Massive Open Online Course)	An online course available for large enrolment on the open web, where open largely refers to open registration, and not necessarily courses in open licence.
Mobile learning	Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school

	system.
Module	A self-contained block of learning which can be completed on its own or as part of a course and which may also result in the attainment of one or more units of competency. Also known as “study unit” or “unit”.
MOODLE	The name of one particular e-learning platform (VLE or LMS) created in Australia to provide educators, administrators and learners with a system to create personalised learning environments.
MQF (Malta Qualifications Framework)	Assists in making the Maltese qualifications system easier to understand and review, and more transparent at a national and international level. The MQF is also a referencing tool that helps to describe and compare both national and foreign qualifications to promote quality, transparency and mobility of qualifications in all types of education. It is mainly referenced to the European Qualifications Framework (EQF) as well as to other non-European qualifications frameworks.
MQRIQ (Qualifications Recognition Information Centre)	The competent body within the NCFHE that recognises qualifications against the MQF. It provides recognition and comparability of both academic and vocational qualifications, using both the MQF and the European Qualifications Framework (EQF) to provide recognition advice on both local and international qualifications. It also assists in the recognition of Maltese qualifications abroad.
Non-formal education/learning	<ul style="list-style-type: none"> • Learning which is embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner’s point of view. • Learning that takes place through

	<p>a program of instruction but does not usually lead to the attainment of a formal qualification or award, for example, in-house professional development programs conducted in the workplace.</p>
NQF (National framework of qualifications)	<p>The single description, at national level or level of an education system, which is internationally understood and through which all qualifications and other learning achievements in higher education may be described and related to each other in a coherent way and which defines the relationship between higher education qualifications. See MQF (Malta Qualifications Framework).</p>
NCFHE (National Commission for Further and Higher Education)	<p>Launched in Malta in 2012 "to foster the development and achievement of excellence in further and higher education in Malta through research, effective licensing, accreditation, quality assurance and recognition of qualifications established under the Malta Qualifications Framework."</p>
Online learning	<p>Online learning is e-learning with a mandatory involvement of a digital network which a learner needs in order to access at least part of the learning materials and services. Online learning refers to network enabled teaching and learning that allows the learner to have increased interaction with content, teacher and other learners.</p>
Open and distance learning (ODL)	<p>A system of teaching and learning characterized by separation of teacher and learner in time and/or place; uses multiple media for delivery of instruction; involves two-way communication and occasional face-to-face meeting for tutorials and learner-learner interaction.</p>
OER (Open Educational Resources)	<ul style="list-style-type: none"> Defined by the OER Paris Declaration 2012 as any "teaching, learning and research materials in any medium, digital

	<p>or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work”.</p> <ul style="list-style-type: none"> • OER are digitized materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research. OER include: <ul style="list-style-type: none"> ○ Learning Content: full courses content modules, learning objects, collections and journals. ○ Tools: software to support the development, use, re-use and delivery of learning content including searching and organization of content, content and learning managements systems, content development tools, and on-line learning communities. ○ Implementation resources: intellectual property licenses to promote open publishing of materials, design principles of best practices, and localisation of content”
Open learning	<p>Policies and practice of openness in entry requirements (with minimal or no restriction on qualifications), choice of courses, place of study and time, etc. It is an educational philosophy where learning can happen anywhere, anytime from any resource, and therefore, this can be seen as a practice in face-to-face</p>

	institutions.
Permeability	Capacity of education and training systems to enable learners to: <ul style="list-style-type: none"> •access and move among different pathways (programmes, levels) and systems; •validate learning outcomes acquired in another system or in non-formal/informal settings.
Post-secondary education	All education beyond secondary school level, including that delivered by universities, further education colleges and community providers.
Post-secondary (non-tertiary) education	These programmes straddle the boundary between upper secondary and tertiary education. They serve to broaden the knowledge of upper secondary education graduates. These programmes are designed to prepare students for studies at first stage of tertiary education or for direct labour market entry. They do not lead to a tertiary qualification.
Pre-vocational education	Education preparing students for the world of work, including counselling on career choices, training in general work skills and habits, and work experience.
Programme	A coherent set or sequence of educational activities designed and organized to achieve pre-determined learning objectives or accomplish a specific set of educational tasks over a sustained period. Within an education programme, educational activities may also be grouped into sub-components variously described in national contexts as 'courses', 'modules', 'units' and/or 'subjects'. A programme may have major components nor normally characterised as courses, units or modules -for example, play-based activities, periods of work experience, research projects and the preparation of dissertat.
Qualification	<ul style="list-style-type: none"> • Certification awarded to a person on successful completion of a

	<p>course in recognition of having achieved particular knowledge, skills or competencies.</p> <ul style="list-style-type: none"> • The requirements for an individual to enter or progress within an occupation. • The formal outcome (certificate, diploma or title) of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards and/or possesses the necessary competence to do a job in a specific area of work.
Quality assurance	<p>Quality assurance encompasses any activity that is concerned with assessing and improving the merit or the worth of a development intervention or its compliance with given standards. Note: examples of quality assurance activities include appraisal, RBM (risk-based monitoring), reviews during implementation, evaluations, etc. Quality assurance may also refer to the assessment of the quality of a portfolio and its development effectiveness.</p>
Recognition of learning	<p>The principles and processes through which the knowledge, skills and competences of a person are made visible, mediated and assessed for the purposes of certification, progression and professional standing. Recognition can take place by making learning explicit through the codification of knowledge, skills and competences in qualifications, but it is not limited to this form.</p>
Sectoral skills	<p>Sectoral skills refer to those skills that are relevant to a particular sector e.g. hospitality, engineering, etc. These sectoral skills are determined by the demands of the labour market.</p>
Self-directed learning	<p>Learning by oneself without the aid of an instructor.</p>
Skill	<p>Refers to the ability to apply knowledge,</p>

	<p>use know-how to complete tasks and solve problems and carry out the tasks that comprise a particular job.</p> <p>As an overarching/multidimensional concept/term, “skill” can be also used as a proxy measure on occupation, qualification, educational attainment (these measures have the benefit of being readily available in a range of quantitative datasets). Other abilities, used at daily work, such as teamwork and problem-solving, are also considered as skills (however it is not always easy to be measured due to their subjective nature).</p>
Skills gap	Situation where an individual does not have the level of skills required to perform his or her job adequately.
Soft Skills	<ul style="list-style-type: none"> • Skills that are cross-cutting across jobs and sectors and relate to personal competences (confidence, discipline, self-management) and social competences (teamwork, communication, emotional intelligence). • A set of intangible personal qualities, traits, attributes, habits and attitudes that can be used in many different types of jobs.
STEM (Science, Technology, Engineering and Mathematics)	Science, Technology, Engineering and Maths provide skills that are expected to be held by people with a tertiary-education level degree in these subjects but also skills that are applied to different aspects of life and education.
Study unit	Units are a set of learning outcomes (knowledge, skills and/or competences) which constitute a coherent part of a qualification. A unit can be the smallest part of a qualification that can be assessed, transferred, validated and, possibly, certified. A unit can be specific to a single qualification or common to several qualifications. Also known as “module”.

Summative assessment	Assessment that occurs at a point in time and is carried out to summarise achievement at that point in time. Often more structured than formative assessment, it provides teachers, students and parents with information on student progress and level of achievement. Also called assessment of learning.
Syllabus	Outline of a course/module/subject that lists what needs to be taught and learned. It is different from learning outcomes as the syllabus defines the content rather than the skills and competences to be attained by the learner.
Synchronous learning	Opposite of asynchronous learning, where learner interacts with teachers and/or learners online at the same time from different place.
Trainee	A person undergoing vocational training, either within a training institution or training organisation or at the workplace.
Training	Training is teaching, or developing in oneself or others, any skills and knowledge that relate to specific useful competencies.
Transferable skill	Skills that can be introduced in a different socio-cultural or technical environment, or that can be used in other occupations.
TVET (Technical and vocational education and training)	Understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods. TVET, as part of lifelong learning, can take place at secondary, post-secondary and tertiary levels and includes work-based learning and continuing training and professional development which may lead to qualifications. TVET also includes a wide range of skills development opportunities attuned to national and local contexts. Learning to

	learn, the development of literacy and numeracy skills, transversal skills and citizenship skills are integral components of TVET.
Underpinning knowledge	Underpinning knowledge refers to the theory developed within a particular sector. This knowledge provides the theoretical basis on which individuals use sectoral skills at work.
Upskilling	Short-term targeted training typically provided following initial education and training, and aimed at supplementing, improving or updating knowledge, skills and/or competences acquired during previous training.
Validation	The process by which the validity of the assessment process is ensured (i.e. the checks and balances in the assessment system to ensure that what should happen when people are assessed, does happen). Its primary purpose is quality assurance, confirming that people in different places are assessed in the same way, with a common interpretation of the standards. There are two levels of verification: Individual (or technical) Verification – ensures employee competence by checking individual assessments undertaken by the Verifier & Process or System Verification – ensures a systematic process is established and procedures are followed.
VET (Vocational education and training)	Education and training which aims to equip people with knowledge, know-how, skills and/or competences required in particular occupations or more broadly in the labour market.
Virtual education/learning	Includes aspects of both online and e-learning but goes somewhat further. While it is largely web-centric it does not necessarily limit itself to learners outside a conventional classroom. It uses multimedia and, besides delivering content, also enables a high level of interaction among learners, content, teachers, peers and administration both

	synchronously and asynchronously.
VLE (Virtual Learning Environment)	A web-based software system that assists teachers to manage courses and deliver lessons online. It helps in administration, tracking and reporting of learning process. Also known as Learning Management System (LMS) or e-learning platform.
Work-based learning	Learning taking place through carrying out and reflecting on work tasks in a real environment.
Workload	A quantitative measure of the learning activities that may feasibly be required for the achievement of the learning outcomes (e.g. lectures, seminars, practical work, private study, information retrieval, research, examinations).

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https://ec.europa.eu/epale/sites/epale/files/adultglossary1_en.pdf

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