

Sparks



GAMIFICATION AND GAME-BASED LEARNING

**BEST PRACTICES AND REQUIREMENTS
FOR DIGITAL ENVIRONMENTS**

Spain

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Strategic Partnership for Digital Education Readiness

Co-funded by the Erasmus+ Programme of the EU

**Game-based Learning: best practices and
requirements for digital environments**

NATIONAL REPORT – SPAIN

Femxa Formación S.L.U.



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Introduction

The Sparks project

The COVID-19 pandemic had a significant impact on the delivery of Education and Training all over the world: almost 1.6 billion learners from pre-primary to tertiary education, including VET, were affected (UNESCO, “COVID-19 Impact on Education”, 2020), while education and training providers have been forced to adapt to digital tools to maintain services to learners. The pandemic caused to students a great loss due to the difficulty in re-engaging with education activities; their demotivation as they fall further behind; the curbing of their educational aspirations due to the uncertainty of the learning environment (OECD, “Education and COVID-19: Focusing on the long-term impact of school closures”, 2020).

In this context, Sparks, a Partnership for Digital Education Readiness project, co-founded by the Erasmus Plus Programme of the European Union and implemented by six organizations from Greece, Italy, Spain, Poland, Portugal and Romania, aims to develop a new Conceptual Framework for Game-Based e-Learning Programs and E-Learning platform to let VET providers deliver innovative online learning experiences with the use of gamification, and boost their learners’ motivation and engagement in learning.

The transnational research of Best Practices and requirements in digital environments

The transnational research gathered best practices and requirements for Digital Environments of game-based learning and gamification across the six European countries: Spain, Greece, Poland, Italy, Romania, and Portugal.

The research led by Femxa S.L.U has followed three phases. Firstly, the identification and collection of 48 best practices in game-based learning and gamification experiences, following a unified common criteria tailor-designed for the Sparks Project. Secondly, the development of an online survey as a quantitative research tool to validate the key game mechanics, dynamics, components, and game features found as success factors of the best practices collected. The survey was disseminated in the six countries to collect the input of 304 experts in education and training, validating with incredibly successful results the best practices. None of the key elements included in the survey received an average below an 83% of high ratings (4 or 5).

Thistly, ten Focus Groups aim at gathering the requirements and needs in digital environments of the VET providers and learners. The activities were celebrated with 144 educators and learners from different backgrounds of the VET community from the six EU countries, which hosted 24 participants each. Lastly, the best practices and validated game features, as well as the results of the discussions developed during the Focus Groups, were comparatively analysed by the expert researchers of the six organizations, concluding in this transitional final report



The results will be used by the translational research team to identify the process and system features and the game elements to transfer into a Conceptual Framework for Game-based e-Learning Programs.

Best Practices

Each partner organisation analysed the best practices in game-based learning and gamification for education and training in their country.

The definitions adopted by the research team for "game-based learning" and "gamification" are the following:

- "**Game-Based Learning** refers to the borrowing of certain gaming principles and applying them to real-life settings to engage users" (Trybus, 2015);
- "**Gamification** is the use of game elements and game design techniques in non-game contexts" (Werbach, 2012).

The following pages report the results of the analysis carried out by FEMXA in Spain..



1. Virtual Escape Room: La venganza del Hacker

Title	“VIRTUAL ESCAPE ROOM: La venganza del Hacker” Promoting social interaction between students of distance learning
Date	01-2021 to 03-2021
Authors	UDIMA-CEF
Geographical scope	Spain (Madrid, Barcelona, and Valencia) and Dominican Republic (Santo Domingo), the practice was developed between students of the CEF-UDIMA’s master’s degree.

Partners/Stakeholders

Who were the main partners (technical and financial)?

UDIMA-Distance learning University of Madrid- Innovation Department (developers)
Center of Financial Studies CEF Madrid

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

This experience was available for students of the master’s degree offered by group CEF in collaboration with UDIMA. 128 students of distance learning with ages ranging from 22 to 57 years old (average of 31). The inscription to the experience was free and voluntary.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

The context and difficulties that this practice is addressing is the challenge presented in distance e-learning regarding the lack of social interaction between students that are not able to meet face-to-face. This becomes an even bigger reality after covid and the importance of finding solutions for the inconveniences of distance learning.

Objectives

What is the purpose or objective of the practice? Brief description.

- Promote social interaction between students of diverse master’s degrees offered by UDIMA-CEF.
- Improve the motivation of students and their feeling of belonging to the CEF-UDIMA group.
- Developing an innovative methodology to encourage students to improve different abilities (motivation, implication, attention, cooperation, and collaboration)

What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?



The digital tools used to develop this practice were: Genially (hosting the scape room), Canva (edition and layout of images), Zoom (online communication during the game and breakout rooms for participants), YouTube (dissemination of the presentation video of the game), DaVinci Resolve 16 (video editing).

They are all the necessary instruments to elaborate an attractive game-based learning experience that complies with the objectives of improving engagement, the interaction between students and creating an innovative and attractive experience.

Process

Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

The narrative is that a hacker has attacked the website of the Educational Group CEF-UDIMA, to delete its data. The mission is to investigate who the cyber attacker is, pursue him and finally restore the system. Following this common thread, the participants resolve mysteries, riddles, and puzzles to move forward in the game. The theatre of operations where students must show what they are made of consists of the UDIMA building, specifically the cafeteria, the library, administration, innovation, and IT areas. They approach these virtual spaces through Zoom.

One of the objectives is to promote teamwork, that is why the modality of the game is based on 4-5 participants groups that must pick a leader at the beginning. The leader is the eyes of the team, and the rest of the players will have to rely on him. The time limit to finish the practice is 60 minutes. At the end of the experience, the times of each team will be shown following a ranking.

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

Dynamics: it is relevant the **emotions:** competitiveness (combination of competition with oneself and with other groups of participants), teamwork and social interaction, and positive reactions to exploring (the set is their studying centre, they also get the chance to advance in the game thanks to their teamwork and problem-solving skills); instant gratification when succeeding on a riddle; **narrative** (very important in the game, it is tailor to the participants and its high-quality video, image, etc.); **relationships** (the team's relationship are key to succeed in the practice). **Mechanics:** collaboration, competition, challenges, rewards (final ranking). **Components:** unlocking of contents, teams, time limits and collections of points (no information about the inclusion of avatars, tutorials, or gifts in the game).

If necessary, indicate the structure of the gamification experience following this structure.

- **Modelling of Knowledge:** As the purpose of the game is to increase students' teamwork in a broad way and interaction with each other, there is no specific educational content integrated into the game outside of improving these general competencies. Nevertheless, it's easy to include riddles, puzzles and other types of challenges related to a more specific educational content in this practice.

- **Game process.** (1) The objective, already described, is well defined, easily measurable (succeeding in the challenges or not), relevant and in agreement with the narrative, and balanced (not too difficult not too easy) when talking about the difficulty level and time given. (2) The challenge proposed, resolving a scape room through teamwork is coherent with the learning objectives (motivation, implication, attention, cooperation, and



collaboration) and it is original (the story is tailored to the participants' situation) (3) Rewards/reward systems: finalizing on time the escape room is directly related to the learning object, teamwork. Also, the ranking system is not individual (4) The opinion of participants shows the rules of the game are clear and understandable to the user (5) The competition is described as motivating by the participants (6) There are no levels of difficulty.

- *Design: Criteria to be considered: what data does the system collect?* Information is not available.

- *Development of the game considering the interface: what are the usability conditions?* Basic. Computer, access to the internet, browser, email address.

- *Indicate whether a pilot test has been carried out to verify that it meets all the requirements initially proposed.* Yes

- *Indicate whether the game has been validated: have all the problems and deficiencies encountered during the fine-tuning been debugged?* Yes

- *Indicate whether the same practice has been successfully replicated.* No

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The practice was described as successful in achieving the objectives set by its creators. This is also supported by participants ratings of the game:

96% of participants said the experience was good or very good. When talking about fun (96,6%) and immersion in the game (88.5%), concepts related to its playability, the rating was also high.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved concerning the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

The information available related to the game impact refers to the satisfaction level of its participants, being all positive.

The level of satisfaction was described as satisfactory or very satisfactory by 100% of the participants. Some comments: "very innovative", "very good work and the proposal was very fun", "these games are necessary for the group interaction to be possible".

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

The experience was successful thanks to the tight connection between the overall game structure and narrative with the educational objectives.

The difficulty level was described by the participants as intermediate mostly, that was the goal of the developers. Its success needs to match the difficulty level of the riddles with the target group and the objective of the practice.



The narrative is also an important success factor, it is necessary for the immersion of participants in the practice.

The digital tools used also play an important part, they allow us to have the best experience possible.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

There was no information available about difficulties encountered. About its replication, some difficulties encountered could be not being able to provide such a tailored experience to every participant (concerning game narrative and graphics).

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

<https://www.cef.es/es/cef-sesiones-escape-room-estudiantes-venganza-hacker.html>

<https://www.youtube.com/watch?v=cgDLI24Mg7I>

Presentation video of the practice:

<https://www.youtube.com/watch?v=1Rf6oImwfv4&feature=youtu.be>

2. Development of strategies for Job selection processes

Title	“El Proceso de Selección” Development of strategies for Job selection processes
Date	01/2021-03/2021
Authors	UDIMA, CEF, Jose Manuel Chamorro
Geographical scope	Spain (Madrid, Barcelona, and Valencia) and Dominican Republic (Santo Domingo), the practice was developed between students of the CEF-UDIMA’s master’s degree.

Partners/Stakeholders

Who were the main partners (technical and financial)?
UDIMA-Distance learning University of Madrid- Innovation Department (developers)
Center of Financial Studies CEF Madrid
Jose Manuel Chamorro – Selection processes expert

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)
This experience was available for students of the bachelor’s degree and master’s degree offered by group CEF in collaboration with UDIMA. 181 students with an average of 31 years old participated. The inscription to the experience was free and voluntary and it was developed from the classrooms of a job centre “Bolsa de Empleo”.

Context

What were the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?
Having the tools and abilities to enter the labour market is a constant need of education providers all over the world. Moreover, the work situation in Spain is quite difficult for youngsters as they face the highest numbers of unemployment. Considering this context, the value of this practice is exponential. Educators need to consider the importance of teaching abilities tailored to the workplace and the newest selection processes.

Objectives

What is the purpose or objective of the practice? Brief description.

- Recreating diverse evaluation tests to test students’ competencies, to orient the student about the importance of developing certain abilities in accordance with their specific profile,
- Creating an environment that allows students to get familiar with selection processes tests, and therefore get through the different processes confidently.



What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?

The tool for the creation of digital content for the activities was H5P. on

Process

Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

This practice was created conceiving that the participants come from different parts of Spain and the world. So, these tests could not be specific, due to the wide variety of profiles. The game is based on learning in real and general scenarios, which any of the participants need to incorporate into the workplace.

Thus, a simulation of different tests used in personnel selection processes is created so that students, through self-evaluation of their performance, could orient themselves in the competencies needed to overcome these processes. The skills worked with this practice are discrimination between different selection techniques, knowing in depth their characteristics, understanding what the challenges and objectives of the interview are, work the weaknesses and strengths of their profile to obtain a positive judgment of their candidacy, knowing how to handle emotions and states of anxiety that may occur in this type of process.

The practice was designed and implemented following three phases that make up a circular process of constant improvement of the practice: 1. Design of three scenarios in which the activity is developed and which correspond to the three phases of the selection process: group dynamics, role playing and competency interview. The scripts of the different scenes that would be part of the activity were written in video format, as well as the questions to be answered by the student to achieve the proposed learning objectives. 2. The graphic scripts that serve as guidelines for the recording of videos associated with the activity were elaborated, these videos were produced and the activity itself was implemented in the virtual classroom through the H5P tool. 3. Carrying out the activities with the students.

At the end of the game participants were asked about different aspects of the game dynamics, to verify if the objectives of the practice were met and to get feedback of the different phases and thus improve and refine the game.

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice. **Dynamics:** The simulation scenarios aim at the improvement of **relationships**, in these cases they give the tools for better performance in different selection processes and interaction with interviewers and other candidates, but also allow to have this interaction through the game experience and learn through practice. **Mechanics:** **retro alimentation** and **collaboration** are present in the practice's development, nevertheless the inclusion of more interesting game mechanics could be possible if some game elements were transfer. **Components:** components, such collections, unlocking of contents, social graphics or levels are not recorded, though some could be added to make the experience more playable. It does count with **tutorials**.

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.



The results were very positive showing that the experience was successful in using game elements to achieve learning objectives. It was recorded that 74,3% of users agreed that their knowledge about how the selection processes work improved. They also recorded that 75,7% of user could reflect on their own strengths and weaknesses during selection processes thanks to the practice. Similar numbers were recorded when users were asked about their ability to discover the aspects where they should improve and when asked about their gain in confidence when facing these selection processes in the future. The participants also stated (90%), that the three scenarios were perfectly presented.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

As the results recorded from the participant's perspective were very positive, we can determine that the impact of the activity was overall very good and the situation of the users improved, given all the aspects where they stated that they had experienced an improvement thanks to the practice.

Testimonies: "innovative in the way of focusing the 3 tests and very interesting questions made by the general manager" "I liked how you can explore through the simulation the selection process and learn tips and new ideas to develop an effective job interview when the opportunity comes, also distance learning needs this type of initiatives to transfer knowledge to the student in a realistic and effective way".

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

We can highlight the importance of creating the different scenarios following a pedagogical methodology to adjust the situation to reality and to give the tools for achieving the objectives set. In addition, the possibility of improvement following the users' feedback, is key to creating a game that is successful in preparing participants to enter the workplace.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

Some problems faced can be related to the immersion of the users in the game, the solution could be incorporating more game elements to achieve a more satisfactory and fun experience for the users.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).



3. Save the world

Title	Save the world
Date	2017
Authors	Miguel Flexas Sampedro and Juan Carlos Thomas Sedano, educators from Collegi El Temple.
Geographical scope	The practice was developed by teachers at a Spanish school in Palma de Mallorca, and the students at this school were the participants.

Partners/Stakeholders

Who were the main partners (technical and financial)?

Miguel Flexas Sampedro and Juan Carlos Thomas Sedano, educators from Collegi El Temple

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

The practice was pilot tested with a group of students from formative education. And now the practice is available for teachers to implement with their students under a Creative Common licence.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

The practice was created to teach different essential interdisciplinary concepts in an innovative and more attractive way for students, and not only with the aim of learning facts but also learning to take important decisions and to deal with ethical challenges.

Objectives

What is the purpose or objective of the practice? Brief description.

The game is placed in the context of the Second World War, where students will learn Social Science, Physics, Chemistry, Biology, Spanish and English. But the objectives go beyond learning about the events of this war or the knowledge learned. The aim is to make students aware of the events that took place and to show them the different points of view of the different sides in the war, while they delve into the evolution of the laws of physics. All this using language (both oral and written through letters expressing feelings) as an essential element of human relations and the role it plays in an episode of these characteristics.

What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?



The game uses a drive to host a lead board and offers documents for teachers that want to implement the game to be able to understand its mechanics. A website is available with the game chapters, rankings, intro and music, rules, etc. The platform used to create the website was wix.com. You would need a connection to the internet, a computer and email to develop the game.

Process

Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

The game is divided into 12 episodes, from chapter 1 Stephen Hawking to chapter 12 End of the war. Each episode has a different structured, different evaluation strategy and users will play individually, or in teams. The story narrative is the following: Life on Earth has come to an end. We are in the year 2048 and after the launching of nuclear bombs by the great potential Worlds there is no possibility of surviving on a planet totally depleted of natural resources, with a highly polluted and unbreathable air. There is little hope for the few survivors left on the planet. The mission is to save the planet. To be able to do so the user must finish the game and get to the last episode successfully passing the 12 chapters.

For example, the first chapter challenge is to write an argumentative text where they explain to Stephen Hawkins the reasons why they are there, telling facts that demonstrate that they are time travellers from the future, and end with a request. They have a hint: the invitation is dated 28.06.2009 at 12h.and 60 minutes to finish the challenge.

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

The game offers a ranking of the players, as well as badges and insignias. The attitude during the game will also get you insignias, some will be given by the teachers and others from the participants, meaning 100 points for the ranking. The available insignias are: Observer Accompaniment Badge: Who constantly offers to help his companions in their daily tasks.; Observer Quality Badge: Who delivers punctually, orderly and clearly all tasks according to the processing standards.; Unnoticed Badge Observer: Who knows how to maintain a correct attitude in the classroom, at any time and under any circumstances.; Conscientious Observer badge: Who is ready and in place and with the material ready when the teacher enters the classroom.; Excellent Observer Badge: The observer who obtains the highest daily score.; Fast Badge Observer: The observer who performs well and in the shortest time all the tasks of the day.

Apart from the narrative, the insignias of the game also show different historic characters related to the context of the game.

If necessary, indicate the structure of the gamification experience following this structure.

- *Modelling of Knowledge:* It is implemented very well in the game, the challenges and the information given during the game to the users keep on increasing the knowledge of players.

- *Game process. Indicate:* (1) The objective of the game is well defined, it follows the SMART rule (2) Proposition of the challenge, is it coherent with the learning objective, is it original, is it attractive? Yes, it is very innovative (3) Rewards/reward systems: is the reward management model defined, is it directly related to the learning object? Yes, the rewards are adapted to the game, and they provide an evaluation strategy for each chapter and its challenges. There is also an evaluation structure for each chapter that will determine several points (4) Are the rules of the game clear and understandable to the user? Yes (5)



Is the competition motivating? Yes (6) Existence of different levels of difficulty. There are no levels, but there are different chapters where you learn different content.

- *Design*: by studying the possible calculation algorithms, system architecture and data model. Criteria to be considered: what data does the system collect? No information available

- *Development of the game considering the interface*: what are the usability conditions? Email, computer, internet

- *Indicate whether a pilot test has been carried out to verify that it meets all the requirements initially proposed.* Yes, with the students of 4 ESO from Collegi El Temple in Spain.

- *Indicate whether the game has been validated: have all the problems and deficiencies encountered during the fine-tuning been debugged?* No information available

- *Indicate whether the same practice has been successfully replicated.* No

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The game was very successful between the participants, and it was awarded in the SIMO EDUCATION awards of 2017, as one of the 10 most innovative ITC experiences in education of 2017.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

The only information available is that students learned a lot and enjoyed the experience at the same time, being a positive impact.

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

Implementing a clear structure and objectives, that are defined from the beginning. The combination of points and insignias that allow us to consider different learning objectives, not just knowledge but also teamwork and ethical learning.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

Some of the limitations observed are that the game is based on long tasks, that could make the participant get bored and abandon the game.

Related resources/Links



4. Fortnite EF

Title	Fortnite EF - Using Fortnite to work Physical Education Competencies
Date	2018-2019
Authors	Victor Arufe, teacher and researcher of the University of Education of A Coruña
Geographical scope	Coruña, Spain.

Partners/Stakeholders

Who were the main partners (technical and financial)?

Victor Arufe Giráldez, teacher and researcher of the University of Education of A Coruña

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

The pilot testing was developed with 47 students at the Primary Education university degree of A Coruña, in the subject of Physical Education. It is also recorded that at least 25 primary school teachers implemented the practice

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

The project was developed by Victor Arufe, educator of the Education Faculty of A Coruña University with the aim of approaching learning in a more innovative and attractive way for students.

Objectives

What is the purpose or objective of the practice? Brief description. What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?

Adapting some of the objectives and strategies of the Fortnite video game to the contents of Physical Education. With the aim of teaching students' values such as generosity, fair play, respect, or creativity and, at the same time, practice healthy habits and communication skills.

The game is played offline, but some material to develop the game in the classroom can be downloaded <https://www.victorarufe.com/fortnite/>. Also, the structure and rules are available online for anyone to implement the practice.

Process



Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

Following the classical structure of a Fortnite game from www.epicgames.com the curricula of the EP subject was introduced. The elements of the game as described by the methodological approach are Objectives achieved from the educational curricula, modalities of the game, roles of the players, consequences of the storm, Damaging and protective objects, Protocol for reviving injured teammates, Level sheet.

The contents of the Fortnite game in Fortnite EF are divided into 4 major groups: Motor skills, physical abilities, psychomotor components or perceptual-motor factors, and psychosocial values and variables.

There are two different roles of players: the active player that plays the game actively and can be eliminated or win; and the role of the passive player that acts as a supervisor or judge and oversees the ethical aspect and makes sure the other players follow the rules of the game.

There are three game modalities, solo game, two teams or teams of four, with possibility of adapting other modalities. The players have a distinction to identify with the team they belong to.

Each participant is given an empty worksheet with the 10 levels he/she can achieve. As the child wins games, he/she will get a sticker as a level pass. The stickers will be based on material and resources related to healthy lifestyles.

Finally, the winner of each game will have to design a celebration dance.

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

Mechanics: the game includes collaboration between participants, competition (users will try to not be injured and eliminated) the player or team surviving will win the round; challenges (each level constitutes a challenge, the dynamics are the same), rewards (stickers symbolising healthy habits work as insignias); luck (getting injured depends on a lot in luck). Components: collections, fighting, teams, insignias, time limits (the storm will make the playing area smaller every time). Regarding the avatars each player has a distinctive character, but there are no avatars as the game is played offline.

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The results were very positive, both in the pilot testing and in several experiences where the game was adapted (25 at least). A survey was conducted to the pilot test participants, the words used for describing the game more often were motivation, dynamic, fun.

It was also recorded that, through experiences that adapt a game considered violent, when it is used in a control environment and with didactical objectives it can prevent violent behaviours and educate students in ethical values.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the



objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes?

The impact was very positive, in the survey conducted the satisfaction was of an average of 9 from a scale of 10.

If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen: "A broadening of knowledge in terms of innovation and creativity in the subject of Physical Education. Useful learning to be able to make the most of the different educational utilities that present the trends that predominate in our society from time to time.

"I thought it was a very good idea since we bring the child's tastes closer to the classroom in addition to adapting it in an educational way"

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

Some of the aspects highlight from the experience by the articles published were:

- In the team modality, the importance of cooperative work among members and the need to develop strategies that favour group performance.
- As for the final dance performed by the winning player, it is a good way to work on body expression, thus overcoming embarrassment and inhibition of children and adolescents, since they are dances that in general are quickly identified by all the players.
- In relation to the results of the survey, it is worth mentioning that 100% of the respondents stated that Fortnite EF proved to be a rewarding experience for them, which is helpful to work on different Didactic Experiences.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

There is no recording of difficulties encountered. The main possible limitation is the adaptation of the game to an e-learning environment.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

Arufe Giráldez, Víctor (2019). Fortnite EF es un nuevo juego deportivo para el aula de Educación Física. Propuesta de innovación y gamificación basada en el videojuego Fortnite. Sportis Sci J, 5 (2), 323-350. DOI: <https://doi.org/10.17979/sportis.2019.5.2.5257>
<https://www.redem.org/10-buenas-practicas-para-innovar-en-el-aula/>



5. Capture the flag

Title	“Capture the Flag” Gamification of computer security practices
Date	2016–2017
Authors	Marta Beltrán Pardo
Geographical scope	Madrid, Spain.

Partners/Stakeholders

Who were the main partners (technical and financial)?

Marta Beltrán, Electronic engineer, physical science degree and PhD in computer science. Teacher at University of Rey Juan Carlos of Madrid.

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

Students in the third year of the Degree of Computer science and software engineer in the University Rey Juan Carlos of Madrid, in the subject of computer security.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

The context, as described by its developer is: “Most teachers and professionals dedicated to awareness, training, and teaching in cybersecurity agree that the practical part of learning, the hands-on approach, is essential for pupils or students to acquire the desired skills. In the 2016/2017 school year we decided to try to enjoy and be able to perform virtualized hands-on exercises in some way so as not to rely on an expensive lab and not to force students to perform the practices in a face-to-face manner, but without losing the gamification component and keeping the Capture the Flag approach.”

Objectives

What is the purpose or objective of the practice? Brief description.

- For students to practice what they have learned in the theory classroom, improving their ability to make decisions in the most realistic environments possible and to solve complex problems in teams.
- Adding motivation to the exercises performed in the laboratory by setting up competitions of the Capture the Flag type.

What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?

Facebook’s Capture The Flag (available on Github as it is an open-source project). Other tools related to computer security are described hereafter. Participants can access it from any web server.

Process



Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

The game itself consists of overcoming challenges and conquering countries through those victories. Some tasks are in teams, others are individual. The challenges implemented were search for open ports and use of the Nmap tool; Hacking with search engines (Google and Shodan); Script and source code analysis, reverse engineering; Password cracking (brute force, dictionary attacks); Steganography; Exploitation of insecure remote access; Exploitation of vulnerabilities in certificate systems.

The users get points for succeeding in a challenge, which will be rewarded as described below. They receive the rules and instructions for each challenge through messages and a bulletin board.

Here the process followed for the creation of the gamify experience by its developers is explained:

1. A student was chosen to collaborate with the teacher who developed the project in tasks such as analysis, development, etc. He was Sergio González (from the Software Engineering Degree, who had already studied the subject in the previous course following the traditional structure).
2. Analysis of tools and platforms to meet the objectives set. A comparison is made based on the following set of criteria:
 - 2.1. Scalability. It is intended that the platform can be used initially in subjects with lab groups of 30/50 students, but in the future in degrees or MOOCs with groups of hundreds or even thousands of students.
 - 2.2. Flexibility to generate new scenarios with different levels of difficulty or complexity, or to modify those already generated, re-using efforts. The idea is to generate a catalogue of practical exercises.
 - 2.3. Flexibility to perform different types of exercises (defensive, offensive, mixed; individual or team exercises), to propose different game mechanics and dynamics, to reward participants in different ways.
 - 2.4. Reproducibility, guarantee fairness in games and competitions and obtain reliable results so that they can be considered evaluating students.
 - 2.5. Portability and the use of standard technologies, so that teachers and students are not required to install operating systems and environments that they do not already use on a regular basis.
 - 2.6. Usability, for both teachers and students, learning how to use the platform cannot be a barrier.
 - 2.7. Security and privacy, the platform itself must not introduce vulnerabilities into the university's infrastructure or cause problems with the data protection of our students.
 - 2.8. Free and open source. Given that the project must be carried out at zero cost, the analysis should focus on freely distributed
3. Selection of a tool or platform, adaptation to the proposed objectives if necessary and generation of user manuals. The platform selected was Facebook's Capture the Flag (available on Github as it is an open-source project). Operative system: Ubuntu 14.04, VistualBox and Vagrant.
4. Generation of scenarios suitable for the competencies that the students of the subject
5. Design of the most appropriate dynamics and game mechanics to add the desired gamification component to the course. Mechanics implemented:



challenges, rewards after overcoming challenges (point system and ranking system). The other rewards were the personal progress and the competition itself, individually and collaborative. Dynamics: emotions (such as competitiveness, self-improvement, critical thinking, fun, etc), progress, relationships, and restriction (rules and instructions). Components: time limits, collection of points, unlocking of levels, and difficulty levels (gradually), teams, missions.

6. Installation of the tool or platform in its own resources to perform the first concept tests and pilot exercises.
7. Realization of the first experiences, validation, and evaluation of the new practices.

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The results recorded were positive, most of them valued the experience positively and stated that they have learned the same or more following the gamify approach in relation to the traditional one.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

As said before the results were positive, out of the 20 self-evaluations of participants: 19 students respond that they have learned the same or more; 16 students say that they perceive an improvement in their willingness to do the practical activities, because they had more fun; 14 students believe this type of exercises forces them to be more creative, to look for efficient solutions, to be more autonomous; 12 comment that it encourages them to work more as a team; (negative) 5 questioned the method saying it doesn't look for the best way to resolve the problem but the fastest.

The teachers also appreciate the approach and see that students are more committed and enjoy more learning.

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

- The platform choosing is crucial, in this case it allows to develop exercises in work, cybersecurity. It is important for it to be transferable and scalable (larger and smaller groups).
- Free and open access platform, as well as easily manageable, mature and in constant improvement (common platform).
- The solution to the problems should be specific and the evaluation criteria as well.



- A success factor is to consider an order when participants play, the gradually increasing in difficulty is essential to keep students engaged, not feel defeated or bored because the challenges are too difficult or easy in that moment of the practice.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

There were no relevant limitations found. Some of the limitations we could encounter could be related to transferability of the practice to a different environment.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

<https://online.urjc.es/es/para-docentes-investigadores/banco-de-buenas-practicas/item/483-gamificacion-de-las-practicas-de-seguridad-informatica-con-una-herramienta-de-tipo-capture-the-flag>



Active Methodologies.

Geographical scope

Mostly Spain (261 centres where the experience was developed, where in Spanish centres) and 10 centres where from different countries of Europe and South America.

Partners/Stakeholders

Who were the main partners (technical and financial)?

Iñaki Fernández Calvo (Promoter and creator of the idea. Natural Sciences test). Real Monasterio de Santa Isabel School (Barcelona).

Quique Castillo Aguilera (Spanish language and literature test). IES Ricardo Bernardo (Solares, Cantabria)

Antonio Bernabéu Pellús (Spanish language and literature test). CEIP Campoazahar (Santomera, Murcia)

Vicente Alemany Aparici (History test). IES Gabriel Miró (Orihuela, Alicante)

Montse Jansá Garrote (Music and Art test). Real Monasterio de Santa Isabel School (Barcelona)

Laura Casquet Herranz (Music and Art test). Real Monasterio de Santa Isabel School (Barcelona)

David Sierra Bolívar (Maths's test). IES Bernardino de Escalante (Laredo, Cantabria)

Isabel García Esteban (Maths's test). San Vicente de Paúl School (Benavente, Zamora)

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

The students were from the 6th grade of primary school and first grade of ESO, secondary education, from a total of 271 centres. A total of 6.484 students participated.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

The context is the idea of doing an escape room online on a fixed day where centres from different parts of the country and the world participate. The idea came from Iñaki Fernández, and later other educators joined the project.

Objectives

What is the purpose or objective of the practice? Brief description.

The aim of the project is for students to solve five challenges related to the subjects of Mathematics, Language, Biology, Social Sciences, Music and Art in the shortest possible time. To carry out the activity, active learning models were integrated, such as gamification, and different skills such as digital skills and teamwork have been enhanced.

The concrete objectives enunciated by the educators that were aimed with the practice are following: integrate active learning models within our teaching experience; Create a competency test, in addition to the digital competence, integrating the rest of the competencies in this test; Encourage the cooperative work of the students and the group of teachers; To promote the use of ICT, since the activity is



totally digital; Encourage a "healthy" competition among the participants, since they did not compete against anyone, but against their own effectiveness and efficiency.; Promote learning through gamification; Critical search for information; Remembering knowledge and understanding and relating concepts; Work on values such as assertiveness and empathy.

What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?

Yes, the technology used was G Suite (forms, spreadsheets, sites y hangouts); Genially, educaplay and chrome extensions; iMovie for video Editing. Dissemination of the project through SSMM and YouTube.

Process

Explain, step by step, the process of the practice to facilitate its understanding and reproduction.

The practice was a one-day escape room with tests in 5 different subjects. The centres that wanted to participate has to form teams of 3, 4 or 5 components, choose a name (among those proposed by the developers) and be ready to access the link created for the escape room where the five tests they had to pass were located, as well as a form where they could write the correct answers and proceed to send them, since the time of sending the answers would mark the completion time of each of the teams. The challenges are available here: <https://sites.google.com/view/2019-escaperoomdigital/p%C3%A1gina-principal>

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

Mechanics: collaboration between teammates, competition with other teams but mostly with one-self to be able to finalize the escape room in the time given; challenges (5 challenges in five different disciplines). Dynamics: relevant emotions such as curiosity for answer of the challenges, competition against the time limits, and teamwork; the main restriction was the time given and the relationships between team members were important to finalize the game. Components: teams, Time limits, levels, tutorial (youtube videos) and introductory video as well.

If necessary, indicate the structure of the gamification experience following this structure.

- *Modelling of Knowledge*: the challenges are a way to learn different competencies such as teamwork, think under pressure, digital skills, deductive skills. Through the game you also learn and test the knowledge in five different formal subjects.

- *Game process*. (1) The objective of the game follows the SMART rule: specific, measurable, achievable, relevant and on time (2) Proposition of the challenge, is coherent with the learning objective and it is attractive for the users (3) Rewards/reward systems: there is a ranking available with the times performed by the different teams (4) The rules are clear and understandable (5) The competition was defined as motivating by the survey answers of participants (6) No levels of difficulty

- *Design*: by studying the possible calculation algorithms, system architecture and data model. Criteria to be considered: what data does the system collect? No information available



- *Development of the game considering the interface: what are the usability conditions?* No information available. But a PC and internet connection are necessary.
- *Indicate whether a pilot test has been carried out to verify that it meets all the requirements initially proposed. The practice was carried out successfully.*
- *Indicate whether the game has been validated: have all the problems and deficiencies encountered during the fine-tuning been debugged?* No information available.
- *Indicate whether the same practice has been successfully replicated.* No

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The practice was perceived in a positive way by its participants and developers: 1. The group of teachers who have participated (from different areas of Spain) have the feeling that we have demonstrated that virtual teacher cooperation is possible in the preparation of pedagogical tasks that have to do with learning processes (active and emergent), as well as achieving the inclusion of a large number of participants in this test, since the magnitude and diffusion achieved in the development of the test has surprised us all. 2. The feedback obtained from students and participating centres has been very positive, as shown by the results of the satisfaction form.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

The experience was positive and showed the possibilities of using technology for international teaching cooperation, as well as the benefits using gamification has in the large number of participants and their satisfaction level after participating. The impact of this practice is huge as so many countries, educators and students have coordinated themselves successfully for this experience.

The practice was awarded in the 2017 educative innovation and innovative teaching experiences Awards (SIMO), with the Best Experience in Active Methodology.

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

It is necessary for the practice to be simple, with defined objectives and using a technology that is inclusive with the different resources of teachers around the world. The dissemination was also a factor for the success of this practice.

Limitations



What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

There is no recording of difficulties encountered.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

<https://premioespiral.org/recurso/escape-room-digital-2019/a9a5fac5-0d3d-848c-485a-fe23ae6fef9d>

<https://www.redem.org/10-buenas-practicas-para-innovar-en-el-aula/>



Geographical scope Catalonia, Spain.

Partners/Stakeholders

Who were the main partners (technical and financial)?
Escola Pia de Catalunya / Moisès Dubé Escala

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)
The students of the Escola Pia, a total of 43 students from fifth grade of primary school have participated.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?
Create an innovative project to achieve significant change in the students by creating learning methodologies that allows for their integral formation, in the levels of knowledge, abilities and attitudes, from an interdisciplinary point of view.

Objectives

What is the purpose or objective of the practice? Brief description.
The project focuses on the integration of the subjects of Social Environment, English, and Plastic Arts of 5th grade under the same gamification: CLAN ADVENTURE. Through a symbolic and aesthetic framework based on Prehistory and the Ancient Age students will become Palaeolithic beings who must survive and advance as a civilization, going through different stages of history until reaching the Ancient Age.
What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?
For the game the necessary digital tools are. Computer, internet connection, game website (<http://moisesdube.wix.com/clanadventure>), google classroom to store the necessary information about tasks and challenges and to improve collaborative work, access to the blocks for students (one per each clan) to follow their progress online, Plickers to create online questionnaires, Class dojo to record students attitudes.

Process

Explain, step by step, the process of the practice to facilitate its understanding and reproduction.
The objective is to advance through the different levels to get to the civilization by doing the tasks and challenges assigned. At the beginning you organize clans that will have to advance thanks to the competition of tasks, some with timing, and many based on the use of technologies (ICT). There is an online component, the website, where you can find the rules, the scoring and evaluation materials, links to the google classroom, the blocks of content of each clan. And a physical component, a board in the classroom where students will record their progress. The blocks of each clan on the website allows students to check their badges/insignias. The badges system is diverse: personal badges are obtained by achieving different work or attitude objectives. 2. Weekly or daily challenges to



work on (individually or in groups): allow to give a value to a specific task and evaluate students. 3. Small work or research projects: they account for a large proportion of the evaluation system. 4. Exams: written or using virtual tools such as Plickers. 5. Self-assessments or headings: they allow the assessment of the attitude of the work individually or in group.

The users will have their own team for some tasks of 4-5 users, as well as an avatar and tracking of their progress. They have a storyline to begin and a map where the Clan Adventure game progresses. In each team the students can have a different role (responsible, secretary, supervisor, animator, and observatory) each in charge of different aspects but working together as a team.

Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

Dynamics: emotions (competition, self-development, curiosity and exploration, collaboration and teamwork, critic thinking), relationships with other users and team members, progress (recorded online and physically in the classroom board), narration (of the roles and environment or universe created for the game), fast retro alimentation. Mechanics: collaboration, competition (with others through the different badges obtained and with oneself by progressing through the levels), challenges, rewards. Components: avatars from class dojo, teams, unlocking of levels, insignias, time limits for some tasks, levels.

If necessary, indicate the structure of the gamification experience following this structure.

- *Modelling of Knowledge*: the developers create a series of abilities to learn during the projects, some in the areas of social sciences and history, arts, and English; and others transversal such as collaboration, critical thinking, creativity, digital skills, emotional intelligence, and so on.

- *Game process. Indicate*: (1) The objective of the game is well defined, and it follows the SMART rule: specific, measurable, achievable, relevant and on time. (2) The proposition of the challenge is coherent with the learning objective and it is original and attractive, following the same structure and narrative throughout the entire practice (3) Rewards/reward systems: it is directly related to the learning objectives and in accordance to the curricula (4) There are a few rules that are very easy to follow (5) The competition is motivating, students can keep a record of their own progress (6) There are levels of difficulty.

- *Design: by studying the possible calculation algorithms, system architecture and data model. Criteria to be considered: what data does the system collect?* No information available

- *Development of the game considering the interface: what are the usability conditions?* No information available

- *Indicate whether a pilot test has been carried out to verify that it meets all the requirements initially proposed. The experiences were successfully developed with two classes of students and the methodology for its development is available online.*

- *Indicate whether the game has been validated: have all the problems and deficiencies encountered during the fine-tuning been debugged?* No information available

- *Indicate whether the same practice has been successfully replicated.* No information available.



Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The results show the practice was successful and the satisfaction levels very high. All the different elements were rated in a survey by the participants with a punctuation from 1 to 5, and between 70% and 90 % of the responses were 4 or 5 points. The rewards, the plickers tool, the questionnaires where some of the elements rated higher.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

The impact was positive, the results have been very good at the student level, their motivation has increased and their return once the experience was over was highly positive. 97 % of participants value the overall practice as very good (4 and 5 punctuations from a 1 to 5 scale)

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

The methodology used is very innovative and well structured, key for success. The practice has a lot of game elements while being easy to understand and with a very good educational content. The rewards systems, the avatars and the variety of digital tools and tasks are some of the keys for the success of the practice.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

There is no recording of difficulties encountered.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

<https://educaciodemacat/qui-es-qui/experiencia/clan-adventure>

https://educaciodemacat/sites/default/files/clan_adventure_projecte.pdf

Link game website: <http://moisesdube.wix.com/clanadventure>



Authors

María Jesús Delgado Rodríguez; Rosa Martínez López; María del Carmen Rodado Ruíz

Geographical scope

Madrid, Spain.

Partners/Stakeholders

Who were the main partners (technical and financial)?

María Jesús Delgado Rodríguez, Doctor in Economics by Universidad Complutense of Madrid

Rosa Martínez López, Doctor in Economics by Universidad Rey Juan Carlos of Madrid

María del Carmen Rodado Ruíz, Doctor in Economics by Universidad Complutense of Madrid

Target groups/Beneficiaries

Who are the beneficiaries (direct or indirect) of the practice? How many are there? (Disaggregated data by gender and age)

The practice was implemented for students of the COMPANY'S TAX SYSTEM subject of the ADE and applied economics bachelor's degrees at the University Rey Juan Carlos. More than a thousand students were enrolled in the subject.

Context

What was the initial situation and its specific context? What are the specific difficulties that the practice seeks to address?

An established by the creator of the practice "The subject "Régimen Fiscal de la Empresa" (COMPANY'S TAX SYSTEM) is a subject closely connected to the working world and in continuous updating, since the objective of the course is for students to acquire skills related to tax management from a business perspective. One of the main problems we face as teachers is the lack of interest of the students to approach the preparation of the topics autonomously and to use the available resources to which they have access. To facilitate students' interest and effort to understand and study this subject, in the 2017-2018 academic year, a teaching practice was implemented to create an active learning environment based on games. With this innovation, it is intended that students explore the learning possibilities that we offer them in the subject in a more autonomous way."

Objectives

What is the purpose or objective of the practice? Brief description.

The general objectives were to use a useful tool with the aim of fostering active learning and formation in a collaborative and autonomous way. The practice itself has the goals of achieving a real methodological change in the classrooms; make students achieve knowledge through practice and interaction, promote self-learning, encourage students to make their own decisions.

What is the technology needed to develop the practice? Does it fit the objective to be achieved with the game?

The structure was blended, in the classroom and in the Virtual Classroom (online). The virtual classroom and a digital tool for questionnaires were the main instruments used.

Process



Explain, step by step, the process of the practice to facilitate its understanding and reproduction. Indicate, as established in the methodology, which dynamics, mechanics and game components are necessary to develop the practice.

1. **Players:** most part of the evaluation is individual, but the game is played in teams. The game starts with the creation of a Fictional Company by each team. The teams allow for students to motivate each other and cooperate in practical tasks. Also, a lot of the activities will suppose their collaborative critical thinking.
2. **Objective:** the teams must pass the fiscal inspections of the company and close the fiscal period with as few mistakes as possible. Therefore, the objective is clear and follows the SMART rule.
3. **Levels:** Level 1: Creation of the company and opening of the fiscal year. Level 2: Corporate Income Tax. Level 3: Personal Income Tax. Level 4: Value Added Tax. Level 5 (final): Closing of the fiscal year.
4. **Rewards:** each level suppose an insignia passing a level means achieving the next one, the insignias are related to different positions in the company structure. Such as level 5 senior manager or level 1 junior apprentice
5. **Challenges/Tasks:** each level is composed by an individual preparation task in the virtual Classroom with a test to evaluate their own progress, and a competition by teams in practical cases that also will be evaluated.
6. **Modelling of knowledge:** each level is associated with several points of the subject curricula, and the Virtual Classroom offers all the materials they need.
7. **Overall:**
Dynamics: emotions (fun, competitiveness, critic thinking, self-improvement, creativeness), narration (the creation of the companies and its development will be the theme of the practice till the end), progress
Mechanics: competition, challenges/tasks, retro alimentation, rewards.
Components: collections of points and insignias, teams, unlocking of levels, time limits/deadlines for some tasks, missions like surpassing the inspections.

- *Design: Criteria to be considered: what data does the system collect?* No information available.

- *Development of the game considering the interface: what are the usability conditions?* Computer and internet access, access to the virtual classroom, email address. For this specific experience the game was only available for the students of the subject in the Economics degree.

- *Indicate whether a pilot test has been carried out to verify that it meets all the requirements initially proposed.* Yes, and it was successful.

- *Indicate whether the game has been validated: have all the problems and deficiencies encountered during the fine-tuning been debugged?* No information available.

- *Indicate whether the same practice has been successfully replicated.* No information available.

Results

What results have been obtained with this practice in the game? This section should reflect the way your practice is perceived, so the results should be clearly presented and supported by data.

The students were more implicated, and they dedicated more time to the subject than before. Some of the results recorded were high level of participation (due to students being able to record their progress from the beginning), more motivation, high quality in



the most part of the activities developed, a positive rating of the game by the participants, and a higher level of commitment with their own learning and that of their peers.

Impact

What has been the impact (positive or negative) of this practice on the beneficiaries (men and women)? Has the situation of the beneficiaries improved with respect to the objectives of this specific gamification experience? In what way has the situation improved, increased motivation in learning, improved knowledge, or attitudes? If possible, collect testimonies from stakeholders through which the benefits of the practice can be seen.

The impact for the participants was very positive and huge as recorded by the results. Also, the satisfaction of students was high overall. They were asked to rate the experience from 1 to 10 and practically all the users rated it very high, and no one rated the game lower than 5. Some other impacts that were appreciated by the teachers were more interest from the students to be protagonist and active participants in the classroom, as well as more self-learning in an autonomous way by the students, giving the chance to use the classroom time to more deep and complex activities.

Success factors

What are the conditions, internal (game elements, systems, and tools) and external (institutional, economic, social, etc.) necessary to make this practice a success?

The ability to record the progress in the subject since its beginnings encouraged students to keep working and studying.

The combination of team tasks and individual learning was key for students to dedicate more time to the subject and to be more motivated as they could improve by themselves and work in teams to pass a final evaluation task.

The maintenance of the same narrative helped the students to be immersed in the game and seeing their company, as well as seeing their recognitions (insignias) upgrading in level.

Limitations

What constraints or difficulties were encountered in implementing the practice, how were they addressed, and what other constraints might we encounter in replicating this practice?

No specific limitations recorded.

Related resources/Links

Establish a list of references related to the practice (training manuals, guidelines, photos, videos, web pages, etc.).

Link to the home page of the gamification experience in question. If possible, contact the organization and/or person who carried out the practice.

<https://online.urjc.es/es/para-docentes-investigadores/banco-de-buenas-practicas/item/474-diseno-de-entornos-de-aprendizaje-activos-basados-en-la-gamificacion#desarrollo>



Surveys Analysis

An online questionnaire was designed **to validate the best practices** collected in game-based learning in the six European countries involved: Spain, Italy, Greece, Romania, Portugal, and Poland. The survey aimed to gather the VET experts' perspectives on the innovative experiences, game dynamics, mechanics, and components researched by the Sparks consortium.

1. Methodology

The research work followed three main phases:

1. Design of the quantitative research tool;
2. Fieldwork;
3. Data Analysis.

Phase I: Design of the quantitative research tool

The chosen method was categorisation, creating blocks linked to main general research questions and developing more specific research questions inside each block. The development of the survey as a research tool for validation was implemented as follows:

1. all the Best Practices collected by the consortium were reviewed;
2. a log was created to perform an in-depth comparative analysis of the key elements of the practices collected;
3. research questions related to the main points that needed validation from the best practices were developed;
4. the survey questions were developed, based on a 5-point Riker scale, for each research question determined;
5. the survey questions were finally validated by the consortium.

Phase II: Fieldwork

Once elaborated, the online survey was disseminated by the partners. In Spain, 59 responses were collected.

Phase III: Data Analysis

- 1) *Recollection* of the data obtained with the survey.
- 2) *Disposition* of the data. In this Report, the responses obtained were organised to be further analysed in the Final Report of the research, comparing the results of the six countries of the consortium.
- 3) *Analysis* of the data.
- 4) Drawing *conclusions* based on the results of data interpretation.

Phase IV: Final Document elaboration



The last phase of our comparative research is developed in the Final Report, where the consortium analyses the results of the desk research in Best Practices in GBL together with the results of the validation survey performed and the results on the Focus Groups research the needs in VET

2. Survey Results obtained in Spain

The first block of questions aimed at obtaining a **general picture of the target group of educators**. It includes essential information, such as:

- the type of entity the expert belongs to, including initial or continuous vocational center/provider, adult education center/provider, youth center, non-governmental organisation or foundation and other VET providers;
- the job position occupied, including teacher, coach or mentor, trainer, coordinator, administrative staff, management role, social educator or worker and other..

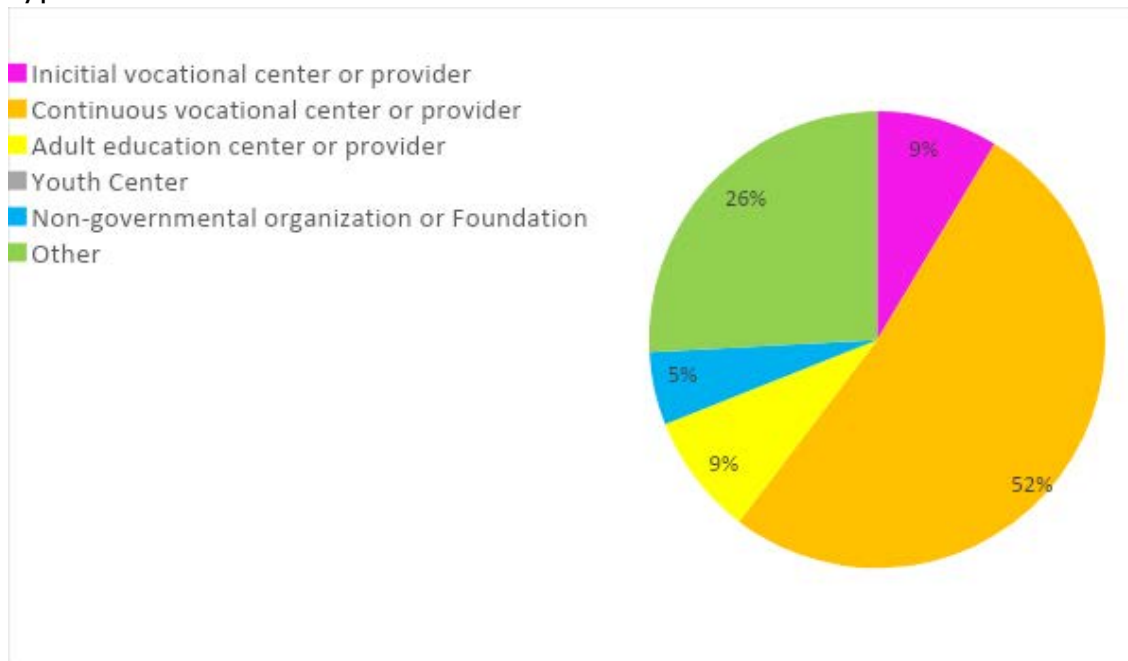
59

Responses

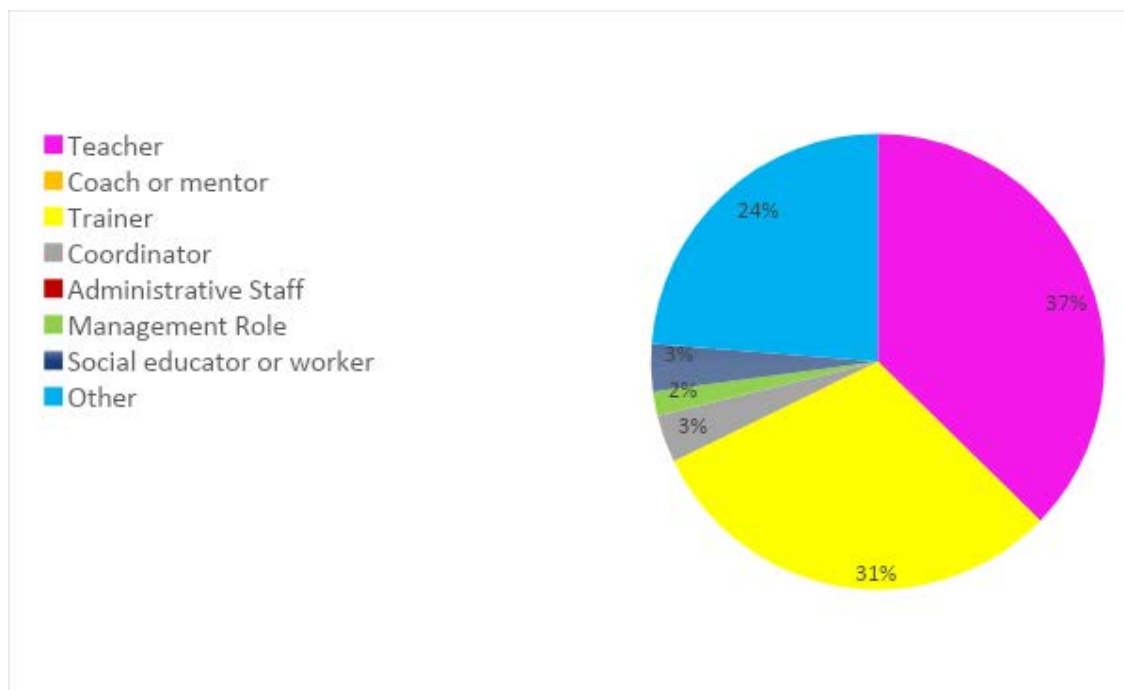
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Average Time for completion

Type of **entities** the educators work for:



The different **job positions** occupied by the people surveyed:



The following question belongs to the second block that responds to the objective of achieving a general picture of the overall level of **competencies of VET experts** in digital skills and ICT tools and platforms, and more specifically their level of competencies in **game-based learning**.

3. I think that incorporating ICT tools and platforms into teaching pedagogies is beneficial for teachers and students.
4,85 Average
4. I feel confident that the competencies of educators (including myself) in digital competencies is sufficient to incorporate ICTs into teaching.
3.4 Average
5. I often implement game-based elements in my teaching/training to assess students or increasing their involvement during classes.
3.9 Average
6. I do not use gamification into teaching, but I would like to.
3.1 Average

The objective of the third block of questions is to **validate the best practices collected** by the following set of questions about the game-based elements that were found as the key to a successful game-based learning experience.

7. Stablishing the objective of the game and the rules previously and explaining them to students before starting the experience.
4,7 Average



8. Defining previously the possible roles of users in the experience and, if relevant, including the possibility of having different roles: active y passive (observer); leader and followers.
4,6 Average
9. Using platforms and digital tools for the gamification experiences that are commonly used and recognizable by teachers
4,65 Average
10. Including an attractive narrative and, if possible, maintaining the storyline defined during the game and till its finalization
4,7 Average
11. Stablishing clear levels in the game experience that gradually became more difficult, with the aim of continuing to challenge users.
4,6 Average
12. Including the possibility of feedback between students and educators during the game, specially at the end of a challenge or level.
4,7 Average
13. Including challenges and tasks that must be done individually and in teams, to foster both teamwork and autonomous work.
4,7 Average
14. Adding the option for the user and the educator of viewing the progress during the game or gamify experience since the beginning (i.e., using avatars or profiles to identify each user and show their progress)
4,6 Average
15. Including access to educational material or additional information in the hosting platform of the experience (i.e., videos, tutorials, curricula, etc.)
4,6 Average
16. Including graphics, visual elements, music, and videos that are stimulant and attractive for the students.
4, 7 Average
17. If the objective of the experience requires it, include simulation scenarios (i.e., job interviews) to foster learning by doing.
4, 6 Average
18. If the objective of the experience is to evaluate students, previously established the criteria and make the students aware of those criteria and objectives chosen.
4,6 Average
19. Establish a reward system (i.e., Points system, ranking, badges, insignias, etc.) that motivates students, but also rewards different qualities such as behavioural attitudes (curiosity, helping other students, devoting more time)
4, 5 Average

This last block constitutes an **open-ended question** so that the surveyed person can make a remark or state a relevant opinion on GBL.



20. Would you like to share any past or present experience with Game-Based learning techniques, tools, or methodologies? You can do it below:

24 of the total of 59 Spanish education providers surveyed answered.

I have only done simulations that have worked quite well.

Well, what I usually do for example when I explain office is for example to make a game in PowerPoint, the 50x15, the students do it with me and so they learn PowerPoint, then when we explain excel, word or access, they themselves put questions in the game and then exchange them and see how much they know about the subject.

In Excel, another game you play is a question game, we hide the answers on another sheet of paper and then, using a formula, if you get it right, it turns green and makes a victory sound.

When I explain how to make web pages I usually do it directly by creating live webs simulating companies that the students would like to have, at the end the student sees how their company would be if one day they could set it up, the student has the role of the client who requests the web and describes what they would like to have.

I try to liven up the training with games, dynamics, sales theatres, and anything that occurs to me or to the students, I consider these tools very important to learn and enjoy the training, in some cases the students, because they are adults, do not understand or do not understand that games in training are necessary and help us to improve our interaction with others in real life. Thank you very much.

I have used simulated job interviews, in design courses, teams presenting projects as if they were real agencies, etc.

I have only done one gamification course, but I have not put it into practice. I make resources using tics to teach by playing, but that is not gamification. I am very interested in learning

I have developed game dynamics, I would like to do it more often, but I think that there is a lack of infrastructure (resources) to be able to develop these activities daily in my field, sports training. The courses teach these dynamics, but then the work lacks resources and initiative of many monitors.

I have only made a few attempts, but without any programming of the content.

Gamification is a great tool implemented in education and training, but it requires some very clear points so that it does not obstruct the natural development of the learning process. Excessive use of some tools can deteriorate or complicate the development of the knowledge of the subject under study.

If I use some well-known applications such as Kahoot. The student is more interested and motivated in learning through gamification.

Game dynamics enhance creativity in 'open' activities in which the learner develops a topic or must reach an objective and in activities with predefined results, it increases motivation and the desire to carry them out.

Role-play to experience the content in practice; recognition through badges, rankings; time-limited exercises.

Adapt the experience to the professional environment to make it useful and practical.



With the game you learn and evaluate, it is better than any exam, because you enjoy and show what you know unconsciously.
We worked on Diversity through gamification, and it was a great success.
Having introduced "games", "mini-games" and collaborative group work activities in various training projects.
I have had the opportunity to collaborate in a professional development project for a company in the pharmaceutical sector in which a web tool was developed in which participants simulated a Formula 1 race, and in which each circuit corresponded to a skill that they either had to develop or improve. Each circuit you participated in a series of challenges (linked to training and real day-to-day practice) that earned you points.
For me, simulations are the most valuable part of learning.
We must bear in mind that when we put children to compete in a game, we can find students with high abilities and students with slow response or with other types of difficulty. Keeping this in mind is essential so that each child can progress at his or her own pace without continually comparing him or herself with others.
In addition, it is important to have a wide range of activities so that, on the one hand, they are adapted to the level of the student, and, on the other hand, they do not lose the novelty factor that attracts them so much, i.e., if you always do Kahoot, in the end it is a resource that is exhausted.
It is necessary to establish a guide of different resources (ordered by learning curve for teachers) and to alternate them and "move up a level" little by little but without pause.
Please, I am interested in receiving the templates that were mentioned yesterday.
In order to internalise the contents of the history subject, we played a card game in which we established a timeline, the game consisted of taking turns to take the cards out of the hand and put them in order in a chronological line, at the end of the game the one who had placed the most cards in the period with the most number of cards in the timeline was the one with the most number of cards in the timeline (years, decades, centuries...)

3. Final Conclusions

In conclusion, both the average competencies in ICT and game-based learning of Spanish educators are sufficient, and they show a common appreciation for the benefits of applying game elements to teaching.

The validation by experts in education of the best practices collected by the SPARKS consortium has been extremely successful based in the responses, all the mechanics, dynamics, components, and pedagogical techniques incorporated in the survey have received a high number in the 1 to 5 scale proposed, all the elements of the best practices identify have received a punctuation higher than 4 above 5.

Focus Groups Analysis

Each partner organisation implemented a Focus Group with a minimum of 24 participants: 12 educators and 12 students in the field of Vocational Education and Training.

1. Methodology

A common questioning route was developed for the implementation of the focus group. Each partner implemented its focus groups at the local level following the common questions outlined by the project team to reach the goals of the qualitative analysis.

The questions aimed to gather the target groups' needs, such as pains in their current e-learning practices and jobs-to-be-done, possible gains deriving from the platform, and the features and game elements they would find more effective and engaging in Game-based Learning Programs.

A moderator and an observer were involved in the implementation of the activity.

2. Report of the Focus Groups. Analysis and comments

PARTNER ORGANIZATION	Femxa SLU
DATE AND HOUR 15 September 2021, H 10.00 - 11.00	PLACE Microsoft Teams
FORMAT: Online	
PARTICIPANTS: VET teachers and trainers	NUMBER OF PARTICIPANTS: 25
MODERATOR: <i>María del Carmen López Cruz, Area Illán Rodríguez</i>	OBSERVER: Jose María García Seijo

Composition of the group

- no. 13 teachers and trainers of vocational education from diverse backgrounds.
- No. 12 students of vocational education from diverse backgrounds

Q1

1.1. Do you have any experience with gamification and game-based learning? Have you ever applied game elements to your lessons or sessions? Or have you participated as a student in a class that has implemented GBL?

1.2. What **positive and negative aspects** did you realize during these experiences?



NOTES

The educators involved in the focus group represented different sectors and their needs towards objectives of game-based learning experiences change depending on the teaching field and the level. Nevertheless, they shared their different experiences with game-based learning offering multiple common points in the way they elaborated their gamification or game-based learning activities, as well as what they consider to be its strong points and its faults.

COMMON RESPONSES

The group agrees that students of today are more involved with the digital round, and it is part of their reality, so it is important to include this reality in their learning as well.

Participants also share the changes that the covid pandemic causes in teaching and learning and how, even though both educators and students found difficulties in adapting to the new reality and learning online, it forces them to implement in the learning process more digital tools and to learn how to use them properly.

A few of the educators in the group agree that, even though they find gameboard learning experiences a useful resource to motivate and engage students, they found it difficult to implement elaborated game activities completely online and find it less time consuming and more productive to be able to explain it and indicate them in person in the classroom setting, even though the experience itself could take place completely online.

In general, everyone describes the pedagogical gaming approach as positive and highly valuable, and they shared some of their experiences:

- Using Kahoot or quizzes during learning to revise material as well as with self-evaluation purposes, or simply as a fun activity to do something different to the classic teaching method of explaining listening between teacher and student.
- Storytelling app that allows to have an interactive experience where the student chooses from different paths, that can lead to a worse or better outcome. The experience was used by one of the participants to learn about the danger of bullying and how to prevent it.
- Using rewards systems for normal day to day tasks, such as prizes.
- Simulation exercises to create a fun experience from an exercise that normally students do not enjoy, with the aim of giving them practice in a real workplace situation.
- Interactive videos to learn first aid, for example, were brought to light.

Some of the negative points brought to light were the difficulties to perform the activities without support and that sometimes the game or competition becomes more important than the learning objectives and the gamification experience loses its value.

Q2

2.1. Do you appreciate gamification and GBL in education and training? Do you think games add a positive input to learning?

2.2. How, in your opinion, gamification and games can enhance learning?

NOTES

The general opinion of the participants of the focus group was their appreciation for gamification and GBL and they shared more experiences where it was put to practice that GBL not only is motivating students, but the experience itself helps learners to put into practice what they learn in books, and it enhances their learning.

COMMON RESPONSES



The participants agree in some of benefits of GBL, being that it helps to improve student attention and commitment, to engage students, to improve their digital skills, teamwork and collaboration, problem solving skills, and other competencies depending on the specific activity, that normally students feel that they do not learn during their education but in the workplace.

Q3 Question 3: Do you feel like you have the resources available in VET to implement GBL? In case the answer is not, what do you think would make the situation better (educators- more time for teachers for the planification of these classes, more online resources to help with gamification, etc.; students- more innovative and attractive game experiences, more of these types of experiences in general, etc.)?

NOTES

The general opinion was that there are a lot of resources available online to implement GBL and gamification. Some of the participants were more experienced than others and they shared the online pages, blogs and other resources and digital tools available during the activity.

COMMON RESPONSES

- From the general knowledge shared by educators and students we realize that, even though there is a common basic knowledge on how to implement gamification and GBL, just a few of the participants had more advanced skills to be able to create their own experiences or to implement more complex ones.
- The educators stated that they need more guidance and manuals to be able to apply more advanced experiences, as well as more time for planification. A teacher shared that she enjoys and appreciates the benefits of GB, but she does not have the time and does not know where the appropriate sites are to get information and keep learning.
- Students agree that they would like to have more of this type of experiences and more often.
- One the educators shared with the group a map of 220 of diverse digital tools, that creates a full picture of a great number of resources that can be use in gamification at different levels and for different types of action: editing videos and images, flipcharts, interactive walls, etc.
- He also shares that he uses CODEPEND (online portfolio) to write and organize code. For his specific field of teaching, he assures how much this type of tools help students to be more organize and collaborative.

Q4 4.1. What digital tools and platforms do you have access to/knowledge of?
4.2 Do you believe VET teachers and trainers, including yourself, have the necessary digital skills to integrate more digital tools into their teaching practices and to support students with their own gaps in digital skills?
4.3 Do you believe you need more support regarding digital instruments (students an teachers)?

NOTES

Most participants had a basic knowledge of digital technologies, while 5 educators were more experienced in the use of more advanced digital tools in their teaching. A lot of them want to



improve and update their digital pedagogical competence, and they would appreciate more information about courses and new tools.

COMMON RESPONSES

The participants stated and most agreed that:

- There is a lot of knowledge online, but it is difficult to search through all the available resources without guidance, for lack of knowledge or mostly time, educators end up using the more basic and common tools because they feel safer with that choice.
- More than resources or tool, the need is for education and formation in gamification and GBL, and not simple technical training to be able to implement the tools, but specially training in how to successfully implement the GBL exercises, how to blend them with the curricula appropriately and how to, summing up, implement a successful experience that students will find engaging.
- The need for more training and information on how to evaluate gamification experiences as it is difficult to maintain a rigid classic criterion. It is very useful for students to practice the real-world situations, to implement simulation activities. But it is difficult to evaluate all students in an objective rigorous way.
- More courses that approach GBL for mentors because the field is always advancing and developing it is necessary to update the courses available to the changes, so that educators can be UpToDate with the available resources and methodologies.

Q5

Would you consider a gamification platform or templates useful to support educators when gamifying their classes?

NOTES

For all the attendees, they consider it useful to implement gamification experiences more often, because it will save them time. Also, the general opinion is that it would be a great way to start to implement GBL activities.

In conclusion, a platform that allows them to share information and access information about implementing GBL, a place to have all the available resources or bibliography organize in categories related to vocational fields and up to date, and a tool that helps them introduce GBL into their teaching in a timesaving way, such as a template, will be very useful and well receive.

COMMON RESPONSES

Participants agree that it would be useful to have the information more updated all in the same place, and that the information available even though it is there a lot of times does not apply for non-formal education.

A lot of the participants also agree that the way it works right now is that every teacher or trainer must do their own research in the subject by themselves.

Every participant agreed that having a platform for sharing information that was visited would help. So that, they could share the information they had, their experiences, the positive and negative aspects, and overall, not feeling lost when using GBL.

It will also be useful to have an organized online resource where bibliography about gamification and GBL was organized and updated, specially by different categories or fields of teaching.

It is mentioned by some participants that guiding and tutorials that lead them step by step in the process, could be really encouraging to beginners to start implementing gamification and GBL.

