

INNOVATIVE
AND TECHNOLOGY-ENHANCED
TEACHING AND LEARNING

TEACHER'S HANDBOOK



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ERASMUS+ PRINTEL PROJECT "CHANGE IN CLASSROOM: PROMOTING INNOVATIVE TEACHING
& LEARNING TO ENHANCE STUDENT LEARNING EXPERIENCE IN EASTERN PARTNERSHIP COUNTRIES"

INNOVATIVE AND TECHNOLOGY ENHANCED TEACHING AND LEARNING: **ACTIVE LEARNING AND ICT-ENHANCED TEACHING: M-LEARNING AND GAMIFICATION**

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Forword

The current Handbook is developed within the frames of Erasmus+ PRINTeL project aimed at promoting innovative teaching and learning (T&L) pedagogies in Eastern Partnership Countries (EPC) - Armenia, Georgia and Belarus. The project contributes to enhancing student real-life learning experience by introducing a major change in the classroom via interactive and technology-enhanced T&L practices. The training of the university teaching staff on new, interactive T&L methods and approaches is on PRINTeL target as well.

The expertise and experience of EU and EPC universities participating in the project have served as a basis for this Handbook development. It compiles the materials of PRINTeL training of trainer (TOT) workshops held at 5 EU partner universities, which later were fine-tuned by EPC university trainers based on their 100 in-house teacher trainings (TT) experience.

The Handbook consists of five chapters, each devoted to a certain T&L method and/or strategy, as follows:

Through the material, experience and best practices accumulated in this manual, the Handbook delivers general knowledge on the use of active T&L pedagogical methods mentioned above, suggests practical tips for teachers and trainers, offers methodological patterns applied in students teaching and teachers training and provides a depository of resources on the specified innovative T&L methods.

Each T&L method in this Handbook is described in detail and advices on advantages and challenges of each are offered. The Handbook allows the users to set the pace of their learning, as well as the depth to which they strive in relation to each method.

The present Handbook aims to offer support both for university teachers who themselves want to learn more about active learning methods and for trainers who train their colleagues on the use of these methods. The proposed activities can be undertaken individually, jointly with a few peers or in a more

formal training group. In case of group training, the trainer decides which resources listed in the Handbook to apply. Individual learners can make their own selection of provided material.

Readers interested in being engaged in virtual communities and discussion groups of various teaching practices, as well as seeking for additional Open Educational Recourses (OER) for their practice are kindly invited to get registered and become a member of the **Virtual Academy of Teaching and Learning (VATL)** at www.vatl.y-su.am, - an online platform and a depository of OERs for the teachers and students interested in innovative and technology enhanced T&L.

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For further information about the PRINTeL project please visit the project's website on www.printel.am.

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INTRODUCTION

Nowadays students are exposed to all kinds of information from very different sources. Innovating in the classroom so as to keep them motivated and engaged is a challenging task. Active learning teaching interventions are the answers to this challenge. This chapter aims at showing teachers new ways of teaching implementing two methodologies, m-learning and gamification, to help them go beyond the traditional class.

Currently, there seems to be an urgent need to integrate new technologies in the educational process. M-learning has become a powerful tool to support this. Innovative teaching approaches such as m-learning go beyond time and the physical boundaries of the classroom so as the teaching and learning processes become ubiquitous.

In this brochure, the principles of m-learning are described exploring the benefits and challenges of using m-learning in Higher Education. M-learning will help the teacher in many ways, creating successful interactive learning and allowing to monitor students' knowledge, to give immediate feedback, and to manage the teaching process outside the classroom. We will also talk about the roles of the teacher and students and provide some very useful apps to implement m-learning such as polling apps, apps for quizzes, or apps to use augmented reality in the learning materials.

Integrating m-learning increases the two-way interaction between teachers and students and helps both to be on the same track in the education process. Teachers can use m-learning in a class to observe and monitor the ongoing process of students' understanding and to evaluate a lesson, both from the students' and the teachers' perspective. Some recommendations when implementing m-learning will be provided and some mobile applications suggested to contribute to active students' involvement and active interaction not only between the students and the teacher, and also amongst the students.

Another approach to engage students is to implement the methodological strategy of gamification. This teaching strategy focuses on introducing gameful experiences in the learning and teaching processes to motivate students.

A definition of what gamification involves in teaching is introduced to distinguish it from other gameful approaches such as game-based learning. To understand this approach is essential so as not to confuse it with the use of games in the class. Gamification applies other strategies introducing features of games and videogames that are the ones that influence students' engagement.

All these gamification elements are firstly described and then the roles of the teachers and students that should be adopted to make the gamification process successful. In addition, some resources and applications that teachers can use in order to gamify their teaching are introduced, taking into account different levels of implementation, either using gamification platforms, gamified quizzes, game-like features in virtual learning environments (VLEs), or using different ICTs. Finally, some recommendations are suggested so teachers have a useful guide on how to implement a successful gamification in their teaching.

PART 1
MOBILE LEARNING



1.1. Introducing M-learning

The 21st century generation lives on a widespread use of the Internet and mobile devices. The day-to-day development of mobile technologies presents some challenges. On these grounds, there is a need to integrate new technologies into the education system.

Mobile learning is the use of mobile technologies in the educational process both individually and with other teaching methods. Online learning enables students to be involved in learning anytime anywhere. Learners can use their mobile devices to access educational resources, and to interact with others in classrooms and outside.

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 (UNESCO, 2013).

UNESCO defines mobile devices as digital, easy-to-use devices that are usually owned and controlled by an individual rather than an institution, which can access the Internet, have multimedia capabilities, and solve a number of problems. Learners today are more likely to access learning through digital gadgets rather than with traditional books, and journals, therefore, teachers should take advantage of this fact and exploit the affordances that mobile devices provide.

M-learning is a powerful educational tool that can support the educational process in a way that was not possible before. In that way, mobile learning

enables learning anytime, anywhere and can facilitate personalized learning and provide immediate feedback.

The physical boundaries of the classroom and time for learning no longer prevail because the learning becomes ubiquitous, students can communicate with teachers, other students and anyone else to satisfy their need for knowledge using the new generation of mobile devices – laptops, smartphones or tablets. Besides, smartphones are becoming very popular in today's life since almost everyone can afford one. During the last decade the role of mobile phones has changed dramatically; they are no longer considered as a tool for communication only, now they are also used in teaching and learning. Moreover, mobile devices make it possible for students to gather, access and process information outside the classroom.



Figure 1. M-learning: mobile devices for learning and teaching

Source: <https://www.pulselearning.com/fs/2016/06/>

[Why-mLearning-is-not-just-eLearning-on-a-mobile-device.png](#)

HE students are increasingly using mobile devices in their studies as they are more accessible. Therefore, there is a need to introduce these to all strands of education, and even to make them accessible to those living in remote areas where there are no schools, teachers or libraries. In addition, m-learning promotes a variety of learning resources, making education more fun and exciting. Through mobile learning, teachers can add videos, visuals, and different types of styles to make the lessons more interesting.

Mobile learning has both its benefits and challenges. One of the benefits of mobile learning is its personalization - mobile phone and tablet applications can, for example, choose more difficult or easier texts based on the skills and knowledge of a particular user. This technology helps ensure that students are not left behind. One-size-fits-all approaches to teaching are insufficient for teachers and students, and mobile learning offers a perfect methodological approach to personalize the curriculum.

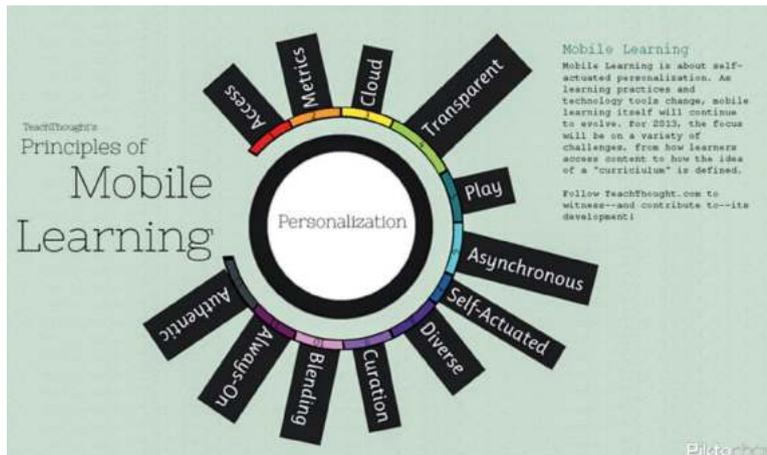


Fig. 2. Twelve principles of mobile learning

Source: <https://www.teachthought.com/wp-content/uploads/2012/10/Principles-of-Mobile-Learning.png>

Heik (2018) lists 12 principles of mobile learning. In m-learning **access** is constant and with access to the **cloud**, all data sources and materials are constantly available. The **metrics** of understanding and “performance of knowledge” are also available. **Transparency** is the natural result of connectivity, mobility, and collaboration. M-learning performance gains an immediate audience with both local and global communities of learning through social media platforms. Among the most powerful principles of mobile learning is **asynchronous access**. Mobile learning changes the tone of learning

from academic and compliant to personal and **playful**. It also enables a learning experience that is increasingly personalized: *just in time, just enough, just for me* (Heik, 2018). With asynchronous access to content, peers, and experts comes the potential for **self-actuation** and comes **diversity** as well. Learners can act as experts of resource and assessment and apps and mobile resources can support **curation** of content. M-learning provides a **blending** of digital interactions. There is an **always-on** learning, persistent and iterative. All these principles converge to allow students to have experiences that are **authentic** and personalized.

One of the best features of mobile learning is its **flexibility**. Teachers and students can learn from their own experience and their own pace. Different types of teaching methods and dynamic materials can have a great impact. They help make the material **accessible** permanently through, for instance, websites, podcasts, video or other multimedia formats. **Feedback** is also key in mobile learning. Mobile technologies can streamline assessments and provide learners and teachers more immediate indicators of progress. Both real-time feedback and real-time **interaction** with students give a great impact on overall learning.

M-learning is a bridge between formal and informal learning. Using a mobile device, students can easily access additional materials. Mobile learning may include students with physical disabilities. It also makes education-related costs effective. Mobile learning generates and develops students’ digital competence. It also gives us the opportunity to get acquainted with modern teaching methods, stay in touch with the use of education in the field of education innovation.

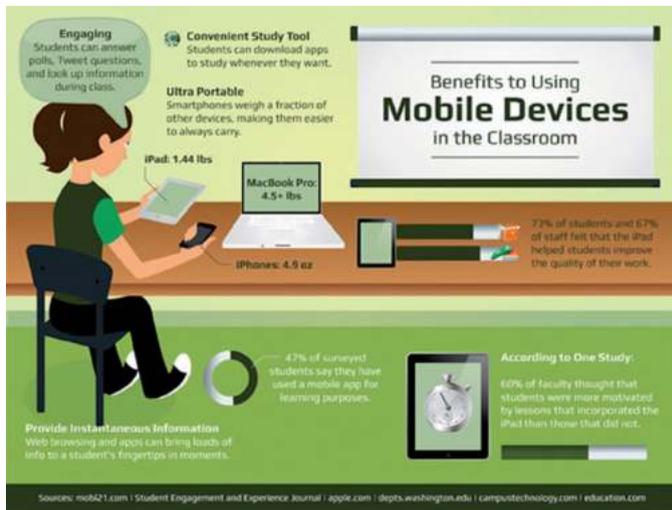


Figure 3. M-learning: Benefits to using Mobile Devices in the classroom

There are some challenges that should be faced when applying m-learning. Firstly, there are some technical challenges such as connectivity and battery life. Using mobile devices for learning can be a problem if users have poor connectivity. Wi-Fi and mobile networks should work in a consistent manner, otherwise, this connectivity problem can lead to frustration on the part of teachers and learners and it is likely to contribute to demotivate them. Moreover, enough electricity power outlets in the classrooms for recharging students' mobile devices should be taken into account to normalise their use in classes.

Accessibility and cost for learners could also be a significant issue. Teacher should evaluate which access and connectivity students have outside the class. Apart from that, file sizes and formats that are compatible with a computer often lead to performance problems for mobile devices. When creating materials teachers should take into account size as continuous use of small handheld devices can cause eyestrain and headaches. Moreover, they need to keep in mind that any learning task should render well on different screen sizes and be compatible with different operating systems.

Teachers need to make sure that mobile devices in the classroom are not used for other purposes than learning and get distracted with browsing social media channels or even answer calls. The solution is to devise an interesting learning activity to keep them engaged using their mobile devices to enhance their learning.

1.2. Roles of the Teacher and Students in M-learning

People see smartphones as an integral and inseparable part of their lives. Smartphones have become an indispensable device and useful for our daily tasks. People are already using mobile phones to get information whenever they can. Therefore, teachers can take advantage of this fact and use them in class for learning purposes. The crucial task for teachers is to design a lesson plan that exploits fully the potential of these devices.



Figure 4. Learners' preference for mobile learning

Source: <https://elearninginfographics.com/top-4-reasons-why-learners-prefer-mobile-learning-infographic/>

1.3. M-learning: Apps and Resources

“89% of smartphone users download Apps, 50% for education” – Source: *Towards Maturity (Growth Engineering (2017), Mobile Learning and the Future of L&D)*.

Nowadays, the Internet provides different resources and applications that can be used in learning processes and environment, especially in mobile learning.

Mobile learning apps and resources conventionally can be divided into 8 groups:

- 1) *Learning Management System (LMS) apps*
- 2) *Polling apps*
- 3) *Apps for quizzes and tests*
- 4) *Apps for research, note taking, and self-training*
- 5) *Podcast apps*
- 6) *Apps for communities*
- 7) *Lesson planning apps*
- 8) *Apps for fostering students' creativity*
- 9) *Augmented reality.*

1. *Learning Management System (LMS) apps*

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting, and delivery of educational courses, training programmes, or learning and development programmes. The learning management system concept emerged directly from e-Learning. Although the first LMS appeared in the higher education sector, the majority of the LMSs today focus on the corporate market. Learning Management Systems make up the largest segment of the learning system market. The first introduction of the LMS was in the late 1990s. (Source: Davis, B., Carmean, C., & Wagner, E. (2009). «The Evolution of the LMS: From Management to Learning». The eLearning Guild Research. 24).

LMSs have some features which are useful for managing courses, users and roles with ease, and for providing online assessment, tracking students' attendance and receiving timely feedback from learners. Many LMSs have created their own apps for mobile phones, and learners can receive assignments and all the necessary information on their phones.

Examples of LMS:

- Moodle Mobile - https://docs.moodle.org/38/en/Moodle_app
- Talent LMS - <https://www.talentlms.com/mobile>
- Schoology: <https://www.schoology.com/k-12/mobile-app>.

2. *Polling apps*

Polling apps are software applications for creating and managing different types of surveys and polls. Polling apps are very useful for understanding students' prior knowledge and for diagnostic assessment. These apps are also helpful for the assessment of learners' needs and expectations and live polls with instant results. Some polling apps provide instant analyzed results that are visually very impressive and helpful for students to understand where they are and what they want to achieve.

Some examples of polling apps:

- Sli.do - <https://www.sli.do/>
- Mentimeter - <https://www.mentimeter.com/>
- Polleverywhere - <https://www.polleverywhere.com/>.

3. *Apps for quizzes and tests*

The following apps are very helpful for individual or group testing, contests. They also provide opportunities for Gamification (see section 2.5 Resources for gamification).

- Kahoot - <https://kahoot.com/>

- Socrative - <https://socrative.com/>
- QuizUp - <https://www.quizup.com/en>.

4. Apps for research, note taking, and self-training

The following apps can be useful for making flashcards or memo cards, organizing information portions, creating notes, finding the necessary information easily, working in groups and even challenging each other. These apps can be used for individual and group work. With some of these apps learners can analyze their thoughts and structure those using different Mind maps and layouts.

- Evernote - <https://evernote.com/intl/ru/>
- Simplemind - <https://simplemind.eu/>
- Quizlet - <https://quizlet.com/ru>
- Elevate - <https://www.elevateapp.com/>.

5. Podcast apps

According to The Oxford English Dictionary, a podcast is an episodic series of digital audio files that a user can download in order to practise listening. Podcasts can contain files in PDF and EPUB formats also. Videos also can be shared following a podcast model.

An enhanced podcast displays images simultaneously with audio. It can contain hyperlinks, markers, images, all the needed information can be displayed in the same window, making it easier to display materials. Podcasts can be successfully used in m-learning.

- Pocket casts - <https://www.pocketcasts.com/>
- Himalaya - <https://www.himalaya.com/ru>.

6. Apps for communities

There are different apps for communities that can be used by learners

and researchers for connecting with the needed people and professional networks. These apps can be useful for creating open and close groups, finding information, articles, and sharing own research results. Some of the following communities provide opportunities for group discussions, surveys in bigger communities, etc.

- Academia.edu - <https://www.academia.edu/Documents/in/App>
- Researchgate - <https://www.researchgate.net/>
- LinkedIn - <https://www.linkedin.com/>
- Facebook - <https://www.facebook.com/>
- Reddit - <https://www.reddit.com/>.

7. Lesson planning apps

The following apps help teachers to manage the classroom and engage the students. These are useful tools for planning lesson activities with the learners in HEIs.

- Padlet - <https://padlet.com/>
- Edmodo - <https://new.edmodo.com/?go2url=%2Fhome>.

8. Apps to foster students' creativity

This group of apps is very useful for encouraging students' creativity and curiosity. These apps give teachers and students an opportunity to create infographics and videos easily. Using these apps is a lot of fun. Moreover, students will be able to create interesting and useful short videos and report their own learning experience.

- Canva - <https://www.canva.com/>
- Adobe spark video - <https://spark.adobe.com/>
- Stop motion studio - <https://www.cateater.com/>
- Flipgrid - <https://info.flipgrid.com/>.

9. Apps for Augmented Reality (AR):

With AR you can superimpose computer-generated images on top of your view of reality, thus creating a composite view that augments the real world. Point your camera at something that the app recognizes, and it will generate a 3D animation or a video superimposed over whatever is shown on your camera screen.

- HP Reveal: <https://www.hpreveal.com/>
- Layar: <https://www.layar.com/>
- CoSpaces Edu: <https://cospaces.io/edu/>.

1.4. Some Teaching Practices of M-learning

M-learning, as a component under the active learning umbrella, gained popularity after observing students' behaviour change while attending classes. Students' "addiction" to mobile phones is both obvious and strong. Mobile phones are one of the essential devices that students use to communicate and express themselves in their everyday lives. Using smartphones as a medium for involving and interacting with the learners during the classes is becoming more and more popular and effective.

Integration of m-learning in introducing active learning methodology makes classes dynamic, increases two-way interaction between teachers and students and helps both to be on the same track during the lecture.

There is a huge number of m-learning apps that can be used for teaching purposes. Sometimes it is difficult for teachers to navigate among so many alternatives and get confused and abandon the idea of going beyond traditional lectures with active learning activities using mobile devices. One of the suggestions is to start with just one app, practice and experiment it during the real process of educational activity. After mastering one, another app can be chosen and experience the same process. In addition, it is important to have a

repository of different apps and tools and upgrade them permanently.

Teachers may use m-learning activities in every phase of the lecturing process. It is important to be creative and enthusiastic experimenting with different apps in teaching. Here are some teaching practices to help teachers exploit m-learning and adapt it to their field of teaching.

A. Using M-learning at the beginning of the lecture

It is not only interesting but also relevant for a teacher to know the students' expectations for the course or for a teacher. This kind of information enables a teacher to understand interests and identify the knowledge gaps students have. Based on the gained information, a teacher can adjust and tailor the content of the session to the revealed information. This makes classes more interesting, fruitful and active. Students are satisfied as they got the information that they were curious for or had a lack of.

M-learning provides teacher with the possibility to gather information about expectations students have. Students can express their wishes anonymously as sometimes speaking up in front of a large audience is a bias for them. Different apps, such as *Mentimeter* or *PolleEverywhere* can be used in different ways – asking open ended questions about the expectations or providing multiple-choice questions with a limited number of answers. So, students choose what they are willing to listen to.

B. Observing the ongoing process of understanding

It is also necessary to monitor students' ongoing understanding of the topic that the teacher teaching during the class. In addition, having students' active attention during the teacher enables teachers to keep students involved and engaged. M-learning apps such as *Kahoot!* or *Socrative* are helpful and easy to use in this situation. A teacher can prepare questions in a form of a short quiz in advance to ask after each chunk of the lesson.

Using mobile apps for this purpose is beneficial both for the students and the lecturer. While answering the questions, students are provided with a summary of the content covered and the feedback of the concepts that they did not understand. As for teachers, the process of ongoing monitoring the students' understanding of the topic helps the teacher to cover students' knowledge gaps and readjust their lesson plan.

C. Assessment at the end of a lesson

Teachers can also use m-learning apps to monitor students' understanding at the end of the sessions. Polls may play a role of "exit ticket" asking a couple of appraisal questions and suggestions from students. As in all other situations, here some apps are useful for analytics and reporting the data received from the audience. While using Polls at the end of the lectures, a teacher can compare two sources of data – data collected from the beginning of the class and compared to the data at the end of the session. This relevant information helps teachers to improve their lessons and to take into account the students' feedback either to improve their teaching method or to readjust the content of the lesson.

D. For discussion purposes

M-learning apps might be used in lectures to introduce discussions or debates on controversial topics to develop students' critical thinking. Polling apps such as *Mentimeter* or *Sli.do* allow students to express their ideas freely in front of the class as their responses remain anonymous. This type of tasks makes lectures very interactive since students are actively engage with what is being discussed.

1.5. Recommendation when Implementing M-learning

The rapid development of ICTs has influenced all the spheres of people's

activities. The HE system has also undergone significant changes. Teachers face the need to transform and modernize their education process. Nowadays, teachers must focus not only on the contents of the subjects they are teaching but also on the teaching methodology they are going to use to motivate their students. The role of the teacher is definitely changing. It is not enough to be an expert in the discipline you are teaching. Teachers should take into account how to attract their students' attention, look for ways of engaging them and build up an active two-way interaction in order to achieve the best result in the process of teaching. The use of the technology helps the teacher:

- to create interactive learning environment,
- to check up students' knowledge very quickly,
- to give immediate feedback,
- to make the process of education more varied,
- to conduct the process of teaching outside the classroom,
- to personalize the process of teaching and build up an individual educational paradigm for each student,
- to provide connection between formal and informal teaching, and
- to make the process of looking for new and additional information on the topic easier.

When implementing m-learning, teachers should follow some parameters. First of all, they should be ready to change their approach to teaching, secondly, to improve the level of their competence, and finally, to invest in their own professional growth. In addition, universities should have appropriate resources to organize new active learning processes providing technical support, suitable mobile devices, excellent internet connectivity, etc.

Here follows a set of recommendations concerning the role of the teacher and their own effort in the process of modernizing education.

1. Teachers should understand that the transformation of the higher education system as a whole is inevitable. Unfortunately, some teachers

view these changes as optional, with unnecessary workload, but not as an opportunity for improvement the quality of HE teaching.

2. Teachers today should innovative methodologies to activate their classes.
3. The teacher should experiment teaching trends that make use of ICTSs so as to improve their interaction with their students and improve their teaching processes.
4. The teacher should be ready to invest their own resources (time, money) in the development of competences and mastering necessary skills.

The second block of recommendations deals with the usage of mobile technologies in the classroom and interaction with students.

1. It is necessary to make sure that the classroom gives the opportunity to work with mobile applications with good internet connectivity and sufficient electricity sockets.
2. Students should be told in advance that they will need some mobile devices, smartphones, tablets or laptops, to work in the classroom. This should be done so that none of the students will drop of the interaction with the group.
3. It is not advisable to introduce all possible applications and programme s at the beginning of the transformation of the educational process. Teachers themselves need time to master these apps to monitor their work inside and outside the classroom.
4. Teachers should understand whether the use of the applications is appropriate in a particular discipline and in a particular group of students. A mobile application should always contribute to the achievement of the goals of the educational process.
5. Teachers should explain students why a particular technology is being used, what exactly they should do with it and what results they should achieve. This must be done to avoid rejection, when students do not understand their task and do not see how the application that they are using is connected with the learning task in a meaningful way.

6. Teachers should be aware of the students' reaction to the use of any app or programme in class.
7. Teachers should have a clearly set timing of the lesson, in which a teacher is planning to use some applications, especially if the teacher and the students have never done it before. It is necessary to set aside some time to understand how the application works. Each programme/application needs a short introduction to explain how and why it will be used. Students should be provided with clear instructions concerning the use of a given programme . Teachers should understand that students might work with the application at different rates: some students will work quickly and without any help, some might need more time and help from the teacher or other students. It is also necessary to allot some time for feedback to discuss the results of their work with the application and to analyse these results together with the students.
8. Teachers should not use more than two or three different programme s and applications in one lesson due to time limit of a lesson. When using more than one, teachers should take into account that students will need time to switch from one programme to the other or from an active learning activity to more traditional forms of teaching.
9. Teachers should be aware that not all the applications are effective for every lesson and in every subject. However, there are general mobile applications that can be used in a variety of teaching contexts, such as polling apps, *Mentimeter*, *Poll Everywhere*, or *Sli.do*, and gamified tests such as *Kahoot!* or *Socrative*. Short questionnaires can be used at the beginning or at the end of every lesson to check up students' comprehension. Visual display of the results provides the opportunity to see the general level of the group or to monitor each student's individual achievements.
10. The creation of word clouds is another teaching strategy that helps to engage students with the topic of the lesson. It is really useful to use it at

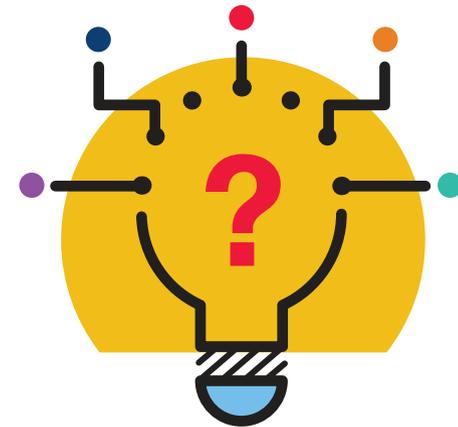
the beginning and at the end of the lesson. In this way, teachers can see whether the students' understanding of the content has changed.

The most important thing in the transformation of the education process with the help of m-learning is not to forget about the main educational goal, which is to help students master specific knowledge and to develop their skills and specific competences of the discipline they are studying. Mobile applications must contribute to the achievement of this goal and ensure students' engagement and more active interaction within the group and with the teacher.

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PART 2
GAMIFICATION



2.1. Introduction to Gamification

Currently, working with the digital generation, teachers face new challenges. They must apply innovative teaching methods that will make the student active, motivated, and engaged in the learning process. Recent pedagogical approaches are being developed using playful elements such as gamification.

Before defining gamification and to be able to understand this educational strategy deeply, we should consider other educational approaches that use playful components but are different from gamification: game-based learning (GBL), serious games or simulations.

Game-based learning uses existing games and incorporates them into teaching contexts so as to harness their entertainment elements for the benefits of learning goals. Game-based learning can be implemented in a more or less intensive way depending on the number of games that are included in the programme, from a use supporting certain aspects of the curriculum, to an entirely game-based approach. In this area Digital game-based learning (DGBLL) refers to using actual digital video games as learning tools.

Serious Games are games created for reasons other than pure entertainment. Their main purpose is “serious” and not simply to entertain, i.e. to teach or train in areas such as education.

A simulation is a virtual representation that tries to imitate the real world such as a flight or drive simulators, 3D computer simulators, etc. Simulations do not need gameplay elements. They allow users to practice an activity in a safe environment.

These educational approaches should not be confused with gamification. Gamification is “the use of the elements of the game and design techniques of digital games in a non-game context” (Werbach & Hunter, 2012, p. 26). The

purpose of gamification is to engage people, motivate action, promote learning, and solve problems (Kapp, 2012, p. 10). Marczewski (2016) distinguishes these gameful approaches in the following figure:

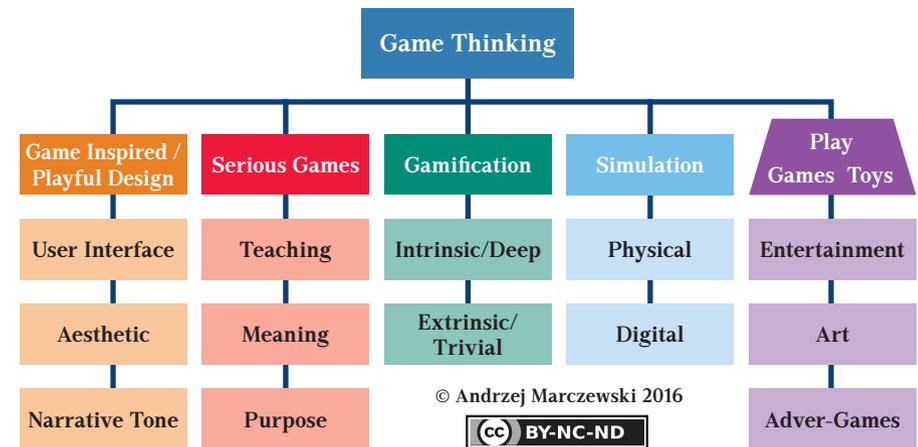


Figure 5. Differences between games, serious games, and gamification (Marczewski, 2016)

For more information about the difference between Gamification and Games see the following video by Kapp: <https://youtu.be/kHn0Maj8ygs>.

2.2. Elements of Gamification

Which are the game design elements that we could use to gamify our teaching? The game design elements are the ingredients which are used “to cook” a successful recipe for a gamified learning experience.

There are different taxonomies and classifications of these elements which are very heterogeneous and overlap between them (Kim, Siong, Lockee, & Burton, 2018; Sailer, Hense, Mayr, & Mandl, 2017). Deterding, Dixon, Khaled, and Nacke (2011) identify that game elements fall into five levels

of abstraction: game interface design patterns, game design patterns and mechanics, game design principles and heuristics, game models and game design methods. Alternatively, Hunicke, LeBlanc, and Zubek (2004) establish their description of game elements within the MDA (Mechanics, Dynamics and Aesthetics) framework. The mechanics of the game (e.g. points, badges, ...) cause a certain type of dynamics, i.e. how the game works, and the aesthetics refers to their emotional response that the player exhibits while playing the game.

Werbach and Hunter (2012, p. 81) argue that game elements are in a hierarchy, the DMC Pyramid, identifying three categories: dynamics (aspects of the gamified system that have to be considered but never directly enter the games), mechanics (basic processes that drive the action forward) and components (the specific instantiations of mechanics and dynamics). These concepts, however, are not equivalent to those in the MDA framework. The dynamics, mechanics and components are connected to each other in different levels of abstraction being the dynamics the ones with a higher amount of abstraction (see Figure 6) For instance, a learner receives a *badge* after completing a task; this gamification component is connected to at least two game mechanics such as *challenge* and *reward*, which, in turn, relate to *emotions* or *progression*.

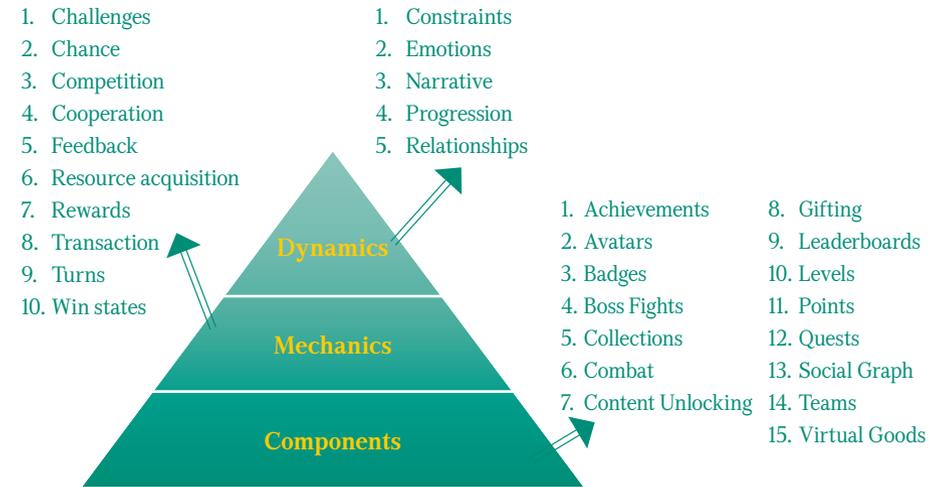


Figure 6. DMC Pyramid. Werbach and Hunter (2012)
Source: <https://images.app.goo.gl/vqF59Ckt1H3n9CzU6>.

Werbach and Hunter (2012, p. 78) consider five dynamics: *constraints* or limitations; *emotions* (curiosity or competitiveness etc.); *narrative* (a coherent storyline); *progression*, i.e. growth and development; *relationships* or social interactions. They also identify the following important game mechanics (2012, p. 79): *challenge* (the kind of a task which requires an effort to solve); *chance* or an element of randomness; *competition*; *cooperation*; *feedback*; *resource acquisition* through obtaining useful items within the game; *rewards*; *transaction*, i.e. trading with the other players; *turns* or sequential participation in game activities; and finally, *win states*, which relate to performing an objective in order to win. With regards to the components Werbach and Hunter (2012, p. 80) list fifteen game components which include *achievements*, *avatars*, *badges*, *boss fights*, *collections*, *combat*, *content unlocking*, *gifting*, *leaderboards*, *levels*, *points*, *quests*, *social graph*, *teams* and *virtual goods*. From all these, the most frequently used components in gamification implementations are *points*, *badges* and *leaderboards* (PBL) (Chou, 2015; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011)

so as to reward the users' performance. Points are usually earned by learners' successful interactions with the gamified environment (Werbach & Hunter, 2012) and help them identify how far they have progressed. The accumulation of points is commonly displayed in a leaderboard which rank learners according to their performance (Landers & Landers, 2015); and finally, badges are visual representations of accomplishments (Abramovich, Schunn, & Higashi 2013; Fanferelli, 2018; Kyewski & Krämer, 2018).

PBL can be motivating but they should be well designed for a successful gamified experience (Kapp, 2012) and be implemented with care (Goethe, 2019). Badges, for example, must be attainable, some easier and some more difficult. Similarly, leaderboards can be very motivating for students at the top of the table, but demotivating for those at the bottom. Therefore, the ranking can be devised in a way that avoids the demotivating factor of being in the last positions. It is considered, however, that the PBL is not sufficient to maintain motivation and engagement in a constant and sustainable manner (Chou, 2015; Kapp, 2012; Marczewski, 2013) as it only affects students' extrinsic motivation. Many gamified teaching designs are based on PBL (Chou, 2015) because of the simplicity of implementing these elements and introducing students to a gamified activity. However, PBL are not sufficient to maintain students' engagement in a prolonged task such as a full course, although some short-term benefits of PBL are already proved (Attali & Arieli-Attali, 2015; Landers, Bauer, & Callan, 2015; Sailer et al., 2017). Besides, research on how PBL increase student performance seems to be still inconclusive.

2.3. Structural and Content Gamification

Kapp (2012, 2013) distinguishes two types of gamification: structural and content. On the one hand, structural gamification refers to a model in which the structure of the learning tasks is gamified without modifying the content.

The main objective of this type of gamification is to engage students through rewards using, for instance, points, badges, and leaderboards (PBL). In this type of gamification, the learning content does not become game-like. On the other hand, content gamification implies altering the content to make it more like a game or video game, such as including a storyline in which challenges related to the story must be solved to achieve the objectives of the course. In this case, the gamification elements are embedded in the all the teaching-learning process.

Gamification learning experiences should aim at trying to influence students' intrinsic motivation. In this regard, a more holistic approach to gamification design is needed when devising a learning experience so as to include other gamification elements beyond the PBL. One of these engaging elements is introducing the dynamic of a narrative. The narrative is the actual nuts and bolts of the gamification experience participants go through (van der Meer, 2018). Two main types of narrative are identified in a study of different gamified language teaching interventions: those which included a story and those which only set up a scenario (Batlle & Gonzalez, 2017). Adding a story or a scenario to a gamification design has an impact on the other elements of the whole gamification procedure (avatars, challenges, rewards, etc.) and provide more opportunities for teachers to integrate these elements into their teaching tasks in a coherent way (Pujolà & González, 2019).

2.4. Roles of the Teachers and Students

In active learning, teaching and learning consists mainly in the assumption that the learner must be autonomous and the role of the teachers changes so as to facilitate students' learning activities. When implementing learning tasks, teachers should prompt active, independent, and meaningful activities to students. The main task of the present HE teacher is to facilitate students'

acquisition of knowledge and to activate autonomy, critical thinking and creative attitude.

Gamification educational environments should create learning conditions to increase students' motivation, to develop students' autonomy, to attract students' attention and ultimately, to engage them. In gamification, learners are motivated by helping them find the solution to practical problems and by the actions to achieve their own learning goals. The development of intrinsic motivation in gamification begins with the students' involvement with the gamification processes, with their desire to take part in them.

Intrinsic motivational processes unfold in a situation of choice, which encourages students to take independent actions meaningful to them. Meaningful actions as a result of choice turn the learning process into a vital goal, which is a condition for effective learning. Students are not alienated from the educational process, as happens in traditional education, but become involved in it because their own motive for solving the educational problem is associated with the internal content of mastering the subject. The formation of their own meaningful attitude to learning involves the fact that the implementation of gamification should take into account students' needs, capabilities and expectations so as the gamification is accepted by them. In these conditions, the pedagogical dialogue between teachers and students begins with an action that promotes interaction, mutual influence, and collaborative work of the participants in the educational process. A well-planned gamified teaching unit also contributes to the formation of internal motivators - self-esteem, intellectual moods, beliefs, interests, attitudes, and moral principles.

2.5. Resources for Gamification

Gamification platforms and tools

There is a diverse variety of platforms, apps and tools for teachers to use when implementing gamification in their teaching. Four approaches to use them can be established according to Pujolà & Appel (2020):

- a) gamification platforms that help to set up and manage gamified lessons or entire courses,
- b) gamified quizzes that help teachers improve lesson interaction and also build gamified tests for assessment purposes,
- c) game-like features used in regular virtual learning environments (VLEs), and
- d) using different ICTs when implementing a gamified teaching intervention.

a) Gamification platforms

The following four platforms can help teachers gamify a whole course:

Classcraft < <https://www.classcraft.com/>> is a platform that looks like a video game of the "World of Warcraft". Teachers can create a world of character such as Mages, Healers and Warriors with unique of powers who must cooperate and participate in missions so as to get points and gold for their teams. The objective is to progress collaboratively through a gamified storyline while learning and developing their knowledge.

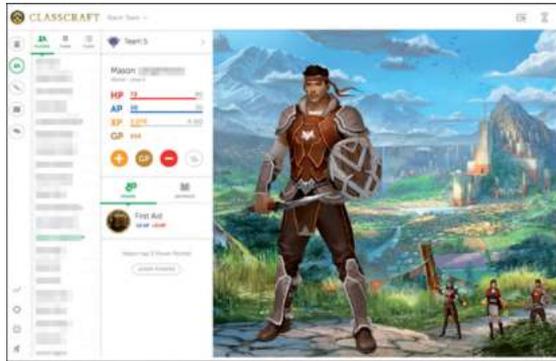


Figure 7. Classcraft screenshot

Source: <https://www.freeteach4teachers.com/2017/10/using-classcraft-for-gamified.html>

ClassDojo <<https://www.classdojo.com/>> is a free virtual classroom management web or mobile app that serves as a digital token economy system. Teachers can assign avatars to students, and award points as students perform tasks reflecting behaviour aspects. Although it has a rather childish interface, it can also be used in HE as an effective method for tracking data (see fig. 7).

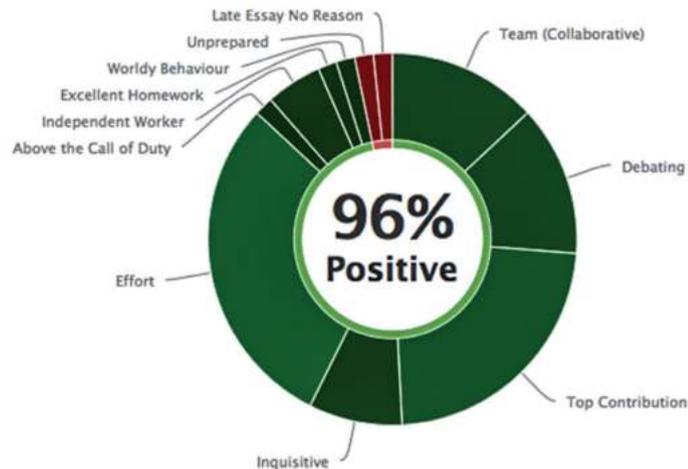


Figure 8. Dojo's tracking report of a student

Source: <https://historyotters.files.wordpress.com/2013/10/photo-5.png>

GradeCraft <<https://www.gradecraft.com/>>, a cloud-based LMS developed by the University of Michigan to support gamified courses. Students can set their own goals, get badges and stay informed about their learning analytics throughout the class (Holman, Aguilar, & Fishman, 2013). Teachers can also determine what tasks must be carried out before students can unlock the next set of material for them to reach their next goal. This LMS helps teachers apply gameful methodologies and design gamified learning environment through features such as levelling systems, badges, leaderboards, planners, rubrics and unlocks.

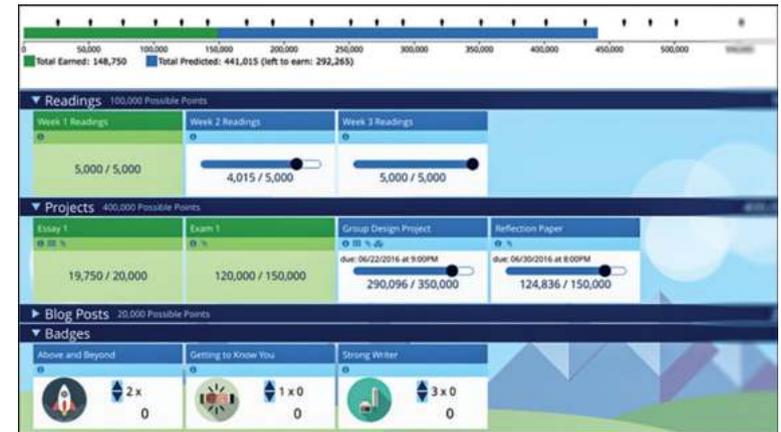


Figure 9. Point system and badge record in GradeCraft

Source: <https://cdn0.capterra-static.com/screenshots/2130745/165549.png>

b) Gamification quizzes as Personal Response Systems

Kahoot!, Socrative, Quizalize or Quizziz, to name just a few, are mobile applications that can be used as Q/A response systems that provide instant feedback and can be used in a lesson to assess students' knowledge or opinions and to encourage interactive lessons.

Kahoot! and Socrative are quite popular and have different game-like tasks, self-paced or timed, and can be played individually and in teams. Both include similar gamified tasks that keep track of students' points, in which students' ranking is based on correct answers to questions. Most of these apps are used for assessment in which teachers try to engage their students in a competitive mood as if they were a contest gam. For example, in Socrative teachers can organise a rocket race asking question to their students in groups (see Figure 10).



Figure 10. Socrative – SpaceRace Rockets

Source: https://stg.socrative.com/1.0.105/img/screenshots/space_race_711x409_@2x.jpg

These Q/A apps increase students' motivation, interactivity, participation, interaction, and engagement. They are also helpful for feedback and formative assessment and encourage collaborative learning.

c) Gamifying VLEs

Another option to devise a gamified course is to include the game-like elements into regular VLEs such as Moodle. Although Moodle is not a virtual environment specifically for gamification, there are some features that allow teachers to gamify their courses in Moodle (Somova & Gachkova, 2016; Gachkova, Takev, Somova, 2018) by using, for instance, a scoring system or

the choice activity to help learners set their own goals. Moreover, different plug-ins can be added for gamification purposes such as:

- Quizventure - quiz questions from the course and sends possible answers in the form of spaceships. Students have to shoot the correct answer.
- Level Up! - it lets students “level up” each time they complete a quiz.
- Ranking Block - A ranking block to show the top three top students.
- Stach - let students find items by exploring the activities.

Denmeade (2015) provides advice and information about how to set up a scoring system, to make use of activity loops, to set challenges for students to self-access their abilities and to set learning goals with the choice activity, to configure gateways and to include badges for students' mastery achievements.

d) Using other ICTs

The last approach to gamify your teaching is to integrate different ICT tools and resources. Based on Pujolà and Appel (2020) the following table illustrates some possibilities of implementing gamification components and their corresponding mechanics using a variety of ICT tools.

Table 1: Introducing gamification components and mechanics in classroom tasks

Mechanics	Components	Task	ICT tools/resources
Identity	Avatars	Students design their own avatars to use them in the narrative of the gamification proposal.	Voki: https://www.voki.com/ Avatar Generator: https://www.generateit.net/avatar-generator/
	Logos/ Emblems	Students define the common characteristics of their teams and embody these in the logo designs.	DesignEvo https://www.designevo.com/logo-maker/
Challenge	Achievements	Students make an infographics (as an intermediate or final product) of a topic as a challenge.	Canva https://www.canva.com/
	Missions	Students identify a secret code in a video by answering questions.	Edpuzzle: https://edpuzzle.com/ PlayPosit https://go.playposit.com/
	Secret Missions	Volunteer Students to carry out an activity unknown to the rest.	Teachers can use any digital communication tool to inform selected students.
Competition & cooperation	Combats	Students in teams devise their own Kahoots! for revision purposes at different points in the course. Points or badges are awarded.	Kahoot! https://kahoot.com/

Mechanics	Components	Task	ICT tools/resources
Cooperation	Teams	Organize an Educative Escape Room or <i>breakoutEdu</i> (https://www.breakoutedu.com) so Students in groups have to cooperate to succeed in getting out.	ICT for designing puzzles, QR codes or any mlearning app to be used to solve them. If teachers opt for breakout.edu, consult: https://www.breakoutedu.com/ .
Rewards	Badges	To organize a badge system to reward attitudes or skills in performing some tasks.	Teachers can use <i>Makebadges</i> to design badges to be included in their VLEs https://www.makebadg.es/ To get track of badges: Flippity: http://www.flippity.net/ or ClassDojo: https://www.classdojo.com/ .
Feedback	Points and Leaderboards	Establish a system of scoring to measure the development and achievement of students' tasks.	To manage points and leaderboards, Teachers can use <i>Pointagram</i> : https://www.pointagram.com/ or <i>Flippity</i> : http://www.flippity.net/ .

2.6. Some Gamification Practices

Using gamification as a teaching method requires teachers to concentrate on the goals they want to achieve. The goal might be achieving learning outcomes or solving a challenge or a problem. Keeping the final goal in mind while planning the process of gamification is essential for following the right track and reaching the set goal effectively and efficiently.

A good hint for a teacher is to think about the gamification teaching intervention as a “student journey” to reach the learning goal which could be set by the students, the teacher or in collaboration with both. Also, it is a good practice for teachers to put themselves in their students’ shoes and to imagine themselves as students in class. This is an excellent strategy to use on each step of the gamification planning.

The first step for designing gamification is to analyse the target group deeply. Exploring audience characteristics will help teachers to define the gap between existing knowledge and skills and learning outcomes. At this stage, it is very important to take into consideration the course year of the students, and devise the gamification intervention accordingly to the students’ skills. Target group analysis also implies detecting what type of players our students are. Consequently, teachers can understand their possible students’ reaction to the gamification intervention according to players’ characteristics: player, achiever, free spirit, disruptor, philanthropist, socializer (Marczewski, 2016). Teachers can then plan the challenge level accordingly after this analysis. Doing this analysis thoroughly is a necessary step so as to identify the components, mechanics and dynamics for a successful gamification.

One of the key points teachers should consider in the planning phase is the timing of the whole gamification process and the connection of each step to provide a smooth flow of all the gamification process. A storyline or narrative can help teachers to design a more coherent gamification to glue the different steps together.

Another piece of advice for teachers who want to try gamification is to design a dynamic intervention in which students feel constantly active, asking them to overcome different challenges, getting appraisal and rewards, making them more engaged and curious to continue. It is also very important to show students’ progression so they are aware of where they are in the gamification process.

Teachers should monitor the ongoing process to detect weak points and reformulate the planning accordingly. After implementation, teachers should also measure whether the set of learning goals was achieved. They should incorporate three levels of evaluation: students’ perception, learning and performance measures.

2.7 Recommendations to Gamify Teaching

Gamification in education requires developing an effective strategy, requiring in-depth analysis of the educational context: determining the characteristics of learners and setting the learning objectives. For that purpose, firstly teachers should consider the following five tips (Figure 11) for developing a successful gamification design.



Figure 11. Design Tips for Gamification

Source: <https://elearninginfographics.com/gamification-design-tips-infographic/>

In more detail, basics steps have been formulated to help teachers create a successful gamification strategy.

Step 1: Assess and analyse your learner

- a) Identify your students' needs and difficulties:
 - Gamify your classroom to keep students engaged.
 - Pinpointing student difficulties and they will help you determine the best gamification strategies for your classroom.
 - Most importantly, identifying students' needs will put them at the forefront of your gamified learning strategy.
- b) Survey your class:
 - Just as marketers survey their target markets before gamifying their products, you should survey your class to determine the best ways to engage them.
 - The purpose is to understand what type of games your students play, and guide your subsequent research into gaming. This, in turn, will help you introduce the gamification elements that are aligned with their interests. Keeping students actively involved in the gamification process will allow for greater engagement and retention.
 - By using aspects from their favourite games, you should see a favourable response to your gamification.

Step 2: Define learning goals

- a) Set learning and behaviour goals:
 - To gamify your teaching, deploy clearly-defined objectives in the form of learning and behaviour goals that address the learning and competences you want your students to develop.
 - Behaviour goals involve helping students concentrate and work efficiently. For example, you may set a learning goal to have your students master a specific skill by a certain deadline. A behaviour goal may focus on empowering students to tune out classroom distractions.

- These goals will help guide the gamified learning experience – a key to making sure you gamify your teaching effectively.

b) Structure open projects to help meet these goals

- Allow learners to choose their project such as a:
 - Digital presentation
 - Creative piece (infographics, webpages, ...)
 - Paper or essay
 - Unique product that is appropriate for a given topic.
- Presenting choices encourages learners to test themselves in new ways and demonstrate their strong suits. In doing so, you will learn more about their distinct learning styles, which can help you structure future lessons.

Step 3: Structure the gamified learning experience

- Adjust your scoring system. Many students see their marks as the most nerve-wracking part.
- The gamification design should involve highlighting progress instead of mistakes.
- With regards to tests and assignments, you can give scores both traditionally and in the form of experience points.
- You can also award extra points for completing extra-curricular assignments, participating in class or anything else that demonstrates an effort to learn.
- You should show these points that they have been awarded throughout the year, giving them a clear reference landmark to see how much they have learned and accomplished.

Step 4: Identify resources

- a) Create a manual and organize teams:
- Instruction manuals — either digital or physical — come with almost

every video game. They explain how to play and progress, sometimes including tips and secrets. Therefore, providing an instruction manual is a way of helping understand all the gamifying process.

- This manual should contain information such as:
 - The stages and challenges they have to go through to achieve the final goal.
 - The scoring system, including the ways students can gain XP.
 - How students can obtain rewards, and what kinds of rewards are available.
 - Tips on what they must do to succeed in the gamified learning environment.

b) Organize studying and learning teams:

- Dividing students into studying or learning teams not only opens the door to group work and collaboration, but helps replicate a core element of almost any game.
- Instant feedback should be provided. When handling a full class, you cannot provide observations at the same rate but peer feedback can help in this process.
- Devote a brief lesson to teach students about sharing constructive criticism, encouraging them to actively provide comments while working in teams.
- You can provide support and insight as needed to strengthen this fast feedback loop.

Step 5: Apply gamification elements

- a) Make progress visible:
- Displaying students' progress and how much they have achieved from the start is a key element in any gamification design.
 - You can create and share a bar chart that contains each student's progress

towards mastering a skill. Whenever a student achieves a certain score on a quiz or completes homework and assignments, you can fill in their appropriate skill-mastery bar with the amount of points or badges they have earned.

- As most teachers keep these charts posted for students to see, consider allowing them to submit nicknames that suit the gamification narrative. In this way, each student will know in which position is in the leaderboards without feeling anxious or embarrassed.

b) Offer rewards

- To combine gamification and learning in a way that truly engages students, you should strongly consider giving rewards.
- Research shows that reward systems in gamified teaching encourage students to acknowledge their accomplishments and continue to progress. This is a mechanic used in most modern video games — players receive trophies for completing certain tasks.
- The more difficult the task and lofty the achievement, the larger the reward. You can hand out your rewards-of-choice accordingly, giving badges for completing an assignment and to have excellent attendance over the course of a unit.
- This hallmark element of contemporary gaming plays a key role in creating an engaging experience, continuously incentivizing and motivating students.

Last but not least, Figure 12 illustrates four design mistakes to be avoided when implementing gamification in teaching.



Figure 12. Gamification design mistakes to avoid

Source: <https://elearninginfographics.com/4-gamification-design-mistakes-avoid-infographic/>

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This Guidebook is developed within the frame of Erasmus+ PRINTeL project aimed at promoting innovative teaching and learning pedagogies in Eastern Partnership Countries.

Innovative teaching is a proactive approach to integrate new teaching and learning (T&L) strategies and methods into a classroom. New technology plays a key role in innovative T&L to offer students a more interactive and attractive experience. Innovative T&L also involves creativity on the part of the teacher who reorganizes the educational process by transforming from “being a lecturer” to “being a designer” of learning methods and environments. Here the teacher serves as a guide or consultant while students participate. A primary motive of innovative T&L is to encourage the students’ broad engagement in the learning process. When students interact with teachers and peers, they gain more practical experience and retain more information from a class.

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