

INTRODUCTION TO GAME-BASED LEARNING AND GAMIFICATION IN SECONDARY EDUCATION



GAME - BASED
Learning &
GAMIFICATION
TECHNIQUES
in Education



Directorate
of Secondary
Education
Ioannina



CRHACKLAB F4D

 DouMag Ltd



Game-based Learning and Gamification in Education Guidebook

Authors: *Alexandros Tserolas, Euthalia Kontou, Stamatoula Logotheti (Directorate of Secondary Education of Ioannina), Eleni Kalapoda, Maria Efstathiou, Marina Nikolaou (Doumag Limited), Giorgia Marchionni, Elena Tefa (CRHACK LAB FOLIGNO 4D)*

Edited by:

*Euthalia Kontou (Directorate of Secondary Education of Ioannina),
Maria Efstathiou (Doumag Limited),
Giorgia Marchionni (CRHACK LAB FOLIGNO 4D)*

Layout & Design:

*Alexandros Tserolas (Directorate of Secondary Education of Ioannina),
Marina Nikolaou (Doumag Limited),
Elena Tefa (CRHACK LAB FOLIGNO 4D)*

Copyright © 2024



Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0). To view a copy of this license, send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA, or visit: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

Published By: *Directorate of Secondary Education of Ioannina*

Game-based Learning and Gamification Techniques in Education
2022-1-EL01-KA210-SCH-000084562

www.gbl-edu.eu

"The material of the project reflects only the author's views. The European Commission's support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission or the Hellenic National Agency cannot be held responsible for any use which may be made of the information contained therein."

TABLE OF CONTENTS

TABLE OF CONTENTS	2
ABOUT THE PROJECT	3
CHAPTER 1 GAME-BASED LEARNING & GAMIFICATION CONCEPTS	6
1.1 The Concept of Game	7
1.2 Features of a Game	7
1.3 Gamification	9
1.4 Game-based Learning	11
1.5 Gamification and Game-based Learning in the Classroom	13
CHAPTER 2 EDUCATIONAL GAMES	20
2.1. The Power of Educational Games: Bridging Fun and Learning	21
2.2. The Principles of Educational Games	21
2.3. Benefits of Using Educational Games in the Classroom	22
2.4. Examples of Digital Educational Games	23
2.5. Examples of Physical Educational Games	26
CHAPTER 3 GAME DESIGN	29
3.1. Introduction to Educational Game Design	30
3.2. Learning Theories and Game Mechanics	31
3.3. Basic Parameters for the Design of a Game	32
3.4. The Process of Designing an Educational Game	38
CHAPTER 4 DEVELOPING LESSON PLANS USING GAME-BASED LEARNING AND GAMIFICATION ELEMENTS	45
4.1 What is a Lesson Plan and How to Develop it Effectively	46
4.2. The Educational Significance of GBL	47
4.3. Lesson Plans Development	49
4.4. Incorporating Gamification Elements	51
ANNEXES	52
A. Good Practices in Partner Countries	53
B. Lesson Plans	69
REFERENCES	152

ABOUT THE PROJECT

The project «**Game-based Learning and Gamification Techniques in Education**» aspires to provide knowledge, pedagogical approaches, appropriate teaching materials and technical tools to secondary education teachers and at the same time to inform and educate them in order to emphasize the priority in teaching but also the evaluation of useful and essential skills through game-based learning and the use of gamification in the educational process.

Coordinator institution of this project, is the **Directorate of Secondary Education of Ioannina** (Greece). The other partners of this project are: **DouMag Limited** from Nicosia, Cyprus and **CRHACK LAB FOLIGNO 4D** from Foligno, Italy.

During the implementation phase of the project, teachers from the project partner countries participated in **three trainings** where they were trained in new pedagogical approaches and teaching methods such as Game-based learning and the use of Gamification in education.

More specifically:

- ❖ The **first training** was implemented in Foligno, Italy, from the 8th to the 12th of May 2023 and was hosted by the partner CRHACK LAB FOLIGNO 4D. 17 teachers attended the training, which was targeted in Game-based learning and developed skills required for teaching in the classroom through collaborative activities working in groups. The group consisted of 7 teachers from Greece, 6 teachers from Cyprus and 7 teachers from Italy that worked together and also visited schools in the general region to learn about the Italian educational system. At the same time, they were given the opportunity to get in touch with the culture and traditions of the host country through cultural activities, which included guided tours and visits to museums in the periphery of Perugia and the Italian capital city of Rome. A significant impact of their participation was also the development of their language skills and the strengthening of their sense of European citizenship.



Figure 1. Foligno - 1st training activity

- ❖ The **second training** was implemented in Nicosia, Cyprus, from the 23rd to the 27th of October 2023 and was hosted by the partner DouMag Limited. During this training, particular emphasis was given to the theoretical and practical training of the participating teachers on the subject of Gamification, during the first three days. Each training module covered different aspects of the use of Gamification in education. The skills and knowledge required for someone to use this technique inside the classroom were demonstrated and practiced by the participants with interactive and collaborative training activities. The last two days were dedicated to preparatory work for the creation of the guidebook of the project.



Figure 2. Nicosia - 2nd training activity

- ❖ The **third training** was implemented in Ioannina, Greece, from the 15th to the 19th of April 2024 and was hosted by the coordinator of the project, the Directorate of Secondary Education of Ioannina. In this training, the participants deepened their knowledge in the educational subject of the project and finalized their work and actions for the creation of the guidebook. The participating teachers were in contact with university professors, responsible policy makers and directors of education, as well as with teachers who use those learning methodologies in their classrooms on a daily basis, in order to insert the above knowledge to the guidebook, aiming to assist the teachers that will use it.



Figure 3. Ioannina - 3rd training activity

The main output of this project though, is this **guidebook** which serves as a complete informative tool for the introduction to Game-based Learning and Gamification techniques in teaching and as a pedagogical guide for the implementation of activities with modern educational methods for children and is addressed to teachers, lecturers and trainers in schools in primary and mainly secondary education. This guidebook has a wiki form as well and its final version is translated into all partner languages and English.

The completed **guide includes:**

1. results of the 3 trainings for teachers in each partner's country
2. information on the principles and definitions of Game-based Learning and Gamification
3. best practices in the project's subject from different EU countries
4. different types of games and their possible uses in the educational process
5. solutions on how to include game design elements in educational activities
6. the integrated process of designing an educational game as a team project, following by description of all stages: concept - design - prototype – piloting
7. examples of lesson plans that were developed during the project.

5

The guide was developed in accordance with the principles of the research method "desk research", as well as with the full documentation of the project implementation in terms of the development of the educational activities. It was developed in two phases. The first one was only about the external secondary data research to the project and the second phase was about the presentation of the project as a model application of modern techniques of Game-based Learning and Gamification in education.

The targeted **impact** of the project was for teachers from the partner countries to be trained on new trends imposed by modern educational needs and specifically in the methods of game-based learning and the use of gamification in the educational process. This knowledge will be transferred to other teachers in the wider partner area. (but also, at national level) through the dissemination of the results as well as the specialized guide that is provided within the framework of the project.

Project's Website: www.gbl-edu.eu

CHAPTER 1

GAME-BASED LEARNING & GAMIFICATION CONCEPTS

1.1 The Concept of Game

A game is an activity or form of entertainment that usually involves participation, rules, and goals. Often, it is played for fun, but it can also be educational or social in nature. Games can be played individually or with teams, and often involve competition, cooperation, or both. Playing usually involves the use of imagination, strategy, skill, or physical abilities, depending on the type of game. Games are important for skill development, socialization, psychological well-being and entertainment. Some definitions of what a game is, are:

- ❖ rule-based activity with goals that have been set from its beginning (Groh, 2012)
- ❖ a system in which players engage in an artificial conflict, defined by rules, that leads to a measurable outcome (Salen & Zimmerman, 2004)
- ❖ activities involving one or more players (Dempsey, Haynes, Lucassen, & Casey, 2002)
- ❖ set of activities (Kim, Song, Lockee & 14 Burton, 2018)

1.2 Features of a Game

7

Schell (2008) identified 4 primary elements in games: Aesthetical, Technology, Game mechanics and Story. Those can be easily divided in sections as can be seen in the picture below.

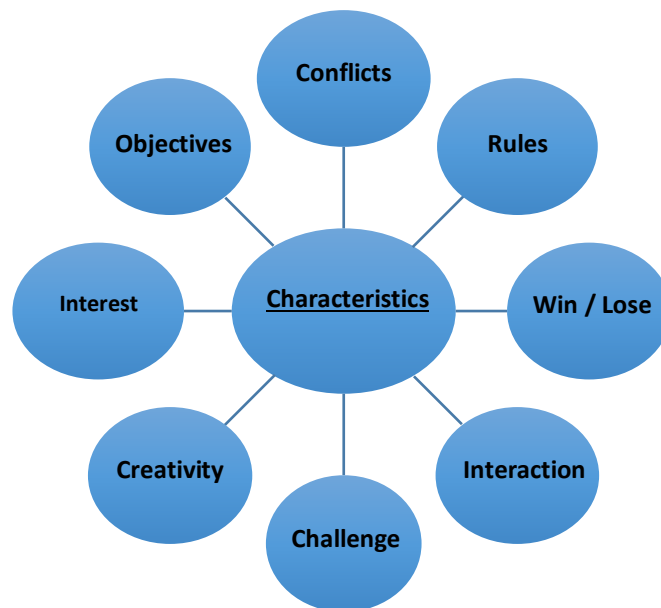


Figure 4. Schell's characteristics of a game

Conflicts: In game-based learning, conflicts serve as catalysts for engagement and critical thinking. By embedding conflicts related to educational content, students are challenged to resolve discrepancies and make decisions, mirroring real-life situations. This not only makes the learning process more engaging but also enhances problem-solving skills and the ability to think under pressure.

Objectives: Clear objectives are crucial in educational games as they provide students with a sense of direction and purpose. Objectives should align with learning outcomes, guiding players through content while offering milestones that signify progress. This helps in maintaining motivation and can be used to assess understanding and mastery of the subject matter.

Interest: To be effective, educational games must capture and retain students' interest. This can be achieved through engaging storylines, appealing graphics, and relevant content. Interest-driven learning leads to higher motivation and better retention of information, making learning a more enjoyable and impactful experience.

Creativity: Creativity is fostered in game-based learning by allowing students to explore different solutions to problems and express themselves in unique ways. Games that encourage creativity not only make learning more enjoyable but also help in developing innovative thinking skills that are crucial in today's rapidly changing world.

Challenge: Challenges in games stimulate interest and promote sustained engagement. When used in educational settings, challenges should be tailored to the students' skill level to avoid frustration and ensure a positive learning curve. Overcoming challenges can lead to a deeper understanding of the subject and a more rewarding learning experience.

Interaction: Interaction is a key element of game-based learning, promoting active engagement with the material. Through interacting with the game environment, other players, or even AI components, students can learn from each contextually rich experience.

Win / Lose: Incorporating wins and losses in educational games provides immediate feedback on student performance. This feedback is essential for learning as it helps students understand the consequences of their decisions and encourages them to think critically and iterate on their strategies. Celebrating wins boosts confidence, while constructive handling of losses can foster resilience and determination.

Rules: Rules in educational games define what players can and cannot do, which helps in creating a structured learning environment. Well-designed rules simplify complex systems and processes into manageable, interactive lessons. This not only makes learning more accessible but also teaches students the importance of adhering to guidelines and thinking strategically within defined parameters.

1.3 Gamification

The term gamification comes from the digital media industry. The first documented use dates back to 2008 but the term was not widely adopted until the second half of 2010. **Gamification** is the application of elements and mechanisms that are usually found in games in non-game environments. The purpose of gamification is to motivate, entertain and encourage people to take specific actions, achieve goals or compete in an enjoyable way. It is defined as “the engineering, aesthetics, and thinking of games based on play to engage people, motivate action, promote learning, and solve problems” (Kapp, 2012). Gamification (Deterding et al, 2011) is the use of game mechanics for non-game applications, especially mobile websites and web pages, to encourage users and adopt the applications. Also, gamification attempts to encourage users engage in desired behaviors in relation to applications.

Through gamification, people are encouraged to participate, discover and achieve goals, improve their skills and interact with others in a fun and dynamic environment. It is found in various fields such as education, entrepreneurship, health, fitness, social platforms and personal development. In education, gamification can be applied to lessons and educational programs to make learning more fun and interest.

The **technique of gamification** consists of tools and techniques used to leverage the environment or application (Bunchball, 2010). According to Bunchball (2010), some of the most common gamified elements are presented in table 1:

Table 1. Gamification elements

Element	Description	Examples
Grades	Numerical recognition of accomplishment	Collect points in a fitness app
Awards	Visual symbols of accomplishment	Earning badges for completing courses
Ranking tables	Comparison of progression with others	Compete on game leaderboards
Flat	Successive stages of progression	Unlocking new levels in an RPG
Challenges	Tasks with an accomplishment goal	Participation in photography contests
Avatar	Virtual representations of users	Create an avatar in an educational game

Points: Used to reward users, they can also be used to manage different behaviors. If points are to stimulate a competition, they should be used as scores. On the flip side, when the goal is to provide constant feedback to the user, every single progress should not be visible to other people.

Levels: Users must be given a target.

Challenges, Trophies, Bidges, Medals: Challenges represent missions that must be completed and then given rewards for completing. Trophies, badges or medals are the visible recognition that the user has reached new levels and completed challenges. The main mechanism for achieving effective challenges and levels is to provide a place for users to display their achievements, such as a trophy rack.

Virtual Good: Those are a good way to encourage users to earn more points and also offer the possibility to personalize something to reflect their identity.

Classification table, Ranking, Score table (ranking tables): Often used to manage and display user results with the aim of competition as an incentive for behavior.

Many researchers have investigated the **effects of gamification for learning and education** and found a positive relationship between gamification and desired outcomes (Domínguez et al., 2013; Su & Cheng, 2015).

In fact, there is evidence to suggest that when digital game elements such as avatars, points, badges, and leaderboards are used to achieve specific learning goals and engage students emotionally, socially, and cognitively, they are more likely to enjoy the learning experience. process (Gupta & Goyal, 2022). However, designing successful gamification applications in education that affect positive behavioral changes is still a puzzle (Dichev & Dicheva, 2017). For gamification to be effective, individual elements of the game must be linked to specific behavioral, motivational, or attitudinal outcomes, which must then be related to learning outcomes (Economou, 2017).

Educators consider the use of gamification as a major factor that improves or not the learning achievement of students. Research such as that of Nah et al., (2014) as well as Su & Cheng, (2015) revealed that gamification in learning and education can improve learning achievement. The effects of gamification on learning and education vary according to specific circumstances, such as the characteristics of the content and the audience. Mayo (2009) insists on the relatively beneficial effect of gamified lessons compared to traditional lessons.

Expected outcomes from learning include psychological and behavioral changes. Many teachers face difficulties in their classrooms because their students are not motivated and do not actively participate in classroom activities. Because of such practical experiences, motivation and engagement have long been the focus of educators and researchers. Some researchers have found gamification to be effective in inducing psychological and behavioral changes. Su and Cheng (2015)

claim that game-based learning can foster student motivation and engagement. The psychological and behavioral changes resulting from gamification for learning and education are not limited to motivation and engagement.

Learning through gamification can provide a different and enjoyable approach to education, encouraging participation, engagement and knowledge acquisition.

1.4 Game-based Learning

Game-based Learning is a type of active learning experience within a game context that has specific learning objectives and measurable outcomes. The learning experience gives the student clear and challenging goals in a virtual game context, requires a high degree of student interaction, and offers informative feedback on student performance. Many times, games are designed to allow the player to understand the subject within a real-world context.

Game-based Learning (GBL) uses specific games to teach students certain skills or a specific learning outcome by providing students with clear and challenging goals within a game. A good example of this is a Jeopardy or Kahoot game review. More often than not, games are designed to allow students to understand the subject matter within a real-world context.



Figure 5. GBL elements

Game-based learning (GBL) is the union of educational learning theories, curricula and digital play with the aim of improving the learning experience (Jayasinghe & Dharmaratne, 2013; Roodt & Ryklief, 2019). The concept of GBL is fun learning through doing/playing and specially designed, structured game learning materials that can stimulate the development of thinking and self-learning skills among vocational students (Azizan et al., 2021). Serious games are the most common type of GBL used in education and focus on developing games with specific educational purposes (Anastasiadis et al., 2018; Games & Carvalho, 2022).

Dimitra et al. (2020) identified seven main types of GBL approaches applied in education: (i) memory games, (ii) simulation games, (iii) interactive, (iv) quiz games, (v) puzzles, (vi) strategy games, and (vii) reality testing games.

In order to better understand GBL, **different types of games** can be examined and the following must be taken into account: the place where play takes place and the environment in which students play.

Game types and as depicted in the below table are:

Table 2. Game types

Game type	Description	Examples
Educational video games	Games designed to teach specific skills	Learn to code with CodeCombat
Simulations	Digital environments that mimic real situations	Practice surgical procedures in a virtual environment
Educational role-playing games	Games that allow players to take on roles in fictional environments	Learning History with the "Oregon Trail" Game
Serious games	Games designed for teaching specific subjects	Learning about environmental issues with the game "SimCity"

Board games: Monopoly can be considered as an educational game. It has all the necessary elements: a story, characters, points, competition and many other aspects. There are many examples of Monopoly-like games for schools with modified rules for different subjects, such as History Monopoly or Math Monopoly.

Game preparation (for example, the board and rules) is very important. Students should be involved in the build-of-the-game phase, as it can be extremely instructive and motivating. Keep in mind that making an educational game can be a great Project Based Learning (PBL) activity.

Real life games: The environment here is the real world. This is, perhaps, the most impressive, but also the most stressful type of game. In this genre, students must move, act, and use their bodies and minds to play. This element is also the most defining one that challenges students in almost every aspect of their learning. Since there is the possibility for the student to move to a specific space, real-life play is often associated with theater. It is easy to find role play activities as well as simulations or dramas in this type of learning games. Students act "as if" a character in the game and make decisions according to their goals, environment and rules.

Digital games: The environment here is online. Digital games can be compared to board games. In fact, many digital GBL programs use online boards that a teacher can edit or add instructional content depending on the topic to be played. Also, in this type of game, students can be involved in the construction of the game,

especially if the teacher is not able to manage online tools without their help. Students have a character (but not necessarily an account) that moves through the game, where they face challenges, placed along the game path. A digital game does not include skills linked to the use of the body and real space, but it can train students to collaborate in a different and virtual way.



Figure 6. Playing in nature

A **key advantage** of game-based learning is that it allows learners to experience a simulation environment where they can apply their knowledge and try out different strategies before taking action in the real world. Many games also have reward systems that encourage participants to work harder to achieve their goals and complete tasks. In addition, play can be used to introduce concepts or ideas in a fun way, allowing for greater understanding and retention of information than through traditional teaching methods alone.

The future of game-based learning looks bright - it is already being used in many classrooms around the world - from primary schools to universities. As technology advances further and more sophisticated tools become available, we will likely see even more creative applications of this type of training come into play. With its promise to engage students in meaningful ways while delivering valuable lessons, there's no doubt that game-based learning is here to stay.

1.5 Gamification and Game-based Learning in the Classroom

Game-based learning and gamification may at first glance appear to be similar and interchangeable terms. While both terms combine games and learning, the difference lies in how the game elements are integrated into the learning experience. This distinction leads to a greater difference in learning outcomes when comparing game-based learning versus gamification.

Gamification and GBL is an innovative technology that is considered a top trend in education. Both technologies may seem similar, but they are two distinct techniques with multidimensional relationships (Jayasinghe & Dharmaratne,2013; Krath et al.,

2021). GBL and gamification differ in that GBL integrates games seamlessly into the educational curriculum to achieve specific learning outcomes. On the other hand, GBL Gamification involves turning the entire learning process into a game using game elements such as points, badges, leaderboards, avatars, quests, social graphs or certificates (Krath et al., 2021). However, the border between GBL and gamification is quite thin at times, especially when both have relatively comparable goals. Both GBL and gamification aim to solve a problem, motivate participants and increase learning through the use of game-based ideas and tactics.

In game-based learning, the game is the learning experience, while in gamification, game elements are added to the traditional teaching method.

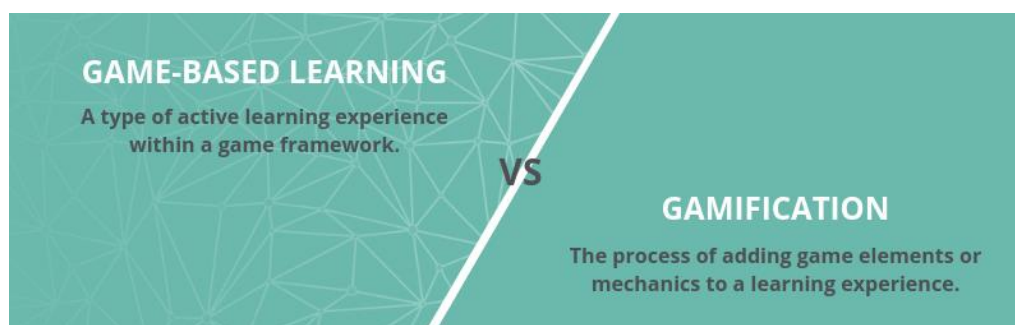


Figure 7. GBL vs Gamification

In gamification, the end result (grades, rewards, first place, completing as much as possible, not last place) can easily become the focus rather than learning. Gamification can make students rely on extrinsic motivation. We refer to the mental state that leads a person to behave in a certain way or engage in an activity to gain a reward or avoid a punishment.

As for the Gamification aspect, the application of game design elements in non-game environments, is rapidly gaining popularity in various fields. It harnesses the inherent human love of games and competition to motivate and engage people in activities that might otherwise be considered mundane or challenging. As we delve into the world of gamification, let's explore the **significant advantages** that make it a preferred choice for many teachers in the school environment.

- ❖ **Enhanced engagement:** One of the most notable benefits of gamification is the increased level of engagement it brings. By incorporating game elements such as rewards, leaderboards and levels, gamification makes everyday tasks more exciting and engaging. This increased engagement can lead to improved performance and productivity, in a learning, work or customer engagement context.
- ❖ **Improved learning and retention:** Gamification has achieved considerable success in the fields of education and training. By turning learning into a game, it makes the process more enjoyable and less intimidating. This approach can lead to improved understanding and retention of information,

as learners are more likely to remember content, they found engaging and enjoyable.

- ❖ **Increased motivation:** The competitive nature of games can push individuals to push their limits and strive for better results. This drive can be harnessed through gamification to motivate people to achieve their goals, whether it's learning a new skill, improving performance at work, or adopting healthier habits.
- ❖ **Improved user experience:** In customer-facing applications, gamification can significantly improve the user experience. It can make interactions with products or services more enjoyable and memorable, thus increasing customer loyalty and satisfaction.
- ❖ **Enhancing cooperation and teamwork:** In many cases, gamification involves team-based challenges or competitions. This approach can foster a sense of camaraderie and teamwork as individuals work together toward a common goal. This benefit is especially valuable in workplaces where effective collaboration is key to success.
- ❖ **Real-time feedback and progress tracking:** Many gamification platforms provide real-time feedback and progress tracking. These features allow people to see exactly how they're doing, what they need to improve on, and how close they are to achieving their goals. This instant feedback can be incredibly motivating and can help individuals stay on track to achieve their goals.
- ❖ **Promoting behavior change:** Through the system of rewards and punishments, gamification can effectively encourage positive behavior changes. Whether it's promoting physical activity, encouraging healthier eating, or cultivating better money management habits, gamification can be a powerful tool for personal growth.



Figure 8. Gamification benefits

Gamification offers a multitude of benefits that can significantly enhance engagement, learning, motivation, user experience and more. Its flexibility and effectiveness make it a valuable tool in a wide range of applications, from workplace education and training to customer engagement and personal

development. As we move further into the digital age, the role of gamification is set to become even more important and influential.

On the other side, Game-based learning is a revolutionary approach that has changed the way we perceive education and training. By incorporating the engaging elements of games into the learning process, it has demonstrated **numerous benefits that enhance both the learning experience and outcomes**. Those are:

- ❖ **Enhances commitment and motivation:** One of the most important advantages of game-based learning is its ability to enhance engagement and motivation. Traditional learning methods often struggle to keep students interested, leading to a lack of motivation and, ultimately, poor learning outcomes. Game-based learning, however, leverages the inherent appeal of games to capture students' attention, stimulating their interest and motivation to learn.
- ❖ **Enhances retention of learning:** Game-based learning also significantly improves learning retention. The interactive and immersive nature of games encourages active learning, which is known to enhance memory retention. By actively participating in the learning process, students are more likely to remember and understand the material, leading to better long-term learning outcomes.
- ❖ **Promotes skill development:** Another key benefit of game-based learning is the ability to develop skills. Games often require players to use and develop a range of skills, from critical thinking and problem solving to communication and teamwork. By incorporating these elements into the learning process, game-based learning can help students develop these essential skills.
- ❖ **Encourages Adaptive Learning:** Game-based learning encourages adaptive learning by allowing students to learn at their own pace. In a game, students can progress through levels or stages based on their understanding and mastery of the content. This personalized learning approach caters to individual learning needs and abilities, promoting a more inclusive and effective learning environment.
- ❖ **Provides Immediate Feedback:** Game-based learning provides immediate feedback, which is vital for learning. In a game, players receive instant feedback on their actions, helping them understand what they did right or wrong. This immediate feedback allows students to quickly correct errors, reinforcing correct actions.

Game-based learning offers numerous advantages that can significantly improve the learning process and outcomes. By increasing engagement and motivation, enhancing learning retention, promoting skill development, encouraging adaptive

learning and providing immediate feedback, game-based learning is a powerful tool for modern education and training.



Figure 9. GBL benefits

While one integrates levels, badges, and other game mechanics into your current strategy, the other takes a more isolationist approach. The key to finding the best choice for your next lesson plan is knowing **how they contrast and compare**. Gamification is more holistic. It enhances students' motivation and monitors their progress. On the other hand, game-based learning uses games to enhance knowledge, build skills, and test student proficiency.

Here are **6 key distinctions between Game-based Learning and Gamification**.

1. **Gamification takes a holistic approach:** Gamification includes game mechanics, rewards, and design elements that you would typically see in an online gaming experience. These elements are integrated into a "traditional" eLearning course to improve motivation and allow for self-monitoring of progress. For example, students earn a badge for completing the activity or getting high marks on an exam. On the other hand, game-based learning takes a more focused approach.
2. **Game-based learning centers on a specific skill or behavior:** GBL has a narrower scope as the games focus on specific skills, performance issues, behaviors or training issues. For example, customer service staff need to develop their communication skills to improve job performance. Serious games are used to identify errors or loopholes so that employees can address them immediately.
3. **Gamification does not involve the traditional game:** One of the most popular myths about gamification is that it has its roots in stand-alone games. In-game training can include levels, points, and leaderboards. However, it does not follow a traditional game format or structure. The primary goal is to improve their work habits or expand their knowledge. The game data is just there to support these results. For example, students must be engaged in the lesson to

achieve each milestone and digest the information. The points system allows them to track their training performance and see how far they have come.

4. **Game-based learning turns goals into serious games:** Successful game-based learning starts with goals and outcomes that serve as the foundation of your serious game design. Not every gaming experience includes talents, pain points, and obstacles that employees need to focus on to achieve the best results. Gamification also requires clear goals. However, GBL tackles each milestone with a targeted game rather than covering multiple topics at once like a comprehensive game strategy.
5. **Gamification is based on rewards:** Gamification is based on a fixed reward system. Employees should be intrinsically motivated to achieve goals, but badges or grades give them a boost. Play-based learning can also involve motivation. However, it's more about the experience itself, the idea of progressing through the levels of the game and collecting information along the way or answering questions correctly to achieve the highest score.
6. **Game-based learning includes experiential feedback:** While gamification uses rewards to provide feedback, game-based learning involves error-driven learning and experiential feedback. For example, a gamification course gives learners the opportunity to earn points for achieving the best branching scenario result or passing the final compliance exam. Getting the minimum number of points or none at all helps them highlight areas for improvement. In contrast, game-based learning allows students to benefit from first-hand experience and real-world application. They can immediately see where they went wrong from the character's reaction or the end result.



Figure 10. Both approaches provide their own advantages for the educational process

Game-based learning and gamification, although often used interchangeably, have distinct characteristics and advantages. Game-based learning, with its immersive and interactive nature, offers a unique way of acquiring knowledge and skills. It provides a safe environment for students to experiment, make mistakes and learn

from them. It encourages critical thinking; problem solving skills and enhances creativity.

On the other hand, gamification, the process of incorporating game elements into non-game environments, has proven to be an effective tool for engaging and motivating students. It taps into the human instinct for competition, achievement and reward. Game strategies such as points, badges, leaderboards, and levels can make learning fun and engaging, thereby improving knowledge retention and application.

Comparing the two, it's clear that both have their place in the educational landscape. Game-based learning is ideal for complex concepts and practical skills, where immersion and interaction can enhance understanding. Gamification, however, is better suited to motivating students, encouraging participation, and reinforcing knowledge through repetition and reward. In conclusion, the decision between game-based learning and gamification should be guided by the learning objectives, the nature of the content and the specific needs of the students. Both strategies offer innovative and effective ways to enhance learning experiences, improve engagement, and achieve educational goals. It is exciting to imagine the advances and innovations that these strategies can bring to the learning process and, more generally, to the field of education. So, whether it is game-based learning or gamification, the future of learning is indeed promising and full of fun. After all, the growing number of students, who treat school as a practical and knowledge-centered place, forces us to look for tools, methods and procedures, which transform education into education, joy and creation with the ultimate goal of forming complete personalities.



SCAN this picture with the ROAR application to reveal more information on this subject!

CHAPTER 2

EDUCATIONAL GAMES

2.1. The Power of Educational Games: Bridging Fun and Learning

In the ever-evolving landscape of education, the **integration of technology and innovative pedagogical approaches** has become indispensable. One such approach that has gained immense popularity is the **use of educational games**, both in physical and digital formats. These games are not just a source of entertainment; they are powerful tools that facilitate learning in a way that is engaging, interactive, and effective. In this chapter, we will delve deeper into the world of educational games, exploring their principles, benefits, and various examples that span a wide range of subjects.

2.2. The Principles of Educational Games

Educational games are designed to **bridge the gap between theoretical knowledge and practical application**. They offer students a dynamic platform to put what they've learned into action. Whether in a traditional classroom or a digital learning environment, these games employ a set of principles that make them effective in enhancing the learning process.



Figure 11. Educational games combine learning with fun

- ❖ **Active Learning:** Games promote active learning by requiring students to actively participate in tasks, make decisions, and solve problems. This hands-on approach allows them to internalize concepts more effectively than passive methods like reading or listening.
- ❖ **Gamification:** Gamification in learning involves incorporating game elements such as point systems, competition, teamwork, and leaderboards to boost engagement. It taps into the intrinsic motivation of students to achieve goals and surpass their peers, making the learning process more enjoyable.

- ❖ **Trial and Error:** Educational games create a safe space for students to make mistakes and learn from them. Unlike the fear of failure in traditional classrooms, games encourage students to try again, fostering a growth mindset and resilience.
- ❖ **Progress Indicators:** Games often include progress indicators like levels, scores, or badges. These visual cues provide immediate feedback on a student's performance, making their learning journey more transparent and motivating.
- ❖ **Exploration:** Students can explore different identities or roles within games through avatars or characters, allowing them to see concepts from various perspectives. This fosters empathy and a deeper understanding of diverse viewpoints.
- ❖ **Comfort in Gaming Environments:** Many students are already comfortable in gaming environments, which can lead to increased participation and a willingness to take risks. This comfort factor encourages them to be more proactive and open to making mistakes, as mentioned earlier.



Figure 12. Games can be responsible for the development of various important skills in students

- ❖ **Higher Engagement:** The gamification of education significantly boosts student engagement and concentration levels. When learning is enjoyable and interactive, students are more likely to stay focused and retain information.
- ❖ **Critical Thinking:** Educational games encourage critical thinking and problem-solving. They often require students to think outside the box and consider the broader implications of their decisions, moving beyond simple rote learning.

2.3. Benefits of Using Educational Games in the Classroom

The integration of educational games into the classroom setting offers a multitude of **benefits for both educators and students**. These benefits go beyond just making learning fun and include:

- ❖ **Ownership of Learning:** Educational games empower students by giving them a sense of ownership over their learning journey. They become active participants rather than passive recipients of knowledge.
- ❖ **A Safe Space for Failure:** In the gaming world, failure is not a setback but an opportunity to learn and improve. Students are more willing to take risks and learn from their mistakes in a relaxed atmosphere.
- ❖ **Enhanced Enjoyment:** Learning becomes a fun and enjoyable experience when educational games are involved. This positive association with learning can lead to greater enthusiasm and motivation.
- ❖ **Visible Learning Progress:** With progress indicators built into games, students can see how far they've come and what they've achieved. This visibility motivates them to continue learning and striving for improvement.
- ❖ **Intrinsic Motivation:** Educational games can help students discover intrinsic motivations for learning. The desire to master a game or achieve high scores can drive them to explore and understand subjects deeply.
- ❖ **Identity Exploration:** Through avatars and characters in games, students can explore different identities, which can be especially beneficial for subjects related to empathy and understanding diverse perspectives.
- ❖ **Proactive Learning:** Students often feel more comfortable and confident in gaming environments, which makes them more proactive in their learning. They are willing to take initiative and engage actively with the material.
- ❖ **Thinking Beyond Worksheets:** Educational games encourage students to think beyond the confines of traditional worksheets. They introduce gamified consequences, making learning a dynamic and immersive experience.



Figure 13. Benefits of using games in the school classroom

2.4. Examples of Digital Educational Games

Educational games come in various forms, from physical board games to digital apps and online platforms. Here are some noteworthy **examples of digital educational platforms** filled with educational games spanning different subjects:

1. National Geographic Kids

National Geographic Kids offers a treasure trove of biology, history, and science games and experiments. It's an ideal resource for young learners interested in exploring the natural world.

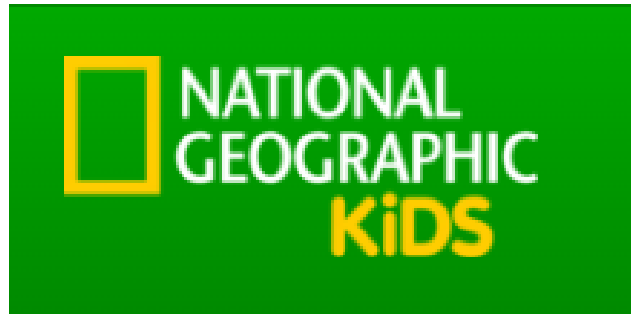


Figure 14. National Geographic Kids

2. Smithsonian STEM Games

Smithsonian STEM Games provides a diverse range of games covering life science, engineering, earth science, and more. These games are designed with clear learning objectives and have been vetted by curriculum experts.



Figure 15. Smithsonian Science Education Center

3. BrainPop

BrainPop offers programming and science games, among other educational resources. It is a valuable tool for educators looking to make complex subjects more accessible and engaging.



Figure 16. BrainPop

4. NASA Kids Club

NASA Kids Club is an initiative that allows kids to embark on an interactive journey through space. It features a series of engaging games that make learning about space exploration both fun and educational.



Figure 17. NASA Kids' Club

5. Science Kids

Science Kids is a comprehensive platform for science experiments, games, and resources. It caters to students who want to explore scientific concepts in a hands-on and interactive way.



Figure 18. Science Kids

6. Gizmos

Gizmos provides interactive math and science labs as well as virtual simulations for students in grades 3-12. These simulations allow students to explore and experiment with various scientific concepts.



Figure 19. Gizmos

7. CodeMonkey

CodeMonkey takes a gaming approach to teaching coding. It introduces coding concepts through fun and challenging games, making it an excellent choice for students interested in programming.



Figure 20. CodeMonkey

2.5. Examples of Physical Educational Games

Although digital educational games are increasingly growing in number and influence, there are countless examples of the good old **physical educational games** that can be incorporated into the classroom or learning environment:

Table 3. Physical game ideas for the classroom

<p>Scrabble</p>	<p>Scrabble is a classic word game that encourages vocabulary development and critical thinking. Players create words on a game board using letter tiles and score points based on the letters' values. It's an excellent way to enhance language skills and strategic thinking.</p>
<p>Math Bingo</p>	<p>Math Bingo is an engaging game that reinforces math concepts. Students are given Bingo cards with math problems, and the teacher calls out the answers. Students mark their cards with the corresponding answers, promoting quick mental math calculations.</p>
<p>Educational Board Games</p>	<p>Numerous educational board games are designed to cover a range of subjects, from history and geography to science and math. Games like "Settlers of Catan," "Ticket to Ride," and "Timeline" offer both fun and educational value.</p>
<p>Puzzle Solving</p>	<p>Puzzles, such as jigsaw puzzles and crossword puzzles, enhance critical thinking and problem-solving skills. They require students to analyze information, make connections, and think logically.</p>
<p>Geocaching</p>	<p>Geocaching is an outdoor treasure-hunting game that incorporates GPS technology. Participants use GPS coordinates to locate hidden containers (geocaches) filled with trinkets and information. It combines technology, navigation, and exploration.</p>

Science Experiments and Kits	Hands-on science experiments and kits allow students to explore scientific principles in a tangible way. Whether it's growing crystals, conducting chemical reactions, or building simple machines, these activities make science come alive.
History Reenactments	Organizing historical reenactments or role-playing games can immerse students in specific historical eras or events. They gain a deeper understanding of history by experiencing it firsthand.
Outdoor Nature Scavenger Hunts	Nature scavenger hunts encourage students to explore the outdoors while identifying and learning about plants, animals, and natural features. It promotes environmental awareness and observation skills.
Physical Education Games	Games like tag, relay races, and obstacle courses in physical education classes not only promote physical fitness but also teamwork, strategy, and sportsmanship.
Card Games	Card games like "Uno" and "Math War" can be adapted to reinforce math skills, strategy, and critical thinking. These games are easily customizable to focus on specific learning objectives.
Interactive Simulations	Interactive simulations, such as science experiments or historical simulations, provide hands-on experiences in a controlled environment. These can be set up in a classroom or outdoor setting to engage students in active learning.
Building Blocks and Engineering Kits	To promote creativity and problem-solving, building block sets like LEGO and engineering kits like K'NEX allow students to design and construct their own creations while learning about structural principles.

Educational games, whether physical or digital, have emerged as powerful tools for enhancing the learning experience. They embody principles such as active learning, gamification, and trial-and-error, creating an environment that fosters engagement, critical thinking, and a love for learning. With a wide array of educational games available across subjects, educators have the opportunity to harness the potential of gamified learning and empower their students to excel in their academic journeys. As technology continues to advance, the world of educational games is poised to evolve even further, offering new and exciting possibilities for education in the future.



*SCAN this QR Code with a scanner application
to reveal more information on this subject!*

CHAPTER 3

GAME DESIGN

3.1. Introduction to Educational Game Design

Game-based learning represents a significant shift in educational methodology, offering a blend of entertainment and educational value to engage and enlighten students. This approach to learning has been shown to enhance both the experience and the retention of knowledge, moving beyond traditional teaching methods to embrace a more interactive and exploratory learning environment (Gee, 2003). By effectively **integrating educational content within game mechanics**, educators can create immersive experiences that foster deeper understanding and engagement among students (Prensky, 2007).

Central to the creation of educational games is the **harmonization of core game elements—mechanics, dynamics, and aesthetics—with pedagogical goals**, aiming to produce an engaging and meaningful learning experience. Mechanics define the rules and systems within the game, dynamics are the emergent patterns of player interaction, and aesthetics concern the emotional impact on the player (Schell, 2008). The challenge lies in designing **games that are not only fun but also align with educational objectives**, ensuring that gameplay meaningfully contributes to learning (Kapp, 2012).

Game mechanics form the foundation of engagement in game design, shaping how players interact with the game world. In educational games, these mechanics must align with learning objectives to ensure that gameplay directly supports educational aims (Squire, 2006). For example, a game designed to teach historical facts might incorporate exploration and puzzle-solving mechanics to engage students in historical inquiry, fostering a deeper connection to the material (Van Eck, 2006).



Figure 21. Gamification Game Mechanics

Dynamics result from the interplay between game mechanics and player actions, leading to emergent behaviors and interaction patterns that make games engaging and replayable. In educational contexts, dynamics can simulate real-world challenges, encourage collaborative problem-solving, and facilitate experiential learning, allowing students to experiment and learn from their actions within a safe environment (Gee, 2005).

3.2. Learning Theories and Game Mechanics

Constructivism posits that learning is an active, constructive process where learners build new knowledge upon the foundation of their previous experiences (Piaget, 1954). In game design, this theory suggests that games should provide environments where learners can explore, experiment, and discover, facilitating the construction of new knowledge through gameplay. **Experiential learning**, similarly, emphasizes learning through experience, advocating for games that offer realistic scenarios and challenges for players to solve, thereby solidifying their understanding through action and reflection (Kolb, 1984).

Games leveraging these theories often feature open-world exploration, scenario-based challenges, and systems that encourage experimentation and iteration. Such mechanics not only engage students but also promote critical thinking, problem-solving, and the application of knowledge in novel contexts.

Designing game mechanics that align with specific learning objectives is crucial for educational effectiveness. For example, a game intended to teach mathematical concepts might incorporate puzzles that require mathematical reasoning to solve. This direct alignment ensures that the gameplay experience is intrinsically educational, with each game mechanic reinforcing a specific learning objective.

Feedback in games, much like in educational settings, provides learners with information about their performance and how it can be improved. Effective educational games incorporate immediate, actionable feedback, helping learners understand their mistakes and learn from them. Scaffolding, or the provision of support to learners at critical moments, can be built into game design through hints, adjustable difficulty levels, and resources that are made available according to the learner's progress and needs (Vygotsky, 1978).

Narratives in games serve not just as a backdrop but as a dynamic framework within which educational content can be explored and understood. Storytelling can contextualize learning objectives, making abstract concepts tangible and engaging for students (Barab et al., 2004). By situating educational goals within a compelling narrative, students are motivated to engage deeply with the content, as they are not just learning; they are participating in a story.

Incorporating characters, conflicts, and resolutions that align with educational themes allows students to see the real-world applications of what they are learning. For example, a game designed to teach scientific principles might center around a story where players must use their knowledge to solve environmental challenges, thereby placing education within an emotionally engaging context.

Themes in educational games serve as the unifying thread that ties the gameplay experience to the learning objectives. Effective thematic integration ensures that all aspects of the game—mechanics, visuals, and interactions—support the educational content. For instance, a game themed around ancient civilizations could include mechanics that involve building and managing a city, directly engaging with historical concepts.

Immersion is another critical aspect of game design, achieved through consistent and compelling thematic elements. A well-designed game environment invites students to immerse themselves fully in the learning experience, enhancing their ability to absorb and retain information.

3.3. Basic Parameters for the Design of a Game

A. Game Objective

One of the fundamental pillars of game design, especially within educational contexts, is the clear definition of objectives. These objectives not only guide the gameplay but also serve as the educational backbone, ensuring that the game's learning outcomes are intertwined with the gameplay experience. Understanding and articulately defining what players need to achieve to win the game is crucial for creating a structured and engaging learning environment.

The objectives of a game should be **clearly defined and communicated** to the players from the outset. This clarity helps to focus the players' efforts and provides a sense of purpose and direction. In educational games, the objectives should align with specific learning outcomes, such as mastering a set of skills, understanding a concept, or applying knowledge to solve problems. For example, in a game designed to teach mathematical concepts, the objective might be to solve a series of increasingly complex puzzles that require the application of mathematical operations learned in class.

When integrating educational content into game objectives, it's essential to strike a balance between challenge and achievability. Objectives should be challenging enough to motivate players but not so difficult that they become frustrating or discouraging. Incorporating incremental levels or milestones can

help players feel a sense of progression and achievement, encouraging continued engagement with the game and the material it aims to teach.

B. Player Interaction

In game design, particularly within educational contexts, the interaction between players is a crucial element that can significantly enhance learning outcomes. This interaction fosters **social learning, collaboration, and competition**, each contributing uniquely to the educational experience. Understanding and intentionally designing these interactions are essential for creating an engaging and effective educational game.

Interaction between players in educational games can generally be categorized into cooperative, competitive, and individualistic interactions, each serving different pedagogical purposes and catering to diverse learning styles and objectives.

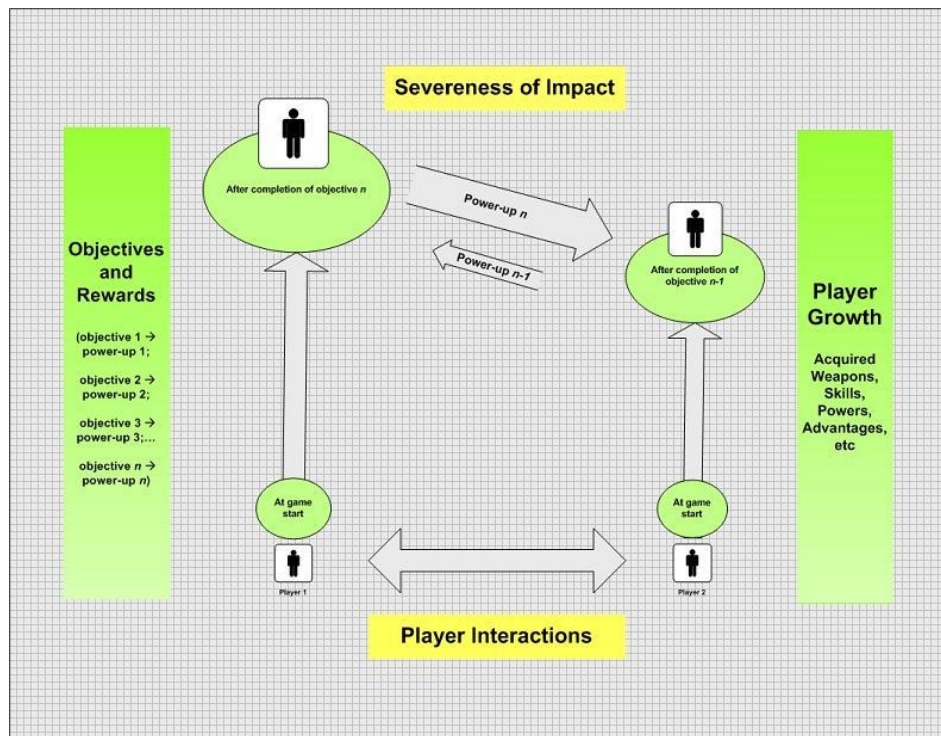


Figure 22. Game Progression, Player Growth and (Im)Balance of Powers

Cooperative Interaction: Players work together towards a common goal, sharing resources, strategies, and knowledge to achieve game objectives. This type of interaction encourages teamwork, communication, and problem-solving skills. Cooperative games can be particularly effective in educational settings by promoting collaboration and peer learning, helping students to develop social and emotional skills alongside academic knowledge (Johnson & Johnson, 1989).

Competitive Interaction: Players compete against each other to achieve game objectives, fostering a sense of challenge and motivation. Competitive interactions can stimulate engagement and effort, encouraging students to improve their knowledge or skills to surpass their peers. However, it's important to balance competition to ensure it remains healthy and supportive, rather than discouraging or stressful (Tauer & Harackiewicz, 2004).

Individualistic Interaction: Players engage with the game independently, focusing on personal achievement and self-improvement. This interaction style allows students to learn at their own pace, providing a personalized learning experience. Individualistic interactions can be beneficial for students who thrive in self-directed environments or for differentiating instruction to meet diverse learning needs (Deci, Koestner, & Ryan, 1999).

Designing for player interaction involves creating game mechanics and scenarios that facilitate the desired type of engagement. For example, cooperative games might include puzzles that require players to combine their knowledge or skills to solve, while competitive games might feature leaderboards or head-to-head challenges.

It's also crucial to consider the dynamics these interactions create and their impact on the learning environment. Games should be designed to encourage positive interactions, fostering an inclusive and supportive community among players. This may involve mechanisms for feedback and reflection, helping students to understand the value of collaboration, respect for competition, and the importance of personal growth.

C. Game Resources

In the realm of educational game design, **blending physical and digital elements** offers a multifaceted approach to learning, leveraging the strengths of both mediums. This hybrid model can provide immersive, interactive experiences that cater to various learning styles and preferences. At the same time someone might prefer the one or the other option based on the needs and the objective of the game. To effectively integrate both physical and digital games into educational settings, a comprehensive understanding of the necessary resources is essential.

Cross-Platform Development Tools: Tools that support the development of digital components that can interact with physical elements. Examples include AR (Augmented Reality) development platforms like ARKit and ARCore, which can bring physical game pieces to life through digital overlays.

Physical Game Materials: Basic prototyping materials for the physical aspects of the game (e.g., board pieces, cards, dice) along with technology for digital interaction (e.g., QR codes, NFC tags, sensors).

Digital Content Creation Tools: Software for creating digital content (e.g., Adobe Creative Suite for graphics, Unity for game development) that complements the physical components.

Educational and Curriculum Experts: Professionals who can ensure that the learning outcomes are effectively integrated into both the physical and digital aspects of the game.

D. Structural components of the game

Components typically refer to the various elements and pieces that constitute a game.

For instance, in a board game, components encompass all items found within the game's package, such as the board, dice, tokens, cards, etc.

Structural components represent a broader, more encompassing category than just the physical items included in a game. These components are essential for facilitating gameplay. For instance, a game might assign distinct roles (characters) to each player, a distinction not necessarily reflected in the physical pieces. Hence, the **foundational elements** of the game encompass both the characters and the players themselves.

Taking sports as an example (since sports are forms of games too), the components necessary for the game include, for example, basketballs in basketball or goals in soccer.

In digital games, the foundational elements comprise, among other aspects, the characters and their avatars, the courses or levels, the collectible items, and any objectives the player needs to achieve to progress through the game.

E. Game Rules

Game rules stand at the heart of any gaming experience, providing the essential guidelines that shape how the game is played. These rules are crucial in defining the scope of the game, setting the stage for the challenges to be faced, and determining how victory is achieved. Beyond their function of maintaining order and fairness, rules in educational games play a pivotal role in **embedding learning objectives into the fabric of gameplay**. They

cleverly disguise learning activities as engaging challenges, seamlessly blending education with entertainment.

Rules **dictate the pace of the game and ensure that players remain engaged** by offering an optimal level of challenge. They are designed not only to test the players' skills and knowledge but also to stretch their abilities and encourage growth. This careful balance between difficulty and skill level is what keeps players in a state of flow, fully immersed in the game. The educational content woven into the rules allows players to learn naturally and intuitively as they play, making complex concepts more accessible and enjoyable to grasp.



Figure 23. Rules define game objects and allowable actions by the players

Moreover, the social dynamics of gameplay, which are also governed by rules, **encourage players to interact, communicate, and collaborate**. These interactions are not just fundamental for the game but are also reflective of social learning processes, where players learn from each other and develop important social skills. In this way, game rules do more than just guide the gameplay; they create a rich, interactive environment where learning is a dynamic and collective experience.

In crafting these rules, designers of educational games are faced with the **challenge of balancing educational goals with gameplay enjoyment**. The success of a game in achieving its educational objectives largely depends on how well these rules are designed to engage the player while effectively conveying the intended lessons. Through strategic rule design, educational games have the potential to transform traditional learning paradigms, making learning an active, engaging, and deeply rewarding journey.

F. Gameplay and Game Mechanics

Gameplay and mechanics are the driving force behind any game, defining the way players interact with the game world and with each other. These elements work together to create an engaging and immersive experience that captivates players, drawing them into the game's narrative and challenges.

Gameplay refers to the specific way in which players interact with a game, the experiences and strategies that the game's rules and mechanics facilitate. It encompasses everything from navigating through game levels, solving puzzles, and completing quests, to engaging in battles and making strategic decisions. The essence of gameplay lies in the player's experience, which is shaped by the game's mechanics and the challenges presented (Salen & Zimmerman, 2004).

Game mechanics, on the other hand, are the rules and systems that govern the game's operation. These include the algorithms and protocols for scoring, player movement, conflict resolution, and the progression of the game. Mechanics are the tools that designers use to create challenges and obstacles for the player, as well as opportunities for creativity and problem-solving. They are the building blocks of gameplay, dictating the actions that players can take within the game world (Schell, 2008).

The **interaction** between gameplay and mechanics is crucial for creating an educational game that is both fun and informative. Good game design uses mechanics in a way that aligns with educational objectives, turning gameplay into a learning experience. For instance, a game designed to teach mathematical concepts might use mechanics that require players to solve math problems in order to advance. This seamless integration of learning content into the game's mechanics makes the educational process engaging and interactive, allowing players to learn through doing (Gee, 2003).

Furthermore, the **feedback systems** inherent in gameplay and mechanics provide immediate responses to the player's actions, which is essential for learning. These systems inform players about the consequences of their decisions, helping them understand the concepts being taught and how they apply in different contexts (Hattie & Timperley, 2007).

3.4. The Process of Designing an Educational Game

❖ Stage 1: Conceptualization

In the initial stage, the primary focus is on laying the groundwork for what will eventually become a tool for learning and engagement in the classroom. This stage is pivotal as it sets the direction for all subsequent design and development efforts. It comprises two critical components: identifying educational objectives and conducting a target audience analysis.

Identifying Educational Objectives:

At the outset of the conceptualization process, a **clear definition of the game's educational objectives** is paramount. These objectives are the cornerstone of the game's design, influencing both the content and mechanics to be developed. It's essential that these objectives adhere to the SMART criteria—specific, measurable, attainable, relevant, and time-bound—to align with curriculum standards and learning outcomes (Doran, 1981). This alignment ensures the game functions as a robust educational tool, complementing traditional teaching methods by targeting areas within the curriculum where students commonly face challenges or where there is a potential to boost engagement levels significantly.

For instance, in a game aimed at enhancing mathematical understanding, objectives might range from mastering specific concepts like fractions to fostering critical problem-solving skills (Gee, 2003). The key is to ensure these goals are deeply embedded in the game's fabric, offering diverse and engaging pathways to learning and concept mastery.

Target Audience Analysis:

Understanding the target audience is equally critical in the conceptualization phase. This analysis goes beyond basic demographics such as age and educational background to delve into the learning preferences, interests, and challenges faced by the student population. Such an understanding ensures that the game's **complexity, content, and design are tailored to meet the students' needs, maximizing engagement and learning efficacy.**

Conducting focus groups, surveys, or interviews with potential players can provide valuable insights into their preferences, including the types of games they find engaging, the themes that interest them, and the challenges they face in the learning process. Additionally, considering cognitive development stages is essential when designing for different age groups, as this will impact the game's complexity and the type of content that is appropriate.

Incorporating elements of gamification that resonate with the target audience, such as competitive elements for older students or storytelling and characters for younger learners, can enhance engagement. Moreover, accessibility should be a key consideration, ensuring that the game is inclusive and can accommodate students with varying learning needs and abilities.

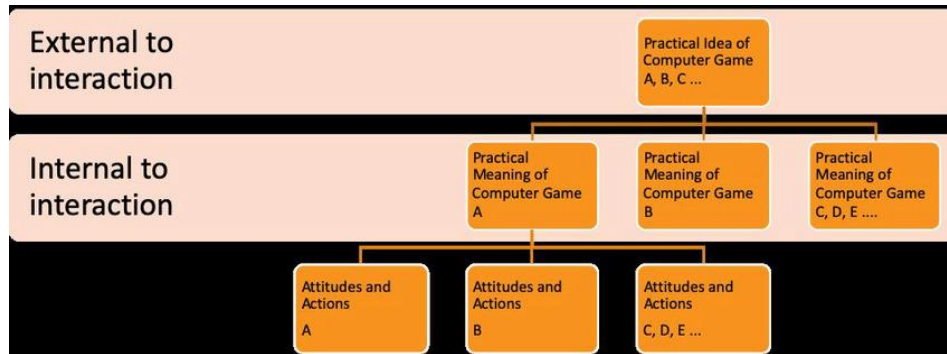


Figure 24. A pragmatic conceptualization of computer games

❖ Stage 2: Design Planning

This stage is where the conceptual foundation begins to take shape, transforming ideas into actionable plans. This stage is crucial for delineating the structure of the game, ensuring that it aligns with educational goals and resonates with the target audience.

Game Type Selection:

Choosing the type of game - be it digital, physical, or a hybrid form - is a pivotal decision influenced by several factors: the educational objectives, the characteristics and preferences of the target audience, and the resources at your disposal (Salen & Zimmerman, 2004). Digital games, for example, are well-suited to interactive and adaptive learning experiences, offering a vast array of multimedia elements to engage students. Physical games, on the other hand, can enhance social interaction and kinesthetic learning, providing a tangible connection to educational content. Hybrid games combine elements of both, potentially offering the best of both worlds but requiring careful consideration of logistics and technology integration. The **choice should support the intended learning outcomes**, catering to the way your audience learns best while also considering the practicalities of development and implementation within your educational setting.

Storyboarding and Scenario Development:

Developing a compelling narrative or scenario is key to engaging players and embedding educational content naturally within the gameplay (Sheldon, 2004). Storyboarding helps visualize the game's progression, illustrating how

players will interact with the story and the educational elements. This process involves creating a sequence of panels or sketches to outline the game's narrative flow, major events, and key interactions. A well-crafted story or scenario can captivate players, making learning objectives more relatable and memorable by placing them within a context or story that players care about. The challenge lies in seamlessly integrating educational content so that learning objectives are met through the act of playing, without disrupting the narrative flow or gameplay.

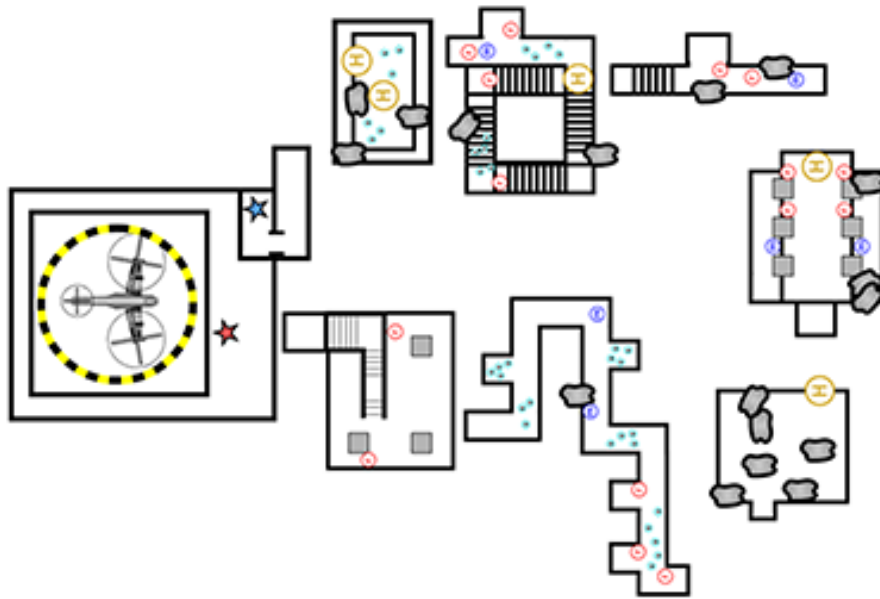


Figure 25. Example of game level planning

Game Mechanics and Rules Definition:

Defining the game's mechanics and rules is where the **educational objectives begin to materialize into the structure of the game** itself (Fullerton, 2014). Mechanics are the actions, processes, and operations players can perform within the game, while rules establish the framework that governs these mechanics. Together, they dictate how the game is played and how it teaches, guiding both the gameplay experience and the learning process. The mechanics should be designed to challenge players in ways that align with the educational goals, requiring the application of knowledge or skills that the game seeks to teach. Rules set the boundaries and objectives within the game, providing structure and goals that motivate and direct the player's actions. This stage requires a careful balance, ensuring that the game is both engaging and educational, challenging players enough to keep them interested while also providing a meaningful learning experience.

❖ Stage 3: Prototyping

This stage is fundamental for exploring the practical aspects of the game's design, allowing developers to iterate and refine ideas through tangible prototypes and initial playtesting.

Creating a Prototype:

The development of a prototype involves creating a **simplified version of the game that encapsulates its core elements**, including the gameplay mechanics, narrative elements, and educational content (Schell, 2008). For board games, this might involve crafting a basic paper model with drawn elements and makeshift pieces, whereas for digital games, developers might create a basic digital mockup or a minimal viable product (MVP) that allows for the interaction with key game functions. The prototype does not need to be polished or complete; its primary purpose is to bring the concept to life in a form that can be tested and evaluated. This step is crucial for identifying any discrepancies between how the game was envisioned and how it functions in practice, providing a foundation for refinement.

Initial Playtesting:

Once a prototype is developed, the next critical step is **initial playtesting**, which involves conducting sessions with a small group from the target audience to evaluate the game's effectiveness, engagement level, and integration of educational content (Fullerton, 2014). Playtesting serves multiple purposes: it assesses the intuitiveness of the game mechanics, the appeal of the narrative, the clarity of the rules, and the effectiveness of the educational content. Feedback gathered during these sessions is invaluable for identifying areas of confusion, elements that do not engage as intended, and aspects of the game that effectively convey the educational material. It's essential to observe not only what players say but also their behavior and engagement levels during play. This direct feedback loop allows developers to make informed adjustments to the game, enhancing its educational value and player experience.

❖ Stage 4: Development and Iterative Playtesting

The fourth stage is crucial for ensuring that the game not only functions as intended but also effectively meets its educational objectives within a classroom setting.

Full-scale Development:

In this phase, the game is expanded into **a more complete version, incorporating all the intended design elements**, including advanced graphics, user interfaces, sound effects, and, for digital games, coding for more complex interactions (Schell, 2008). For physical games, this might involve the production of high-quality materials and components. This development process is **guided by the feedback received** during the initial playtesting phase, ensuring that the game's design evolves in response to user interaction. The focus is on creating a version of the game that is as close to the final product as possible, with detailed attention to how each element—be it a character, a puzzle, or an educational challenge—contributes to the overall learning experience. It's also a time to **ensure that the game's content is accurate, engaging, and aligned with educational standards**, making it suitable for classroom use.

Iterative Testing and Refinement:

With a more complete version of the game in hand, iterative testing becomes the cornerstone of this stage. This involves **continuous playtesting with the target audience** to refine the game's content, mechanics, and usability (Fullerton, 2014). Each round of testing provides critical feedback on various aspects of the game, from the clarity of its rules and the effectiveness of its educational content to the intuitiveness of its interface and the engagement level of its gameplay. It's essential to observe players as they interact with the game, noting both their verbal feedback and their non-verbal cues, such as expressions of frustration or excitement. This feedback loop allows developers to make targeted adjustments, enhancing the game's educational value and user experience.

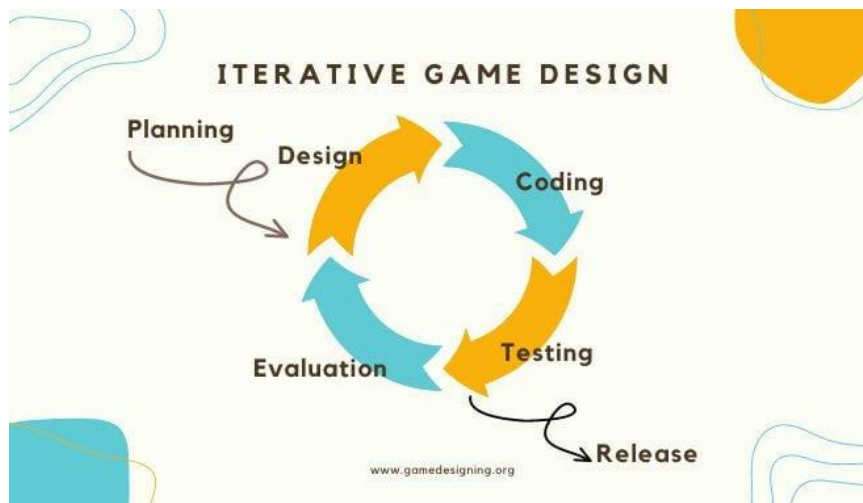


Figure 26. Iterative Game Design Idea (Simplified)

❖ Stage 5: Implementation and Evaluation

Here is where the educational game transitions from development to practical use within its intended learning environment. This phase is critical for assessing the **game's real-world impact on learning and engagement**, requiring careful planning and execution to ensure successful integration and meaningful evaluation.

Implementation in Educational Settings:

Introducing the game into the classroom or another educational setting marks a significant milestone in the game's lifecycle. This process involves not just the physical introduction of the game but also preparing the learning environment for its integration (Qian & Clark, 2016). Educators play a pivotal role at this stage, as they need to understand the game's mechanics, objectives, and educational content to effectively **facilitate gameplay and learning**. Training sessions or workshops can equip educators with the necessary skills and knowledge to guide students through the game, ensuring that its introduction is smooth and its integration into the curriculum is seamless.

Preparation also includes setting clear expectations for students, explaining the game's role in their learning journey, and how it aligns with their course objectives. Logistics, such as scheduling game sessions, ensuring access to required technology or materials, and adjusting classroom layouts, if necessary, need to be addressed to accommodate the new teaching tool.

Assessment and Evaluation:

Measuring the game's effectiveness in achieving its educational objectives is essential for understanding its value and impact (Whitton, 2012). This evaluation should be multifaceted, incorporating direct assessments of learning outcomes, observations of engagement and interaction, and feedback from both students and educators.

Learning Outcomes: Assessments can take various forms, from quizzes and tests aligned with the game's content to projects or presentations that allow students to apply what they have learned. These assessments help quantify the game's impact on knowledge acquisition and skill development.

Engagement and Interaction: Observational data and qualitative feedback can provide insights into how students engage with the game and with each other. Factors like time spent on task, expressions of frustration or satisfaction, and the nature of student collaboration can indicate the game's engagement level and its effectiveness as a learning tool.

Feedback from Players and Educators: Surveys, interviews, or discussion sessions with students and teachers can offer valuable perspectives on the game's usability, relevance, and educational value. This feedback is crucial for identifying strengths and areas for improvement, providing a basis for further refinement.

Collecting and analyzing data from these various sources allows for a comprehensive evaluation of the game's effectiveness. It not only assesses whether the game meets its intended educational objectives but also provides insights into how it might be improved for future iterations.



*SCAN this QR Code with a scanner application
to reveal more information on this subject!*

CHAPTER 4

DEVELOPING LESSON

PLANS USING

GAME-BASED LEARNING

AND GAMIFICATION

ELEMENTS

4.1 What is a Lesson Plan and How to Develop it Effectively

A lesson plan is a detailed outline of the instructional strategies, activities, and assessments designed to achieve specific learning objectives. It serves as a guide for educators to structure their teaching, ensuring that they cover the necessary content and engage students effectively. According to Farrell (2002), lesson planning involves a "systematic recording of thoughts about what will be covered during a lesson".

In modern education, engaging students and fostering effective learning experiences are paramount. Game-Based Learning (GBL) and gamification have emerged as innovative pedagogical approaches that captivate students' attention and enhance their understanding of various subjects. Developing lesson plans that incorporate GBL and gamification requires careful consideration of educational objectives, game design principles, and effective teaching strategies. This comprehensive guide will delve into the process of creating lesson plans that leverage GBL and gamification to maximize educational outcomes.



Figure 27. Lesson planning is essential in teaching

A Lesson Plan usually includes the following:

Learning Objectives: Clear, concise statements outlining what students are expected to learn by the end of the lesson. These should be specific, measurable, achievable, relevant, and time-bound (SMART).

Materials and Resources: A list of all the materials, tools, and resources needed for the lesson. This may include textbooks, digital tools, handouts, and multimedia resources.

Instructional Procedures: A step-by-step outline of the teaching methods and activities. This section includes the introduction, guided practice, independent practice, and closure (Hunter, 1982).

Assessment and Evaluation: Strategies for assessing student understanding and measuring learning outcomes. This can include formative assessments like quizzes and discussions, as well as summative assessments such as exams and projects (Guskey, 2003).

Differentiation and Accommodations: Plans for addressing the diverse needs of students, including those with learning disabilities, English language learners, and gifted students.

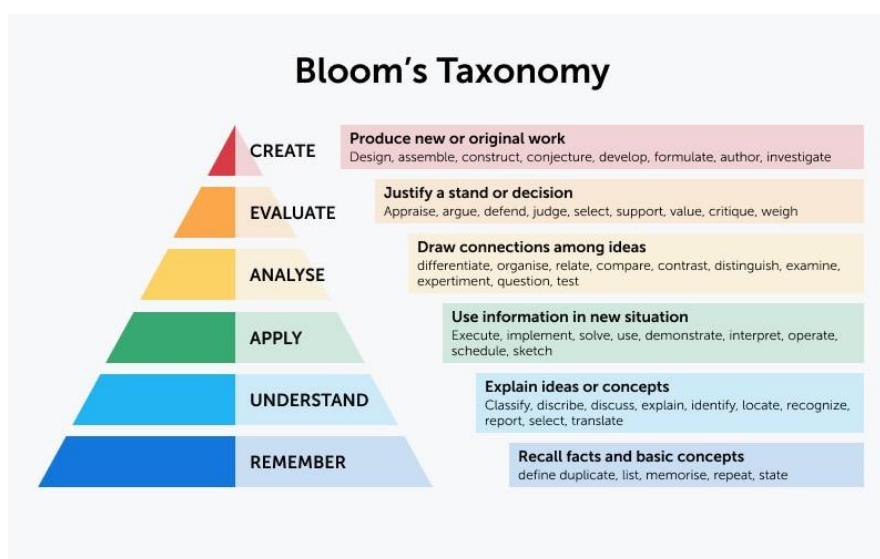


Figure 28. Incorporating Bloom's Taxonomy into lesson plans ensures a comprehensive approach to cognitive development of the students

4.2. The Educational Significance of GBL

Before delving into the intricacies of lesson planning, it's essential to understand why GBL holds such promise in education.

One of the most significant advantages of GBL is its ability to **engage and motivate learners**. Traditional teaching methods often struggle to maintain students' interest throughout a lesson. GBL addresses this issue by providing an immersive and interactive learning environment. The inherent challenge, competition, and reward systems in games capture students' attention and sustain their enthusiasm for learning.

Game-based Learning offers a **multisensory learning experience**. Through visuals, auditory cues, and tactile interactions, students receive information through multiple channels, enhancing their comprehension and retention of the subject matter. This multisensory approach accommodates diverse learning styles, making it more inclusive for all students.

Games promote the **development of various skills**, including problem-solving, critical thinking, decision-making, and collaboration. These skills are not only essential for academic success but also for preparing students for real-world challenges and future careers.

GBL also encompasses a **diverse array of games**, each offering unique benefits and catering to different educational objectives. To create effective lesson plans, educators must be familiar with the types of games commonly used in GBL. It can be effectively integrated into **various subject areas**, enhancing the learning experience and improving students' comprehension. Here are some examples of subjects where GBL can be particularly beneficial:

- ❖ **Mathematics** is a subject that often requires practice and problem-solving. GBL offers math games that make learning math concepts enjoyable and interactive. These games can reinforce arithmetic skills, geometry, algebra, and more.



Figure 29. Mathematics activity using a game

- ❖ **Geography** education often involves memorization and understanding of maps, countries, and cultures. Interactive geography games can make the learning process more engaging and help students develop a deeper appreciation for the world.
- ❖ Studying **history and cultural heritage** is essential for understanding society and fostering cultural sensitivity. GBL can provide immersive experiences that take students back in time, allowing them to explore historical events and cultural traditions in an engaging manner.
- ❖ **Physical education** is not just about sports; it's also about developing teamwork, problem-solving, and physical fitness. GBL can supplement physical education programs by offering sports simulations and fitness challenges that keep students active and motivated.

4.3. Lesson Plans Development

Having established the importance of GBL and its relevance across various subject areas, let's dive into the process of developing GBL lesson plans. Effective GBL lesson plans should align with educational objectives, leverage game mechanics, and consider students' diverse learning needs.

❖ Setting Clear Learning Objectives

Start by defining clear and specific **learning objectives** for your GBL lesson. What do you want your students to achieve by the end of the lesson? Be precise in outlining the knowledge or skills they should acquire. It is important to ensure that your **learning objectives align with curriculum** standards and educational guidelines relevant to your subject and grade level. This ensures that the GBL lesson plan complements the broader educational framework.

❖ Game Selection and Integration

Select games that align with your learning objectives. Consider the type of game (digital or logical/physical) that best suits your lesson plan and students' preferences. After that, **tailor the game** content to fit your educational objectives. For example, if you're using a digital math game, ensure that it covers the specific math concepts you want to teach.



Figure 30. It is important to choose appropriate games based on your students

Finally, you can integrate the selected game into your lesson plan seamlessly. Clearly outline **when and how** students will engage with the game within the broader context of the lesson.

❖ Designing Engaging Game Mechanics

Identify the game mechanics that will enhance engagement and support your learning objectives. Common game mechanics include points, challenges, rewards, and leaderboards. It is vital to encourage healthy **competition and collaboration** among students. Game mechanics can motivate students to excel while also promoting teamwork and peer learning.

❖ Assessing Student Progress

Incorporate **feedback mechanisms** within the game or lesson plan to inform students of their progress. Feedback can include immediate scoring, in-game achievements, or post-game assessments. Regularly monitor students' performance within the game. This allows you to gauge their understanding of the subject matter and identify areas where they may need additional support. Then, use the data gathered from student performance to **adapt your teaching approach**. Differentiate instruction to meet individual learning needs, providing extra challenges for advanced students and additional support for those who require it.



Figure 31. “Learners need endless feedback more than they need endless teaching” - Grant Wiggins

❖ Evaluating and Improving GBL Lesson Plans

Gather feedback from students regarding their experiences with the GBL lesson. This can provide valuable insights into what worked well and what can be improved. Then, you can actually reflect on your GBL lesson plan's effectiveness and iterate on it for future use. Consider making adjustments based on student feedback and your own observations. It is important to stay up-to-date with developments in GBL and educational technology. New games and tools are continually being released, offering fresh opportunities for **enhancing your lesson plans**.

4.4. Incorporating Gamification Elements

While GBL focuses primarily on the use of games for learning, gamification involves integrating game elements and principles into non-game contexts to motivate and engage learners.

Gamification harnesses the motivational power of games to enhance engagement and participation in various educational activities. It applies game-design elements and principles to non-game settings, making learning more enjoyable and motivating. Common **gamification elements** include points, badges, leaderboards, challenges, rewards, and progress tracking. These elements can be strategically integrated into lesson plans to encourage students to actively participate and achieve educational goals.

To effectively incorporate gamification elements into your lesson plans, consider the following steps:

- ❖ **Define Learning Objectives:** Clearly articulate your learning objectives, just as you would for a GBL lesson plan. Identify the specific skills or knowledge you want students to acquire.
- ❖ **Select Appropriate Gamification Elements:** Choose gamification elements that align with your learning objectives. For example, if you aim to reinforce problem-solving skills, consider implementing challenges and leaderboards.
- ❖ **Design Engaging Game Mechanics:** Create game mechanics that encourage active participation and competition. Ensure that the mechanics are intuitive and motivating for students.
- ❖ **Provide Feedback and Recognition:** Implement feedback mechanisms that inform students of their progress and achievements. Recognize and reward students for their efforts and accomplishments.
- ❖ **Evaluate and Adapt:** Continuously evaluate the effectiveness of your gamified lesson plan. Gather feedback from students and make necessary adjustments to improve the learning experience.



ANNEXES

A. Good Practices in Partner Countries

The three partners of this project have collected information on good practices that have been undertaken in their countries in the general context of the subject of this project.

The material was found online and provided during the **desk research** phase of our output. Each partner organization has selected **three case studies** of particular interest relating to Game-based Learning education and Gamification examples, mainly to its national context or involving organizations from the same country.

The research does not in any case claim to be exhaustive, both because of the extent of the subject of this project and because it responds to the need to find useful examples for the usability of games and game elements in the educational process. However, it offers a varied observatory capable of providing food for thought on the variety of means used, the objectives pursued and achieved, the methods of involving the public, etc.

1. FemSTEAM Mysteries: A Role-Model Game-Based Approach to Gender Equality in STEAM



Figure 32. Women in STEM

Name of the Organization where the Case is Implemented

European University Cyprus EUC

Profile of the Organization as Stated in its Website

Emphasizing high-level, student-centered academics, a diverse and inclusive student body and powerful corporate, community and government links, EUC is a trustworthy and reliable partner in your pursuit of higher education

Rising in the rankings, European University Cyprus has been gaining local, regional and global acknowledgement of our efforts to be a student-focused and innovative institution, with an emphasis on an international orientation, sustainability and industry/community engagement.

With a history of more than 60 years, European University Cyprus has grown into a leading academic and research institution in the region with Schools of Medicine, Dentistry, Sciences, Business, Law, and Humanities, Social & Education Sciences and a Distance Education Unit.

Access Link

<https://femsteam-project.eu/>

Target Group

- Young girls, age 12-15: Empowering them through role-model game-based education in approaching STEAM, finding inspirational personalities and planning their careers without considering social stereotypes.
- Young boys, age 12-15: Empowering them to respect their female classmates and later coworkers without stereotypes by acquainting them with the importance of female contributions in STEAM.
- STEM Secondary Education Teachers: Enhancing their skills and professional development by providing them innovative educational methods to make the role of women visible in their STEAM classroom.
- STEM Professionals: Such as trainers, career coaches, science communicators, art curators, researchers, university staff.

Description of the Case

The project "FemSTEAM Mysteries" is based on the values of gender equality and non-discrimination between men and women in the fields of Science, Technology, Engineering, Arts and Mathematics (STEAM), creativity and innovative entrepreneurship. Through the adoption an innovative approach, that integrates STEM and Arts, and combines Role-Model and Game-based methodology with a mystery story-telling digital game (escape room) that engages teenagers (age 12-15), "FemSTEAM Mysteries" aims to create a new culture and attitude amongst teachers and students.

Although many women have contributed massively to the progress of science and technology, very few students as well as teachers in Europe learn and know about them. As a result, girls are reluctant to follow STEM careers (under 35% in scientific fields at a European level). Science is considered a "male field" and young men are usually underestimating the competence of females in those fields. The situation is similar in visual arts education. Gender inequality has led to the underrepresentation of female artists and to male domination of art history. As a result, the vast majority of the famous artists students get acquainted with, are males. In school educational material, the role of women in STEAM is highly underestimated, almost absent. Thus, a need exists for providing students with examples, paradigms and role-models, so as to keep open the option for STEAM careers for girls, and to reduce prejudices.

"FemSTEAM Mysteries" is designed to counteract this tendency for gender inequality in the STEAM by bringing out the significant role of women in STEAM to students' and teachers' community, thereby fighting stereotypes of students and teachers, while providing role models for young girls to follow STEAM careers and also young boys to empower their female classmates and co-workers.

The objectives of "FemSTEAM Mysteries" project are:

- To bring out the significant role of women in STEAM (Science, Technology, Arts, Engineering and Maths).
- To fight stereotypes of students and teachers.
- To inspire young girls through role-model game-based STEAM pedagogy to follow STEAM careers.
- To enhance acquisition of key skills and competences for STEAM studies and careers of all students (boys and girls) through engaging game-based activities and a mystery.

2. Gamification and Education



Figure 33. Gamification in the Classroom

Access Link

<https://www.youtube.com/watch?v=8lp0W4AWKIk>

Target Group

Primary and Secondary school teachers and students.

Description of the Case

This case presents the master thesis of two students of the University of Macedonia. The students created two games for usage in the school classroom.

The first presents to the students Homer's Odyssey in a gamified way, in an effort to present with the help of IT tools to the children, in an interesting way and together with interactive material the adventure of Odysseus.

The second one, is a mobile application who aims to change the dietary habits of children, pushing them to adopt more healthy habits. While playing the game, children are using the main hero to collect healthy foods winning points at the same time.

3. Heritage Quest AR



Figure 34. Heritage Quest AR Application

Access Link

https://play.google.com/store/apps/details?id=com.ImpactGames.HeritageQuestAR&hl=en_US

Target Group

Whoever is interested in the subject of cultural heritage and learning from the past!

Description of the Case

Heritage Quest AR offers an unparalleled adventure through time, blending the thrill of discovery with the power of Augmented Reality. Dive into the rich history of Roman Empire in this immersive story-based game, where you'll live the life of Felix, a 12-year-old boy from the 2nd century, and his family in the historically rich Danube

Limes region. Your journey is set in the vividly reimagined Villa Rustica near the ancient military camp of Gerulata, in what is now Slovakia.

Heritage Quest AR invites you to explore the daily lives of both Roman and non-Roman citizens through the eyes of Felix, experiencing firsthand the joys, trials, and adventures of ancient times. With each step, unravel the mysteries of the Vitelli family and their life along the Danube Limes.

Through the magic of Augmented Reality (AR), the world of the 2nd century comes alive right before your eyes. Discover authentic archaeological sites and remnants, meticulously recreated to offer a mesmerizing and educational experience. Heritage Quest AR seamlessly integrates fiction with reality, allowing you to interact with history in a way that's both engaging and enlightening.

Whether you're a fervent historian eager to walk through the past, or an adventure lover looking for a unique journey, Heritage Quest AR promises an experience like no other. Delve into the heart of ancient civilizations, and let the game's rich narrative and stunning AR visuals transport you to another era.

4. Location-Sensitive Game-based Training of School Youth for the Reduction and Control of CO2 Emissions

58



Figure 35. Environmental Education

Name of the Organization where the Case is Implemented

PHOEBE Research and Innovation Ltd (PHOEBE)

Profile of the Organization as Stated in its Website

PHOEBE is an SME dealing with the design, development and realization of cloud-based solutions to help system operators and consumers enhance efficiency, security and quality of their services.

The organization's vision is to make smart technologies accessible to industrial operators by designing cloud-based software and hardware solutions, combining state-of-the-art research, crowd-sourcing and machine learning, addressing challenges related to energy efficiency, waste reduction and enhanced security.

Access Link

<https://ecoscore.eco-responsible.training/about/>

Target Group

- School youth: Public and/or private schools' children aged 10-16 years in the partner countries and beyond, who are ecologically sensitive and are eager to know more about CO2 emission sources and practices and ways to control it. Currently, significant gaps exist in the understanding of the root of the problem, so as to implement the most effective actions.
- School management, youth teachers and school workers: These are the people everyday around the school children, who are able to make decisions and contribute to the effective implementation of the ECO-SCORE activities and recommendations. Currently, there is no coordination of the way these people work towards the CO2 reduction objectives.
- NGOs active in green deal activities: Citizen and entrepreneurship initiatives in the local societies, which can be integrated to the ECO-SCORE activities to maximise the impact.
- Education, health and environment policy makers: Policy makers are a key stakeholder in establishing the framework conditions which support the green skills. Currently, they are lacking the engaging mechanisms and the successful use-cases, which will give them the tools to accelerate the development of new policies supporting the green deal.
- Local and broader society, including parents and other citizens: Like the people working in the school, all people around the children are key contributors to the overall understanding of the CO2 reduction needs and actions and the actual implementation of the activities.

Description of the Case

The objectives of the project are:

- Implementation of the ECO-SCORE learning objects and activities in the school curriculum of 10 public/private schools across the EU.
- Six (6) NGOs or other relevant organisations implementing engaging green activities using ECO-SCORE results.
- Twenty (20) engaging learning objects building on top of ECO-SCORE results created in a 3-year timeframe across the partner countries.
- Policy recommendations taken by at least 2 policy makers in each country.

Those outcomes will be achieved by implementing the following activities:

- Study and recording of current behaviour and profile of schools regarding CO2 emissions and air quality overall.
- Production of 5 interactive and engaging learning objects and activities to facilitate the green skills' acquisition by school youth and relevant stakeholders.
- ECO-SCORE Implementation and Sustainability Handbook and Policy Recommendations.
- Meetings in partner countries in parallel with focus groups, stakeholders' workshops, etc.

The expected impact will be:

- A study of the eco-awareness and gas footprint of schools.
- A Learning Module book, printable in pdf and also served online through a widely adopted eLearning Platform.
- Assessment interactive quizzes.
- Game design workshops and scenarios.
- A package of small guides for the implementation of the ECO-SCORE material.
- A set of structured policy recommendations.

5. Project – My Smart City



Figure 36. Smart City in Minecraft

Access Link

<https://drive.google.com/file/d/162pFaW76hI5XVtKYASruOlfMXygxI5VF/view>

Target Group

Secondary Education Students

Description of the Case

One of the greatest challenges of the contemporary world and of our future sees the city and its development as the protagonist. Climate change, rising water levels (affecting many coastal cities such as Venice), pollution and population growth are just some of the problems that every urban center must face, an ambitious but necessary goal to safeguard our planet: changing the city and the attitude of its inhabitants will positively benefit the entire planet.

For this reason, it is of fundamental importance to design, build and improve our urban centres, a challenge towards innovation for all the various bodies responsible for solving the innumerable problems that lie along our path: the management of the limited resources available in relationship to population growth, air, water and noise pollution, the morphology of territories at risk of natural disasters, infrastructure, transport and digital education, just to name a few.

It is clear, therefore, that only with courage and ambition will we be able to assemble the pieces of this intricate puzzle together. Given these assumptions, how can a student benefit from building a city in Minecraft? Isn't this too much of a challenge for the class?

The answer is immediate: it isn't. The student will certainly have to deal with complex issues, but the road towards the creation of the Smart City will be fun and full of stimulating moments that will make the experience unique and unrepeatable. Unrepeatable because in Minecraft every world, every story created, will never be identical to the previous one.

The strength of Minecraft lies mainly in its immersive capacity: by moving in first person in this virtual world you will have the sensation that our actions have repercussions on the surrounding environment and on the other living beings present; every choice we make will have concrete consequences in the game world.

The other great advantage of using this software is the transversality of the school subjects addressed in this project: logic, mathematics, grammar, history, geography, design, electronics, civic and digital education. (Others could be added, such as

music, chemistry, art...). The path that will lead our students to the creation of a city up to its Smart expansion will be a road full of adventures, problems to solve and great satisfaction.

6. Playing & Learning from the Past



Figure 37. Playing & Learning from the Past EU Project

Name of the Organization where the Case is Implemented

CRHACK LAB FOLIGNO 4D

62

Profile of the Organization as Stated in its Website

The CRHACK LAB FOLIGNO 4D was created to help young people develop an addiction to innovative thinking and acquire a conscious digital practical culture, exposing them in advance to the most advanced technologies to prepare them for the new jobs that will arise in the next decade. All this with the accompaniment of a team of mentors whose multidisciplinary skills range from management and enhancement of cultural heritage to spatial computing, including communication, art, publishing and design. The NGO works as an Open Lab that makes available innovative AR/ VR technologies (such as AR/VR headsets, 3D printers, etc) to the local community with the aim to involve disadvantaged youngsters who otherwise would not have access to these technologies. Particular attention is driven to the inclusion of those who are at risk of social exclusion.

Access Link

<https://www.playandlearnproject.eu/index.php/en/>

Target Group

Target group of this project are school communities and the general educational public.

Description of the Case

The proposed project is an intercultural project that aims to contribute to the support and development of emerging cultural and digital literacy of learners, along with the improvement of literacy skills, by utilizing the cultural identity of each country using online applications. It was chosen to cultivate skills, attitudes and values in terms of social significance, preservation and transmission of cultural heritage. At the same time, through ICT, learners will be given the opportunity to combine the real world with three-dimensional virtual objects, to interact and collaborate inquiringly, utilizing their empirical-experiential knowledge through the possibilities offered by multimodal approaches. Cultural Heritage and Technology encourage the cooperation and coexistence of peoples through the identification and transmission of common elements, cultivating in learners' tolerance for difference and the importance of diversity, freeing them from future xenophobic syndromes, stereotypes and prejudices

The aim of this project is to strengthen the European dimension through interculturalism and the understanding that technology does not overturn its tradition and notification elements, but instead, with appropriate manipulations and techniques, highlights it through the combination of virtual and real world. It aims through the improvement of literacy skills to contribute to the support and development of the emerging cultural and digital literacy of learners by utilizing the cultural identity of each country using online applications, interactive games and cutting-edge technologies such as virtual and augmented reality.

Specifically, the expected results of the program are expected to be the following:

- Through the acquaintance and presentation of the local cultural heritage of the countries involved, to cultivate the sense of "belonging" to a wider community, to reduce social inequalities and to promote cultural and social participation and integration.
- Through the use of new technologies to provide opportunities for skills development, creativity and group participation with an emphasis on equality and the fight against discrimination to realize the vision of a school open to Europe.
- Cultivation of traditional knowledge and skills necessary for the preservation and sustainable management of cultural heritage to be passed on to future generations.

7. The BUPA Project



Figure 38. The BUPA Project

Name of the Organization where the Case is Implemented

CARDET - Center for the Advancement of Research and Development in Educational Technology

Profile of the Organization as Stated in its Website

CARDET is the leading independent research and education Centre in Cyprus, and one of the prominent ones in the Euro-Mediterranean region, dedicated to harnessing the potential of education as a major driver in shaping a better world.

CARDET adheres to and promotes a set of values and principles that shape and define its culture and work, to facilitate a positive contribution and long-term impact in society.

With a strong focus on social impact, collaboration, learning, integrity, and positivity, CARDET team and partners design, develop and implement ambitious initiatives, inspiring projects that have meaningful contribution to communities both locally and globally.

Access Link

<http://bupaproject.eu/>

Target Group

The project targets to upskilling students and teachers in developing games for thematic learning.

Description of the Case

The BUPA Project- How to make the upskilling process additive with game design concepts– aims to find new and innovative tools and approaches to include coding and game design concepts in school education by upskilling students and teachers in developing games for thematic learning. At the same time, the project aims to develop student's digital skills in what game design framework is concerned and, at the same time, enhance their problem-solving skills.

The project's results are:

- IO1: BUPA Curriculum (includes learning objectives, teaching and assessment methods).
- IO2: BUPA Gamification for Education Framework (set of methodologies based on game design development concepts to create content to use in educational context).
- IO3: Contents and context (resources created based on the principles mentioned is the framework developed in this project – IO2).
- IO4: BUPA MOOC (adapt the content created in IO3 to be SCORM Compliant and platform independent and apply it in an LMS).

8. The Gamification of Learning and its Utilization in Distance Learning



Figure 39. Use of Games in Distance Learning

Name of the Organization where the Case is Implemented

2nd Regional Center for Educational Planning of the South Aegean (PE.K.E.S. of South Aegean)

Profile of the Organization as Stated in its Website

The mission of PE.K.E.S. of South Aegean is:

- educational planning,
- the monitoring,
- the coordination and support of the educational work of public and private school units, as well as the Laboratory Centers (L.C.).

Also, it is the coordination of:

- Centers for Interdisciplinary Assessment, Counseling and Support (Former K.E.S.Y.),
- Education Centers for the Environment and Sustainability (Former K.E.A.), and
- Laboratory Centers of Natural Sciences (E.K.F.E.) of their area of competence,

and

- the scientific and pedagogical support of public and private education teachers,
- the organization of the training, including the introductory one, of the teachers, as well as
- the support of the planning and evaluation of the educational project at the regional level.

66

Access Link

<https://www.youtube.com/watch?v=R1hvNzjemoE>

Target Group

Primary and Secondary school teachers and professionals in the educational area.

Description of the Case

The above educational video is presented in the context of the online seminar that took place on Saturday, 12-12-2020, on the topic: "The enrichment of distance learning with digital tools" and was co-organized by the Laboratory of Psychology, Pedagogy and Media in Education of the PTDE of the University of the Aegean, the "Digital Media in Education and Media Literacy" group, with Director Professor Sofos Loizos (Alivizos) and S.E.E. of the 2nd PEKS South Aegean.

9. The Parthenon Frieze Athena



Figure 40. The Statue of Athena Parthenos

Name of the Organization where the Case is Implemented

Acropolis Museum

Profile of the Organization as Stated in its Website

The mission of the Museum is to house all the surviving antiquities from the Acropolis within a single museum of international stature.

Access Link

<https://www.theacropolismuseum.gr/el/content/hamenoagalma-tis-athinas-parthenoy-0>

Target Group

Primary and Secondary education students and Adults.

Description of the Case

The Acropolis Museum brings to life, digitally, the statue of Athena Parthenos. Made of gold and ivory, this masterpiece was designed by Phidias for the Parthenon. The Museum invites you on a walk of knowledge about its construction materials and techniques, its myths and allegories, its radiance and its adventures.

The learning objective of the experience is to provide a travel to the Ancient Greece and especially to give the opportunity to see the the statue of Athena Parthenos as it was designed by Phidias for the Parthenon. It is presented in three sections. The first section entitled "Parthenon" includes texts and audiovisual material about the architecture and sculptural decoration of the Parthenon. In the second section entitled "Learn About the Frieze", the user can get to know the frieze, either block by block or through thematic tours of its scenes: preparation for the procession, horsemen, chariots, sacrificial procession, gods and handing over the peplos. The third level of the application is entitled "Play with the Frieze". It is aimed at children and is essentially a digitized version of the museum kit, enriching its content with games of memory, colouring and matching image and text.

The museum offers the experience to both children and adults by using audiovisual material and games of memory.

B. Lesson Plans

The **Lesson Plan section** features a set of comprehensive lesson plans developed by the project partners and the teachers participated in the project's activities, designed specifically for **direct in-class teaching of secondary education students**. Each lesson plan is meticulously crafted around the subjects of STEAM education, providing educators with **detailed information and additional content**, such as sources and proposed activity sheets to facilitate effective teaching and learning.



SCAN this picture with the ROAR application to reveal more information on this subject!

Lesson Plan 1: AI in our Lives

Basic Information

Subject: AI, Computers

Keywords: AI, Computers, Computer Science

General description: AI usage in our daily life, school and workspace.

Suggested age group: 12+

Prerequisite student knowledge: Not needed

School infrastructure: Computers and Internet Connection

Additional material needed: Not needed

Additional information from external sources/online tools: www.davinci.ai,
www.elevenlabs.io/text-to-speech, www.wombo.ai

Developed by: Spyros Ellinas, IT teacher and his students

70

Educational Problem

This activity will help the students stay more concentrated, have a more interactive and fun lesson, learn new skills and technics and enter the world of AI.

Learning Objectives

1. Students will learn how to use AI in their advantage.
2. Make the subject more interesting and interactive.
3. Students will be able to analyse the pros and cons of AI.

Phases of the Lesson Plan

Preparation Phase

Venue: Indoor

Phase duration: 20 minutes

Detailed description:

Find the right apps and websites that you need to use in order to create the needed images, videos and audio. There are many apps and websites out there that students can use; some students may find some apps easier to use than other apps. Students must experiment with different methods, apps, websites and tools in order to find the right tool for them.

Implementation Phase

Venue: Indoor

Phase duration: 45-90 minutes

Detailed description:

In this phase students will have to implement the apps, tools and websites they found in the previous phase in order to make something nice and learn new skills using AI. Some students may need more time to get used to the tools and they might need to experiment with multiple tools until they find something easy to use. After they make the images/videos/audio needed for the project that they are trying to create, students need to edit them together and do multiple revisions on what they create, in order to get the best possible outcome and get everything the way they want it to be. Another useful tip for the students is to check out YouTube tutorials on how to do some of the things they want to do. Every student is different and they all may finish their project in any way or order that they want to. Students need to have patience and must try their best to get everything done.

Evaluation Phase

Venue: Indoor

Phase duration: 10-30 minutes

Detailed description:

Project evaluation. Students and teachers must review the project, find flaws and things they don't like about the final project, and fix everything. This is the final phase

of any project. Checking for flaws and evaluating some projects might be less time consuming than other projects, we must not forget that they are all different and they all made their projects using different apps. We take our time here reviewing everything and trying to get our projected perfected, trying to get rid of as many flaws as possible and getting everything done for presentation.

Lesson Plan 2: BOOKMANJI - A Digital Game about Books

Basic Information

Subject: English language

Keywords: Game, books, book blurbs, reading

General description: General description: As a follow-up of the unit, we completed on books (reading book blurbs, listening and writing about a book blurb), children play a digital game which resembles the game on "Jumanji" film and is mainly about reading books of literature. During the game the students will have to answer questions based on various books of literature.

72

Suggested age group: 12-13 year old students with an A2/B1- level of English

Prerequisite student knowledge: Vocabulary related to books (e.g. author, main character, plot, best seller etc.), Present Simple and Past Simple

School infrastructure: Interactive whiteboard, a tablet, internet connection

Additional material needed: Literature books

Additional information from external sources/online tools:

- During the last lesson before the game is played in the class, students read the summary plot of the film "Jumanji" www.rottentomatoes.com/m/1068044-jumanji and/ or watch the trailer of the film and are, thus, prepared for the game during the implementation phase.
- The game was created on genial.ly so the link will be used: <https://view.genial.ly/6564cd587d456400150eacad/interactive-contentbookmanjiathina-karvouni>
- an interactive dice link incorporated in the game: https://youtu.be/AR5A4eg_jE?list=TLGGER7P2Pe3iZcxODEyMjAyMw

- a random wheel to choose players, incorporated in the game: <https://wheelofnames.com/cqe-kja>
- a link to the final <https://learningapps.org/> app that will provide the answer to the winning team
- a QR Code Reader
- Google Chrome or any other browser to look for information on the tablet

Developed by: Athina Karvouni, teacher of English of Secondary Junior High School of Ioannina

Educational Problem

Most students rarely get in touch with real books so the game is supposed to help them restore the lost relationship with books in a fun way. It will get them to actually read real book blurbs, go through the pages and read extracts from books, discover famous authors and well-known books. Students will have to look for information and try to understand meaning in order to fulfill certain tasks. The time limit in the game is meant to encourage them to act fast, cooperate effectively with the members of their team and also make the game more intriguing.

73

Learning Objectives

After the implementation, the students should be able to:

1. revise basic vocabulary about books
2. practice Present and Past Tense
3. improve their reading and speaking skills
4. encourage team work
5. practise problem-solving skills
6. make reading books more engaging and fun
7. touch real books and actually read books
8. have fun in the class while learning and cooperating

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 4 lessons (40 min. each) related to the topic, vocabulary and grammar with reading, listening and writing activities

Detailed description:

We studied texts related to book blurbs and book reviews. We did comprehension and vocabulary exercises. We listened to book blurbs and did listening activities. We also practiced the grammar (Present Simple and Past Simple). Simultaneously, the teacher prepared the game on genial.ly.

During the last lesson, students read the summary plot of the film “Jumanji” www.rottentomatoes.com/m/1068044-jumanji and/ or watch the trailer of the film and are, thus, prepared for the game during the implementation phase. The teams that will play the game can also be defined on that day.

Implementation Phase

Venue: School Classroom

Phase duration: 80 minutes

Detailed description:

The game is presented to the class (already created and can be accessed at: <https://view.genial.ly/6564cd587d456400150eacad/interactive-content-bookmanjiathina-karvouni>). They are all given a chest full of books and a tablet, as well as a smaller chest which is locked. The game rules are explained on the whiteboard. They spin the wheel and randomly choose their player and the route they will follow on the game board. Then, they take turns in rolling the dice and moving their player on the board. Each time they reach a square with the circle on it, they have to fulfill a challenge related to the books in the chest. The goal of the game is to reach the central circle first and thus make it to the exit.

The first team who manages to reach the central circle first is given a final challenge and is led to the solution to the riddle and the key to “escape” the room they have been locked in.

Evaluation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Students are asked to evaluate the game, their experience and their feelings about the game. As a follow-up, they can be given extra homework to describe the game they have just played and write a short review about it.

Lesson Plan 3: Cyberbullying

Basic Information

Subject: English language

Keywords: Cyberbullying, technology, self-esteem, depression, consequences

General description: In this lesson, students will be introduced to the topic of cyberbullying by listening to a radio interview with experts on the field. The students will practice oral comprehension skills as they are expected to locate main ideas put forward in a radio interview with experts about the consequences of cyberbullying. In addition, students will practice oral production skills in communicating to class solutions to this social problem.

75

Suggested age group: Class C, Level B1+ (students aged 17-18)

Prerequisite student knowledge: Ability to express opinion/argumentation, knowledge of Past tenses & Present tenses, linking words

School infrastructure: Projector, computer, speakers, whiteboard

Additional material needed: Worksheets, mobile phones

Additional information from external sources/online tools:

- www.absolutenglish.org/IMG/mp3/cyberbullying.mp3
- www.mentimeter.com
- www.padlet.com

Developed by: Valentina Christodoulou, English teacher

Educational Problem

This lesson will help students obtain a better understanding of the problem of cyberbullying, especially of consequences this might bring upon possible victims. Students will be encouraged to utilize new information as well as personal experiences to discuss possible ways of tackling this social problem.

Learning Objectives

After the implementation, the students should be able to:

1. understand the main points of audio texts concerning the issue of cyberbullying and locate specific information to fulfil specific tasks.
2. express their thoughts and opinions about instances of bullying and its consequences.
3. identify unfamiliar words from the context on the topic of cyberbullying.

Phases of the Lesson Plan

Preparation Phase

76

Venue: Indoors

Phase duration: 10 minutes

Detailed description:

Teacher starts lesson by projecting a short clip with images related to social media and cyberbullying and asks students to quickly describe what they see and what they think the lesson will be about today. After students share their views, the teacher confirms/or introduces today's topic, which is on cyberbullying, and briefly discusses topic-related vocabulary.

*Activity sheets have been created for the above phase and can be accessed at:
<https://drive.google.com/file/d/1ymt7i3GX2QiNdrTXeiYiJM8t1Vj22Qdp/view?usp=sharing>

Implementation Phase

Venue: Indoors

Phase duration: 27 minutes

Detailed description:

First listening: The teacher plays an audio on cyberbullying and asks students to briefly describe what they have heard in the audio. Indicative questions: What was the audio about? What information do we get about cyberbullying? What are its consequences? In what ways is this different?

Second listening: The teacher asks students to listen to the audio one more time and complete Activity 2 on their worksheets (multiple choice) providing reasons for their answers. The teacher checks answers with the class.

After listening: The teacher directs the students' attention to Activity 3 of their worksheet and after checking that all students are familiar with the vocabulary, she asks them to complete the gaps using the vocabulary provided. T checks answers with class. The teacher then asks students to discuss in pairs the dangers entailed in cyberbullying based on a) what they have heard and b) their own experiences and use their mobile phones to post their answers on Padlet (www.padlet.com/christodoulouvalentina10/the-dangers-of-cyberbullying-xsomqoiunbuukuor) so everyone in class can see.

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1ymt7i3GX2QiNdrTXeIYiJM8t1Vj22Qdp/view?usp=sharing>

Evaluation Phase

Venue: Indoors

Phase duration: 8 minutes

Detailed description:

Teacher rounds off the lesson by drawing students' attention to Activity 4 on the handout. Students work in pairs and think of ways to tackle the issue of cyberbullying. Students use their mobile phones to post their answers on www.menti.com. The class discusses which ways are the most effective.

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1ymt7i3GX2QiNdrTXeIYiJM8t1Vj22Qdp/view?usp=sharing>

Lesson Plan 4: Discovering the Past (Otto's Period) through an online Trivial Pursuit Game

Basic Information

Subject: Recent and Modern History

Keywords: Modern History, Otto, Regency, Expulsion of Otto

General description: The period from the arrival of Otto in 1833 until his expulsion in 1862 was a time of significant social, political, and economic changes in Greece. During this period, Greece experienced the establishment of constitutional monarchy, economic growth, and the expansion of education. On the other hand, political conflicts, economic difficulties, and social inequalities were some of the challenges that Greece faced during this period.

Suggested age group: 13-14 years of age

Prerequisite student knowledge: There are no specific prerequisites.

School infrastructure: Computer, Video-projector, smartphones/tablets

Additional material needed: There are no other requirements.

Additional information from external sources/online tools: Use of MS PowerPoint and Class Point app

Developed by: Athanasios Basios

78

Educational Problem

Gamification can be an interesting approach to improve student engagement in the History class. The educational challenge lies in finding a balance between gamification techniques and the needs of students, as well as the content of the course.

Learning Objectives

1. Understand the historical significance of this period for Greece.

2. Recognize the social, political, and economic changes that occurred in Greece during this period.
3. Develop analytical and critical thinking skills regarding the political and social conflicts that influenced Greece during this period.
4. Develop skills in analyzing historical sources and arguments related to this period.
5. Learn to collaborate at the group level.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Explanation of the game elements as they have been integrated into the lesson.

79

Implementation Phase

Venue: School Classroom

Phase duration: 25 minutes

Detailed description:

Students connect to the classpoint.app application, which is an add-on integrated into PowerPoint. They enter the class code provided to them and can immediately start implementing the game.

- Slides with various types of questions (according to Bloom's taxonomy), such as multiple-choice, fill in the blank, and others, have been incorporated and are presented to students after completing the section. These have been designed with the help of artificial intelligence (AI) and have been reviewed and redesigned by the educator, along with the correct answers each time.
- An assessment system for the questions is provided (based on difficulty level, e.g. easy question, difficult question), and "stars" are awarded each time based on the weight given to the answers.
- Each slide has a specific time given to students and automatically "closes" after the time limit has passed. For example, for multiple-choice questions, this

occurs after 30 seconds, but for fill-in-the-blank and short-answer questions, a longer time is given.

- In real-time, all participants can see each other's answers and the speed at which the answers are given. After each question, the correct answer is "revealed," allowing students to know whether they succeeded or not and how many stars they have earned.
- At the end of the entire effort, a grading table is created, providing information on how quickly each participant managed to answer the questions, along with the final ranking based on successful answers and the time required for it.

Evaluation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Submission and response of the relevant questionnaire by the students.

Lesson Plan 5: Environmental Heroes

Basic Information

Subject: Science, Environmental Studies

Keywords: Game-based learning, environmental education, sustainability, pollution, conservation

General description: This lesson uses a game-based approach to teach students about environmental issues and the importance of conservation. Through a role-playing game, students will learn about various environmental challenges and how to address them.

Suggested age group: 12 year old students

Prerequisite student knowledge: Basic understanding of environmental concepts (e.g., pollution, recycling)

School infrastructure: Classroom with desks arranged in groups, projector, computer or tablets for each group

Additional material needed: Game materials (cards, tokens, game board), digital resources (interactive game platform if available)

Additional information from external sources/online tools: Educational websites on environmental conservation, game design tools (e.g., Kahoot!, Quizlet)

Developed by: CRHACKLAB FOLIGNO 4D

Educational Problem

Traditional teaching methods may not fully engage students in learning about environmental issues. Game-based learning can increase engagement and motivation, making complex topics more accessible and enjoyable.

81

Learning Objectives

1. Understand the impact of human activities on the environment.
2. Identify different types of environmental pollution and their sources.
3. Explore solutions to environmental problems through collaborative gameplay.
4. Develop critical thinking and problem-solving skills.
5. Promote teamwork and communication among students.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 30 minutes

Detailed description:

Introduce the concept of game-based learning and explain how the game "Environmental Heroes" will be played.

Divide students into small groups and distribute the game materials.

Provide a brief overview of the environmental issues covered in the game (e.g., air pollution, water pollution, deforestation).

Implementation Phase

Venue: School Classroom

Phase duration: 60 minutes

Detailed description:

Students play the "Environmental Heroes" game in their groups.

Each group assumes the role of a team of environmental scientists tasked with solving different environmental problems.

As they play, students encounter various scenarios and challenges that require them to make decisions and take actions to mitigate environmental damage.

The teacher facilitates the game, providing guidance and answering questions as needed.

82

Evaluation Phase

Venue: School Classroom

Phase duration: 30 minutes

Detailed description:

After the game, conduct a debriefing session where each group shares their experiences and discusses the solutions they implemented in the game.

Encourage students to reflect on what they learned and how they can apply these lessons to real-life environmental issues.

Assess student understanding through a quiz or a reflective essay on the importance of environmental conservation and the role they can play in it.

Lesson Plan 6: Energy Race

Basic Information

Subject: Technology

Keywords: Wind turbine, solar panel

General description: This game intends to educate players to the operation of wind turbine and solar panel.

Suggested age group: 12-13 years old students

Prerequisite student knowledge: Energy sources

School infrastructure: projector, laptop, wind turbine, solar panel camera, pair of scissors, glue, cardboard

Additional material needed: mobile phones

Additional information from external sources/online tools: quizziz

Developed by: Eirini Vartzioti, teacher of Gymnasio Peramatos Ioanninon, in corporation with Environmental Educational Center of Philippiada

83

Educational Problem

Application of Theoretical Knowledge: Participants will have the opportunity to put theoretical knowledge into practice as they explore and photograph the parts of the wind turbine and solar panel.

Developing Observation and Recording Skills: Participants will improve their skills in the field of observation and recording information through photography.

Enhancing Collaboration Skills: Participants will enhance their collaboration and team problem-solving skills through game activities.

Cultivating Emotional Connectivity with the Environment: The game will enhance participants' emotional connection with the environment and the importance of sustainable practices.

Learning Objectives

1. Understanding How Renewable Energy Sources Work: Participants should understand how wind turbines and solar panels work, and how the kinetic energy of wind and sunlight is converted into electricity.
2. Enhancing Knowledge about the Parts of Energy Sources: Participants will gain knowledge about the different parts of the wind turbine and solar panel, and the role of each part in its operation.
3. Understanding the Benefits of Sustainable Energy: Participants will understand the benefits of using renewable energy sources, such as reducing CO2 emissions and contributing to environmental protection.
4. Promoting Collaboration and Teamwork: The game will encourage collaboration and teamwork as participants work as team members to solve challenges and develop solutions.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 40 minutes

Detailed description:

Repeating the educational unit on renewable energy sources that students have been taught in school classroom. Description and explanation of the rules of the game. Preparing-forming the teams.

Implementation Phase

Venue: In the Environmental Educational Center of Philippiada and/or similar facilities

Phase duration: 2 X 45 minutes

Detailed description: Students take part in a QUIZZIZ specially modified for the educational needs. Then they take part in the activities provided from the Environmental Educational Center of Philippiada. They take photos from the wind turbine and the solar panel. They share their photos of the photographed parts in Google Drive. They prepare a presentation with their photos and the description of the parts using Presentation in Google Drive.

Evaluation Phase

Venue: School Classroom

Phase duration: 40 minutes

Detailed description:

Presentations of team work in class. Each team will collect points from the QUIZZIZ and the presentation. The team with the higher score will be the winner. The prize will be the organization of a photo exhibition with the best photos from the wind turbine and the solar panel. The exhibition will take place at the school with the aim of raising awareness among classmates on renewable energy issues.

Lesson Plan 7: Everything is Symmetry or Symmetry is Everything?

Basic Information

85

Subject: Mathematics

Keywords: Symmetry, axis, center, photography, art

General description: What is sought by teaching symmetries is for students to acquire a flexibility in their way of thinking geometrically and to use them as a tool for studying and justifying properties of geometric shapes. With the teaching of the specific subject, it is advisable to make use of new technologies (mobile, computer), alongside the use of other media (such as transparent paper, geometric instruments, squared paper, etc.) with the aim not only of constructing symmetrical shapes but also of understanding and the utilization of the properties of symmetry in the lessons but also in everyday life.

Suggested age group: 16 year old students

Prerequisite student knowledge: Basic geometric concepts, geometric shapes and properties, geometric solids, coordinates in the plane, symmetries (to a line, to a point), axes of symmetry

School infrastructure: Computer laboratory, classroom, an interactive whiteboard or video projector

Additional material needed: Geometric instruments, paper, paints, drawings from paintings and buildings - monuments, shapes, pictures and photographs, photographs of historical monuments, etc.

Additional information from external sources/online tools: Kahoot!, Geogebra,

- www.youtube.com/watch?v=3akCpSD7fUQ
- www.mathsisfun.com/geometry/symmetry-artist.html
- www.photodentro.edu.gr/lor/r/8521/3440?locale=el
- www.youtube.com/watch?v=lmzw7tCTErU
- www.youtube.com/watch?v=xKDsSCCsLY

Developed by: George Angelis

Educational Problem

The educational problem that this scenario helps to solve is the lack of a meaningful understanding of the concept of symmetry. The textbook does not give practical solutions for better understanding, so this scenario comes to solve this problem substantially.

This lesson plan is essentially a review of the "Symmetries" chapter of Geometry, from the Greek school book and we seek to understand and utilize symmetries. It is divided into three phases.

In the first, which will take place in the computer lab, students will be given individual activities to see if they have understood everything taught in the chapter and to see how much of a role symmetry plays in our lives. They will also be divided into groups and work on the computer in the mathisfun program by constructing symmetrical shapes (in terms of line or point) or to make shapes with an axis of symmetry.

In the second phase, students will be divided into 3 groups and will visit the city centre and with the help of their mobile phone or camera they will take pictures of buildings, parks, bins, trees, leaves, cars, church, pavilion, statues, streets, etc., discovering symmetry and at the same time recording it.

The third and final phase will take place in the classroom. Through the drama game, students will "discover" symmetry and have fun at the same time. Two students will start first and along the way everyone will get involved.

Learning Objectives

1. Understand the concept of symmetry and its types.
2. Recognize symmetry in different shapes and solids and distinguish its types.
3. Draw the axes of symmetry, the center of symmetry, and the center of symmetry and symmetrical shapes, in relation to the axis and in relation to the center, of various shapes.
4. Recognize symmetry in art, architecture, nature and demonstrate symmetry in any form of everyday life.

Phases of the Lesson Plan

Preparation Phase

Venue: School IT Classroom

Phase duration: 45 minutes

Detailed description:

Through the introduction the recall of the acquired knowledge is done (3 minutes) and then a short discussion on the material (relevant video and comprehension questions <https://www.youtube.com/watch?v=lmzw7tCTErU>, <https://www.youtube.com/watch?v=xKDsSCCnsLY>) given to them for study in the e-class, as it is necessary (5 minutes).

The students are then given the opportunity to make sure that they understand the prerequisites - acquired knowledge by working individually with a series of activities aimed at establishing whether everything taught in the previous lessons has been understood but.

In the first activity we ask the students to find the shapes that have axes of symmetry. (8 minutes)

In the second activity we ask students to find the shapes that are symmetrical with respect to an axis of symmetry. (8 minutes)

In the third activity we ask students to find the symmetric shapes with respect to the center of symmetry. (8 minutes)

In the next 5 minutes we discuss the results of the activities and solve any questions.

In the last 8 minutes the students will work in pairs on the computer in front of them on the «mathsisfun/symmetryofart» program in which they are asked to become "artists" using symmetry.

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1VdHfN3XlgFm2gdsVT6AILLJdGUwiLbbc/view?usp=sharing>

Implementation Phase

Venue: City Center

Phase duration: 45 minutes

Detailed description:

The next and main stage of this lesson plan will take place in the city center or alternatively in a part of the city that is interesting in terms of symmetry. In any case outside the school. Here students will consider the video they watched on the e-class platform (<https://www.youtube.com/watch?v=3akCpSD7fUQ>). There the students will be divided into 3 groups.

The first group will be the group will search, record and photograph symmetrical shapes with respect to center of symmetry.

The second group will be the group that will search for, record and photograph shapes that have a center of symmetry.

The third group will be the group will search for, record and photograph shapes that have a center of symmetry.

As a reward for all the students' efforts, the best photos chosen by all the children together will be printed and put on permanent display in the hallways of the school.

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1VdHfN3XlgFm2gdsVT6AILLJdGUwiLbbc/view?usp=sharing>

Evaluation Phase

Venue: School Classroom

Phase duration: 45 minutes

Detailed description:

In the final stage, students will return to the classroom where they will engage in the play. This particular play is called "The Mirror". Two players are needed. They agree between them who will make the reflection in the mirror and who will be reflected. The first move is obviously the one who looks in the mirror. The other player tries to imitate the movements - facial expressions of the first player. Then, the players alternate their roles. At first, we have 1 or 2 pairs playing and the others watch by commenting and intervening if something is not going right in their opinion. They all get involved in the process. It's a good exercise in understanding symmetry in terms of level and highly entertaining. (25 minutes)

Afterwards and for the next 15 minutes an overall evaluation of the students' excursion to the city will be made. There will be a presentation of the results by each group and a decision will be made as to which photos (3 from each group) will go into the exhibition that will be held at the school. Also, the project (Activity 4) will be presented and will be posted on the e-class platform and will be related to art.

In the last 5 minutes students using their mobile phones and through the Kahoot! program, will answer both lesson assessment and self-assessment questions.

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1VdHfN3XlgFm2gdsVT6ALLJdGUwilbbc/view?usp=sharing>

Lesson Plan 8: I C U

Basic Information

Subject: Programming with C++

Keywords: If, else Statements, for Loops

General description: The class will be divided into 2 groups of 5 students.

- Step 1: Each group will write (A) the requirements of the program, (B) the solution of the program and (C) the results it will give us when they run it in a C++ Compiler.

- Step 2: Next, they will give to the opposing team only the solution (B) of the program and they will have to find the (A) requirements and the (C) results of the program
- Step 3: Final they will write and run the program in the C++ Compiler to check the results

Suggested age group: 15-18 years old

Prerequisite student knowledge: If else and for commands

School infrastructure: Computers and a video projector

Additional material needed: A4 paper

Additional information from external sources/online tools: Online C++ Compiler

Developed by: Petros Kallis, Computers Engineering Teacher, C TESEK NICOSA, Cyprus

Educational Problem

Will help the students understand the importance of the dialogue, cooperative learning and Game Based Learning.

90

Learning Objectives

1. Comprehend the if else command
2. Comprehend the for command
3. Be able to write the requirements of a program
4. Be able to solve a program
5. Be able to write the result of a program

Phases of the Lesson Plan

Preparation Phase

Venue: School IT Classroom

Phase duration: 45 minutes

Detailed description:

Each group will write (A) the requirements of the program, (B) the solution of the program and (C) the results it will give us when they run it.

Example:

Write a program in C to count how many even and odd numbers there are between 1 and N. N will be requested and given by the user at the beginning of the program.

Implementation Phase

Venue: School IT Classroom

Phase duration: 30 minutes

Detailed description:

Students will give to the opposing team only the solution (B) of the program and they will have to find and write on a paper the (A) requirements and the (C) results of the program

91

Example:

```
#include <iostream>

using namespace std;

int main() {

    int i,n,a=0,p=0;

    cout<<"Input N:";

    cin>>n;

    for(i=1;i<=n;i++)

        if(i%2==0)
```

```
a=a+1;

else if(i%2==1)

    p=p+1;

cout<<"Between 1 and "<<n<<" there are"<<endl;

cout<<"*****"<<endl;

cout<<a<<" Even Numbers"<<endl;

cout<<p<<" Odd Numbers";

return 0;

}
```

Evaluation Phase

Venue: School IT Classroom

Phase duration: 15 minutes

Detailed description:

Write and run the program in the C++ Compiler to check the results if they are the same with the results they wrote on the paper. You can add a timer in order to give them motivation and bonus points for each correct line of code!

Example:

Input N:41

Between 1 and 41 there are

20 Even Numbers

21 Odd Numbers

Lesson Plan 9: ImMer(ge)sive Food Network

Basic Information

Subject: Science, Math, ICT, English, Italian

Keywords: Game based learning, project-based learning, cooperative learning, coding, AI

General description: This lesson plan revolves around an engaging and immersive learning experience for students through a unique combination of game-based learning methodologies and project-based learning, all centered around the theme of a Food Network. Focused on the Mediterranean region, particularly Sardinia, students will delve into the intricacies of food chains by playing various educational games. The core of the lesson involves the collaborative construction of detailed food chains specific to the Sardinian ecosystem. Additionally, students will utilize their creativity and technical skills by designing and building a digital game using Scratch/Cospaces and Merge Cube, providing a hands-on opportunity to merge technology with their learning. The culmination of the lesson plan involves the development of a board game that encapsulates their understanding of the food network dynamics, fostering teamwork, critical thinking, and a comprehensive grasp of ecological relationships.

93

Suggested age group: 12 years old

Prerequisite student knowledge:

- ICT: Coding with visual/ blocks programming
- Science: Knowledge about plants and animals (how they feed, living environment)
- Math: Geometric solids, mathematical relationships and combinations
- Italian/English
- Reading: Read and understand information to use it in the new context/game.
- Writing: Write detailed captions for the game, detailed descriptions to build environments and avatars, questions and quizzes
- Listening: Listen to information and instructions
- Speaking: Present a group project

School infrastructure:

To successfully implement this lesson plan, you would need a variety of school infrastructure elements to support different activities:

A computer lab with sufficient computers or access to individual devices (laptops, tablets) for students to work on digital aspects of the lesson, such as creating games with Scratch/Cospaces and using Merge Cubes.

- Internet Connectivity: Reliable internet connectivity is crucial for accessing online resources
- Software and Tools: Scratch, Open Roberta, Cospaces, Merge Cube, Edison.edu, Tinkercad, Canva, Kahoot, Quizlet...
- Board Game Materials: Materials for creating physical board games, such as poster boards, markers, cards, and other craft supplies
- Collaborative Spaces: Designated areas where students can collaborate on building physical models, discussing ideas, and working on group projects related to constructing food chains
- Projector or Interactive Whiteboard: For presenting instructions, or leading discussions
- Library or Resource Center: Access to books, articles, or other resources related to the Mediterranean region and food chains can enrich students' research and understanding
- Outdoor Space/Museum: Utilizing an outdoor space for activities related to understanding the local environment or even collecting samples for their projects could enhance the learning experience

Additional material needed: Materials such as cardboard, markers, and other craft supplies may be necessary. A dice or virtual dice, A robot. Pics of nature.

94

Additional information from external sources/online tools: Access to: Canva, Scratch, Cospaces, Merge cube, Tinkercad, Open Roberta

Developed by: Sandra Tatti, teacher of Scuola Primaria Lunamatrona and her students

Educational Problem

This learning unit is based on the methodology of game-based learning and project-based learning. The main challenges are to learn through play (learning by doing), encourage problem solving, stimulate group work, foster discussion, create situations of greater inclusion, stimulate attention, and develop greater interest in school subjects.

Students will begin exploring food webs through a series of pre-existing games, sourced from the web and others proposed by the teacher. They will then examine the proposed content, rework their knowledge to create two games based on food webs (escape room) and a board game in cooperative learning using the jigsaw

technique. Each group will have to build an environment with the respective living beings, program movements, construct a path, and the order of clues to be discovered. Additionally, they will need to create a series of quizzes and games to receive the key to access the next room.

Students will be the authors of the games and, at the same time, players of the levels built by their peers to consolidate the learned knowledge. Knowledge assessment will occur through a challenge/game among groups of students to recreate a food web through a board game.

Learning Objectives

1. Encourage student to collaborate and communicate
2. Practice English/Italian skills of reading, writing, listening and speaking
3. Encourage problem solving and critical thinking skills
4. Learn science contents with learning by doing/game-based learning and gamification
5. Improve young learners' creativity and decision making
6. Learn in a fun and engaging way
7. Improve cognitive skills
8. Encourage the development of metaskills in the training process
9. Encourage the development of computational thinking

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 180 minutes

Detailed description:

Students are encouraged to play a series of interactive games already prepared by the teacher to discover and approach food chains and food webs (cserc.com, brainpop.com, bbc.co.uk Science Ks2).

They will then be divided into 4 heterogeneous groups for a reflection phase on the activity carried out and to rework what they have learned through the design of an environment and its food web (deepening knowledge on the web, building connections and combinations of food chains, puzzles, and settings).

Implementation Phase

Venue: School IT Classroom

Phase duration: 360 minutes

Detailed description:

In this phase, the groups will work on the construction of two games to enhance learning: a digital escape room and an analog board game. The escape room will be implemented on the six faces of the Merge Cube through CoSpaces (each of the 4 groups will work on one of the 4 faces of the solid; the first face will be the game introduction and starting point, while the last will be the endpoint with the corresponding final badge). Each group will create a room/environment (using CoSpaces and Canva) with avatars and various animals and plants.

Clues and quizzes (Genially, Quizlet, Kahoot, Edpuzzle, Learning app, etc.) will be designed to solve the puzzle (finding the food chain) to exit the room and move on to the next one.

The board game will also be created through cooperative learning, involving the photographic printing of scenarios and game cards created on Canva with AI, along with the 3D printing of characters (animals and plants) digitally created with Tinkercad. An important phase will be the creation of the game rules, fostering interdisciplinary and disciplinary skills development and the ability to share ideas.

96

Evaluation Phase

Venue: School IT Classroom

Phase duration: 90 minutes

Detailed description:

The final phase involves an assessment of learning and skills through a challenge between students in both the escape room and the 3D board game.

Students will need to demonstrate their ability to use acquired knowledge and skills in a game/simulation situation, including:

- Knowledge acquired in science, particularly regarding food chains/webs.
- Social skills for working in groups and making decisions.

- Problem-solving and strategic abilities (mathematics).
- Finding logical connections and combinations (mathematics).
- Representing connections.
- Cooperating with peers (social skills).
- Decision-making skills.
- Connecting knowledge and information.
- Presenting on a topic.
- Variant with an emphasis on computer science: coding and programming a robot to create a path (the food chain).

Lesson Plan 10: Introduction to Programming with Scratch

Basic Information

Subject: Computer Science

Keywords: Programming, Scratch, Game-Based Learning, Coding, Computer Science Education

97

General description: This lesson plan is designed to introduce students to basic programming concepts using the game-like environment of Scratch. Students will learn how to create simple animations and interactive stories by coding in Scratch's block-based programming language.

Suggested age group: 12 years old

Prerequisite student knowledge: Basic familiarity with computers and using a mouse and keyboard.

School infrastructure: Computers with internet access, Scratch software installed or access to the Scratch website.

Additional material needed: Projector for demonstrations, Scratch project guides or worksheets.

Additional information from external sources/online tools: Scratch website (<https://scratch.mit.edu/>), Scratch tutorials and guides available on the Scratch website.

Developed by: CHRACKLAB FOLIGNO 4D

Educational Problem

Students often find it challenging to grasp programming concepts through traditional teaching methods. By using a game-based approach with Scratch, students can engage with the material in a fun and interactive way, fostering a deeper understanding of coding basics.

Learning Objectives

1. Understand the basics of programming concepts such as sequences, loops, and events.
2. Develop problem-solving and logical thinking skills.
3. Create simple animations and interactive stories using Scratch.
4. Collaborate with peers to develop and share projects.

Phases of the Lesson Plan

Preparation Phase

Venue: School IT Classroom

Phase duration: 30 minutes

Detailed description:

Introduce the lesson objectives and provide a brief overview of Scratch. Demonstrate how to navigate the Scratch interface, create a new project, and use basic blocks to create simple movements and animations. Distribute worksheets or guides that outline the tasks for the implementation phase.

Implementation Phase

Venue: School IT Classroom

Phase duration: 120 minutes

Detailed description:

Students will work individually or in pairs to complete a series of challenges using Scratch. These challenges will include creating a basic animation, programming a

character to move using keyboard inputs, and developing an interactive story with multiple scenes. The teacher will circulate to provide assistance and guidance as needed. Encourage students to experiment and explore different coding blocks.

Evaluation Phase

Venue: School Classroom

Phase duration: 30 minutes

Detailed description:

Students will present their projects to the class, explaining the code they used and the challenges they faced. Conduct a group discussion on what they learned and how they solved problems. Provide feedback and assess students' understanding of the programming concepts based on their projects and presentations.

Lesson Plan 11: Leaving School

99

Basic Information

Subject: Literature

Keywords: Poetry, creative writing, calligram

General description: Students will read Jacques Préver's poem "Leaving the School". After linguistic normalization, the semantic approach of the text will follow. Using the Mentimeter tool, the children will make a word cloud with the key words of the text, based on which they will write their own poem using the storyjumper tool.

Afterwards, the students creating small groups, will retell the poem using the calligram method, i.e. the visual presentation of the poem using painting. Finally, they will make a second word cloud with words that are derivatives and compounds of the words of the first word cloud.

Suggested age group: 13 years old students (2nd grade Junior High School)

Prerequisite student knowledge: Ability to use a laptop or Smartphone

School infrastructure: Access to the internet, drawing materials

Additional material needed: Paper, drawing supplies

Additional information from external sources/online tools: Literature text book for the 2nd grade

Developed by: Vasiliki Karamoutsiou, Philologist, Teacher of Literature and Modern Greek language at Metamorfosi Junior High School, Ioannina

Educational Problem

The lesson plan aims to give students the opportunity to express themselves in a different way during the Literature lesson, utilizing the technological tool storyjumper. In addition, it aims to approach the literature lesson in a playful way giving them pleasant feelings.

We think that this approach will help involve in the process the students who treat literature as something distant or particularly demanding, as a result of which they sometimes show hesitation and do not actively participate in the educational process. Finally, the creation and use of word clouds will help develop the students' vocabulary.

100

Learning Objectives

1. Students will express themselves through creative writing and painting.
2. Students will feel a sense of achievement.
3. Students will increase their vocabulary.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 45 minutes

Detailed description:

- Presentation of lesson, page 110, Greek 2st Grade Junior High School Student's Literature Book
- Reading the poem
- Linguistic normalization
- Conceptual approach

Implementation Phase

Venue: School Classroom

Phase duration: 90 minutes

Detailed description:

The students create a word cloud with the words of the poem which they consider to be key words. Then, using storyjumper, they simultaneously write their own verses on a separate page, trying to use the keywords they have suggested. Then they choose three words from the key words and record in the predetermined time, in the form of a word cloud, as many derivatives and compound words as they can. The winner is whoever uses at least 3 key words in their lyrics and finds the most derived/compound words. Finally, the children draw the poem as a calligram.

101

Evaluation Phase

Venue: School Classroom

Phase duration: 15 minutes

Detailed description:

Upon completion, the students will be asked to express their opinion regarding the playful approach of the course through the discussion and filling in a questionnaire.

Lesson Plan 12: My Daily Routines

Basic Information

Subject: English

Keywords: Describing daily routines; vocabulary; collocations

General description: By the end of this lesson students will be able to identify and describe their daily routines using specific verbs. The lesson implements gamification techniques at the evaluation phase (formative assessment) in order to be more engaging and fun for young students.

Suggested age group: 11-12 years old (A2 CEFR Level)

Prerequisite student knowledge:

- Telling the time
- Days of the week
- Prepositions of time and place
- Informal discussion
- Listening comprehension

102

School infrastructure: Laptop, projector, speakers

Additional material needed: Cards (for charades game)

Additional information from external sources/online tools: Book - Own it! 1 Student's Book page 23

Developed by: Theodosia Demetriou, English teacher

Educational Problem

Students should be able to describe their daily routines in English. Therefore, this lesson will help the students learn specific vocabulary for describing their daily routines in English. The students will improve their speaking and listening skills and the lesson will enhance their communicative language competence by helping them identify word partners/collocations.

Learning Objectives

By the end of the lesson students will be able to:

1. talk about their daily routines using specific verbs (target vocabulary)
2. identify word partners (like brush your teeth not wash your teeth)
3. identify daily routines in short, pre-recorded speech

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 7 minutes

Detailed description:

ACTIVITY 1*: INTRODUCTION - Warm up

Teacher welcomes students and asks about their day. The T then asks one of the ss the following question 'What was the first thing you did today?' trying to elicit the verb 'wake up.' Then asks about the second or third thing they did and tells ss that today's lesson is about daily routines (what do they do every day). The T then gives the ss a handout and tells them that they are going to watch a short video about Mr Bean's morning routine and tells them to answer the following questions at the end of the video.

What is the first thing Mr Bean does after he gets up? (Possible answers: He makes his bed, hits the wall, and puts on his slippers)

What is the last thing he does before he leaves the house? (Possible answers: he covers his teddy bear with a blanket, he tucks him in)

Concept checking question: What is the difference between wake up and get up?

(wake up= still in bed, get up= out of bed)

The T asks ss to give their answers and writes some answers on the board to elicit examples of verbs used to describe daily routines and check prior knowledge. In case there is hesitation, the T replays parts of the video to provide stimuli to the students. The T writes the ss answers on the board.

Video link for warm up

www.youtube.com/watch?v=1a7CzFpZtUo

*Activity sheets have been created for the above phase and can be accessed at:
https://drive.google.com/file/d/1QAZut00zdlk8pbFmWmbOOS_4hDasBtGO/view?usp=sharing

Implementation Phase

Venue: School Classroom

Phase duration: 27 minutes

Detailed description:

ACTIVITY 2*:

The T then directs the ss attention to the pictures in their book (Student's Book page 23). The T explains that the pictures describe daily routines and tells them to match them with the activities in the box (Exercise 1). The T tells ss that there are only 8 pictures, but 12 activities so there are four activities without a picture and points the ss attention to the example (picture a- get dressed). The T gives ss one minute to do the task. The ss report their answers back to the T by raising their hands and their answers are written on the board. The T then asks ss to write in exercise 2 which activities are not in the pictures starting with wake up which is the example and then write the rest in the correct order. Ss report their answers (wake up, get up, have breakfast, go to school). The T writes the answers on the board and then tells students to go back to the handout and prepare for the next activity which is a listening exercise.

ACTIVITY 3*:

The T tells ss that they are going to listen to Eduardo talking about his day and they need to put the activities from the table in the correct order. Explain that, even though there are 12 activities there, the ss will write the numbers 1-13 in the boxes - there will be one box with two numbers because one of the activities will be mentioned twice. Ask them what they think the first activity will be (wake up) and then play the recording. Play the recording twice (to help ss with difficulties do the task) and then ask ss to give their answers. The T writes the answer on the board (projecting the exercise on the board). The T praises ss for their work and tells them

that they will now move to the next part of the lesson. The T asks ss to get their books and go to page 23 again to work on word partners (Learn to learn page 23).

ACTIVITY 4*:

The T advises ss that when you learn new words, you need to think about the words that go with them (to help you remember them). Some words go together naturally in English (like brush your teeth not wash your teeth). Encourage students to notice which words go together and to record them in the table from Exercise 4. The T gives instructions and tells ss to write down all the words from Exercise 1 (box with daily routines) that go with the verbs go, get, and have and then add some of their own to the list (to elicit more activities). The T checks the Ss' answers and provides feedback e.g., go to the cinema, get lost, get married, have dinner, have a bath.

*Activity sheets have been created for the above phase and can be accessed at: https://drive.google.com/file/d/1QAZut00zdlk8pbFmWmbOOS_4hDasBtGO/view?usp=sharing

Evaluation Phase

105

Venue: School Classroom

Phase duration: 11 minutes

Detailed description:

ACTIVITY 5*: CLOSURE - QUICK REVIEW

The T tells ss that they are going to play charades to check what they have learnt in the lesson and gives instructions. The T will ask a student to come up. The student draws a card from the box and acts out the daily activity shown on the card using hand signals and body motions but no spoken words. The student who correctly guesses the activity will be the next person to come up and so on. The T illustrates before they start. Therefore, the T is assessing what the students have learnt in a fun way. The T thanks the ss for their work and cooperation and gives the handout for the take-home activity.

FOLLOW UP ACTIVITY- INDEPENDENT PRACTICE OPPORTUNITIES

Take-Home Activity: On the basis of today's lesson, students are asked to produce a comic strip with the title 'My daily routine'. For this activity, the ss will need to

combine the lesson's target vocabulary on daily routines and their artistic skills and this will be a fun way to revise what has been learnt at the lesson.

DIFFERENTIATION:

The handout was prepared to help students with learning disabilities cope with the lesson. The warm up questions were added to avoid asking students to copy from the board (since some of them are quite slow writers). In addition, the listening exercise, even though it was a book exercise, was added to the handout to avoid any confusion (since they would have to use the same table for doing different exercises and that would be quite confusing for the students with learning disabilities).

*Activity sheets have been created for the above phase and can be accessed at: https://drive.google.com/file/d/1QAZut00zdlk8pbFmWmbOOS_4hDasBtGO/view?usp=sharing

Lesson Plan 13: My Family

106

Basic Information

Subject: French

Keywords: Languages teaching/learning

General description: The scenario aims to make use of the school textbook as well as the development of the student's language, grammar and digital skills so that he is able to understand, produce text in written and spoken language and use specific structures and vocabulary related to the description of a person, the presentation of the family. The student is invited to utilize digital technology through the educational process with the aim of understanding and producing multimodal texts and the implementation of activities that produce active learning.

Suggested age group: 13-year-old adolescents.

Prerequisite student knowledge: Participating students should be familiar with a) cooperative teaching method b) the use of a word processor and web2 tools c)

have basic knowledge of self-presentation, the vocabulary of colors and days as well as possessive adjectives.

Language level of students: A1+ according to the Common European Framework of Reference (CECRL) / Cadre Européen Commun de Référence pour les Langues (CECRL) for the languages

Technical: web browsing, creating a document in GoogleDrive.

School infrastructure: Projector, laptop

Additional material needed: Not needed

Additional information from external sources/online tools: Not needed

Developed by: Eleni Theodorou

Educational Problem

The scenario aims to make use of the school textbook as well as the development of the student's language, grammar and digital skills so that he is able to understand, produce text in written and spoken language and use specific structures and vocabulary related to the description of a person, the presentation of the family.

107

Learning Objectives

Students are expected to:

1. in relation to the subject of the French Language:
 - i. Identify specific information in lists or short texts with limited vocabulary, simple grammatical structures and standard sentence patterns. (A1-2)
 - ii. Collect information about persons, objects, locations from one or more short informative texts and classify them (A1-10).
 - iii. Write simple sentences giving information about themselves, their family, their friends or acquaintances or their immediate environment, (e.g. where they live, what surrounds them, what they do, etc.)
 - iv. Be aware of simple linguistic elements to connect sentences (adverbial conjunctions, adverbs) (A1-09).

- v. Understand specific information (personal details of the speaker or information related to his immediate family environment), formulated with simple vocabulary and standardized sentence structures (A1-24).
2. in understanding written language:
 - i. Locate specific information in short texts with limited vocabulary, simple grammatical structures and standard sentence patterns.
 - ii. Collect information about people, objects, places from one or more short informative texts and classify them.
 3. in the production of written speech and written interaction:
 - i. Write simple sentences giving information write short texts of interpersonal communication, giving or asking for information.
 - ii. Fill in their answers to a questionnaire or complete a short informational text.
 - iii. Compose a short text of typical interpersonal communication (eg, posting on a forum - e-mail), using information from different sources (texts, visual material, etc.).
 4. in the comprehension of spoken language:
 - i. Answer simple questions in the foreign language about the content of a short speech (purely recorded).
 - ii. Understand specific information expressed in simple vocabulary and standard sentence structures.
 5. in oral speech production and oral interaction:
 - i. Answer and ask simple questions concerning immediate daily communication needs (family presentation).
 - ii. Develop general knowledge, attitudes, perceptions, skills.
 - iii. Explore some societal issues such as family relationships, cultural diversity and racism.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 15 minutes

Detailed description:

The teacher to introduce the subject begins with a game. He introduces himself with familiar sentences:

Bonjour, je m' appelle Eleni, je suis grecque. Mon papa s' appelle Nikos et ma maman Anna.

He then asks a student to do the same by changing the information eg:

Salut, je m' appelle Alex, je suis anglais. Mon papa s' appelle Georges et ma maman Christine

At the end, the student asks a classmate to introduce himself and the teacher. In the classroom it is also played with a soft ball. This creates a pleasant atmosphere and the teacher introduces his new topic.

Implementation Phase

Venue: School Classroom

Phase duration: 30 minutes

Detailed description:

Students observe a picture on their worksheet. Questions are asked that aim at reading - understanding the image - poster

- À QUOI CETTE IMAGE VOUS FAIT PENSER? - WHAT DO YOU THINK WHEN YOU SEE THIS PICTURE?
- POUVEZ-VOUS DONNER UN TITRE? - CAN YOU GIVE A TITLE?
- IL YA COMBIEN DE PERSONNES DANS CETTE FAMILLE? - HOW MANY PEOPLE DO YOU SEE IN THIS FAMILY?
- POUVEZ- VOUS LES NOMMER? - CAN YOU NAME THEM?

The teacher coordinates, guides the students in a discussion with the aim of enriching vocabulary related to the topic. Students build on previous knowledge, enrich it and discuss using the target language. Then, students in groups create a word cloud and they apply the vocabulary that was used. Finally, a vocabulary consolidation exercise is provided via learningapps:

<https://learningapps.org/display?v=pyrxgyanv16>

Evaluation Phase

Venue: School Classroom

Phase duration: 2 teaching hours (approximately 80 - 90 minutes)

Detailed description:

Activity 1:

The teacher introduces the topic by showing the film trailer and asks the students to answer the questions that accompany it (worksheet). There is an oral debate in plenary. It then shows a face description digital story <https://youtu.be/KdKYhHsDsrc> as well as two photo tree activities to understand face description vocabulary. Finally in groups he asks the students to watch the trailer again and do activities. At the same time, they are given an illustrated text, through the cartoon creation software www.toondoo.com or www.pixton.com, so that they can better understand the formation of the female gender. To consolidate descriptive vocabulary, they are led through an exercise in learningapps: <https://learningapps.org/display?v=p5wxd7vza01>

Activity 2:

The teacher assigns the students to create their own comic with tools like pixton, toodoo. Explains the process of creating comics. The creations are presented by the students and the teacher requests that the presentations be posted on a collaborative wall (padlet).

Students, in groups, create their own comics, presenting and describing faces. Finally, they describe their family orally with the help of the worksheet! (speaking activity). The best presentation is voted on.

Lesson Plan 14: My Smart City in Minecraft

Basic Information

Subject: English language, Technology, Robotics

Keywords: Climate action, sustainability, smart cities

General description: This activity offers the students to learn throughout gaming; they will have to create an ideal city by using Minecraft. They are tasked with the challenge of envisioning, and constructing their own sustainable city.

Suggested age group: 13-14 year old students

Prerequisite student knowledge: Basic knowledge of town places, directions, sustainability, and climate change problems, intermediate English language level, and basic Minecraft knowledge is needed. The students will be supported by the teacher with selected Minecraft items and materials concerning sustainability.

School infrastructure: IT Classroom

Additional material needed: Minecraft Classroom access at home. To play Minecraft each user requires a license or a Scholl- license.

Additional information from external sources/online tools: Videos and interview concerning "Agenda 2030", Climate change and sustainability, eco-towns.

Developed by: Luciana Patrizii e Domenico Pierfelice

Educational Problem

- Students will be tasked with a design challenge around climate equity and challenged to craft solutions to combat climate change and create a more sustainable city using English language
- Research on how smart cities work in the real world.
- Study key elements such as energy efficiency, waste management citizen interaction Sustainable mobility,
- Group-work and citizenship engagement: Invite other players to visit their virtual city and ask them to interact with the smart infrastructure they have created.

111

Learning Objectives

At the end of the challenge, students should be able to:

1. Define climate action and explain its significance to friends and family. Explain how individuals can contribute to positive change in cities through climate action.
2. Identify the role of cities in climate action. Explore the linkages between climate action in cities and the Sustainable Development Goals.
3. Synthesize knowledge of climate action as part of their Minecraft build to propose innovative and sustainable climate solution.
4. Critically evaluate the feasibility and potential impact of their proposed climate solutions within the context of real cities.
5. Reflect on the strengths and weaknesses of their Minecraft build and presentations, identifying areas for improvement.

6. Attain critical 21st century digital skills: creativity, problem solving, communication, critical thinking.

Phases of the Lesson Plan

Preparation Phase

Venue: School IT Classroom

Phase duration: 720 minutes (Introduction 4 hours, implementation 4 hours and feedback 4 hours approximately)

Detailed description:

Ask students to work in groups and discuss the following questions.

1. What is climate action? And why are cities important when we talk about the climate crisis?
2. Why is it important for young people like you to learn about climate action and be involved in making your city a better place for everyone?
3. What are some of the things that contribute to the climate crisis in cities?
4. What are some things you can do in your everyday life to help your city reach its goals?

112

Step 1 - Familiarity with Smart City Concepts:

Introduce students to the key concepts of an intelligent city, such as sustainability, energy efficiency, intelligent mobility and citizen participation. Stimulate reflection on the positive impacts that an intelligent city can have on everyday life.

Step 2 - Creative Use of Minecraft:

Teach students to use Minecraft as a design and simulation tool to create their own virtual smart city. Provide practical instructions on the functionality of Minecraft and the application of urban design concepts.

Step 3 - Collective Design and Construction:

Organize collaborative design sessions where students work together to outline urban planning, decide the layout of buildings and plan green areas. Use Minecraft as a platform to translate ideas and projects into an interactive virtual city.

step 4 - Integration of Innovative Technologies:

Introduce advanced technology concepts, such as and renewable energy sources, and encourage students to implement them in their virtual city.

Step 5 - Experimentation:

Simulate the implementation of smart solutions through use of modules and plugins in Minecraft, and robotic classes.

Step 6 - Feedback:

Feedback exposition to the class and during the open-day to parents in English about their city, the choices made to create their smart city and sustainable concepts proposed in their city

Implementation Phase

Venue: School IT Classroom and Home

Phase duration: Two weeks approximately

Detailed description:

The class group has now learned about sustainable development in cities and has a deeper understanding of specific themes related to city climate action. They have been given some ideas for how urban planning can promote sustainable living and had the opportunity to think about how this might be represented in Minecraft. Remind the class of the build challenge design challenge. We can encourage students to research information about climate action in their cities, sustainable communities, the sustainable development goals and if their city has a climate action plan. The class can now divide them into teams to start working together through the Minecraft.

Step 1 - Creating the Minecraft World:

Start with a flat world or generate a custom world with different landscapes. Establish the layout of the city, incorporating a central business district, residential areas and recreational spaces.

Step 2 - Building the smart infrastructure:

Design transport systems and intelligent road networks.

Step 3 - Integration and Smart Homes:

Design homes with automated features such as lighting.

Step 4 - Environmental sustainability:

Build clean energy facilities using windmills and solar panels. Create green spaces and parks for environmental balance.

Step 5 - Urban planning and safety:

Plan the city with zones designated for different purposes. Incorporate security measures such as emergency services and surveillance systems.

Evaluation Phase

Venue: School Classroom

Phase duration: 120 minutes

Detailed description:

Through this project, students will not only gain hands-on experience in collaborative design and construction within Minecraft but will also develop a deeper understanding of the principles behind smart city technologies and sustainable practices. The final result will serve as a showcase of their creativity and problem-solving skills in creating a model for a more sustainable and connected future.

Step 1 - Presentation and documentation:

Each team presents their implemented proposals within the Minecraft city, explaining the purpose and benefits of their chosen technologies.

Step 2 - City Tour:

Conduct a virtual tour of the smart city for an immersive experience, this activity could also be recorded in advance.

Step 3 - Documentation:

Prepare a comprehensive document detailing the smart city's features, technologies, and the thought process behind each design choice. Include screenshots or videos of the city to visually demonstrate the implemented concepts, expose the job using English Language.

Step 4 - Reflection and Improvement:

Collect feedback from other students, parents and teachers (we did it during our school open day) evaluating the success of the smart city project. Discuss the challenges faced during the construction phase and brainstorm ways to address them in future projects

Discuss potential enhancements and additional features that could be implemented to further improve the smart city. Encourage students to think about real-world applications of the smart city concept

Lesson Plan 15: Mysterious Writers' Escape Room

Basic Information

Subject: Italian writers

Keywords: Escape room, challenge, knowledge, fun

115

General description: Students will demonstrate their understanding of various writing elements through participation in a virtual escape room activity using the Spatial.io app. They will collaborate and communicate effectively in a virtual environment to solve writing-related puzzles and challenges.

Suggested age group: 13+ year old students

Prerequisite student knowledge: Basic understanding of writing elements, such as plot, character, setting, and descriptive language. Familiarity with different literary genres. Competence in basic writing skills, including sentence structure, grammar, and vocabulary. Ability to work collaboratively in a team setting. Refer to topics or specific knowledge a student must possess in order for him/her to be able to implement the activities inside this lesson plan.

School infrastructure: PC, tablet, touch monitor

Additional material needed:

- Spatial.io accounts for each student
- Escape room scenario and clues (uploaded to Spatial.io)
- Writing prompts or scenarios for each challenge

- Virtual whiteboard and markers within Spatial.io

Additional information from external sources/online tools: links to e-books or reports or actual books that the teacher may need to read or use on this matter

Developed by: Francesca Lazzari, teacher at IC Villamar, Lower Secondary School in Lunamatrona (SU), Sardinia

Educational Problem

The educational problem addressed by this lesson plan is centered on fostering a deeper appreciation and understanding of Italian literature among students. In traditional classroom settings, students often engage with literature in a more passive manner, focusing on theoretical analysis rather than immersive experiences. This lesson plan seeks to address this issue by incorporating an interactive and collaborative approach through a virtual escape room activity. The challenge is to bridge the gap between theoretical knowledge of Italian writers and the experiential understanding of their masterpieces, encouraging students to actively explore, discuss, and apply their learning in a dynamic virtual environment. By immersing students in a literary escape room adventure, the lesson plan aims to overcome the potential monotony associated with traditional literature lessons. The problem lies in students not fully grasping the richness of Italian literature, which can hinder their appreciation for the cultural and linguistic nuances embedded in the works of notable Italian writers. The escape room format introduces an element of excitement and discovery, encouraging students to actively participate in the exploration of Italian literary heritage. This innovative approach seeks to transform the educational experience, making it more engaging and memorable for students, ultimately leading to a more profound understanding and appreciation of Italian writers and their masterpieces.

116

Learning Objectives

1. Students will actively engage in literary exploration by discovering and identifying key Italian writers and their masterpieces. Through virtual escape room challenges, they will develop a deeper understanding of the diverse literary landscape of Italy, recognizing the contributions of different authors.
2. Students will enhance their collaborative writing skills as they work together to solve challenges in the virtual escape room. Through discussions, brainstorming, and shared writing tasks, they will foster effective communication and teamwork while creating written responses to the prompts related to Italian writers and their works.

3. The lesson aims to cultivate an appreciation for the rich cultural and literary heritage of Italy. Students will gain insights into the historical context, linguistic nuances, and unique styles of Italian writers. The objective is to instill a sense of curiosity and respect for the literary contributions that have shaped Italian literature.
4. Students will develop critical thinking skills as they analyze quotes, synthesize information, and respond creatively to writing challenges. Through the virtual escape room activities, they will be encouraged to think critically about the characteristics of different literary genres and the impact of Italian writers on the world of literature.
5. The lesson plan integrates digital literacy skills by utilizing the Spatial.io platform for the virtual escape room. Students will navigate the virtual environment, use collaborative tools, and engage with digital resources to enhance their learning experience. This objective aims to familiarize students with digital platforms for educational purposes.

Phases of the Lesson Plan

Preparation Phase

Venue: Indoor - Online

Phase duration: 330 minutes

Detailed description:

Step 1 - Designing the Virtual Escape Room:

- Identify key Italian writers and literary works to form the basis of the escape room challenges.
- Create engaging and varied writing prompts for each challenge, ensuring alignment with learning objectives.
- Set up a virtual environment in Spatial.io, incorporating Italian literary elements.
- Develop clues, hints, and a storyline that connects challenges and immerses students in the literary adventure.

Step 2 - Familiarizing with Spatial.io:

- Ensure all students have access to Spatial.io accounts.
- Conduct a brief tutorial or demonstration to familiarize students with navigating the virtual environment, using collaborative tools, and understanding how to interact within the platform.

Implementation Phase

Venue: Indoor - Online

Phase duration: 145 minutes

Detailed description:

Step 3 - Introduction and Setting the Scene:

- Begin the class with a brief discussion on the significance of Italian literature.
- Introduce the escape room concept and objectives.
- Transport students to the virtual environment in Spatial.io, setting the scene for the literary adventure.

Step 4 - Virtual Escape Room Challenges:

- Guide students through different virtual stations representing challenges related to Italian writers and their masterpieces.
- Encourage collaboration and discussion as students work on writing tasks using Spatial.io tools.
- Monitor progress, provide hints if needed, and ensure that each team has the opportunity to complete all challenges.

118

Step 5 - Debrief and Discussion:

- Review each challenge within the Spatial.io environment, discussing successful writing techniques and creativity.
- Facilitate a reflection session using collaborative tools to gather insights from students on what they learned about Italian literature and writing.

Evaluation Phase

Venue: Indoor - Online

Phase duration: 75 minutes

Detailed description:

Step 6 - Wrap-Up and Assignment:

- Summarize key takeaways from the lesson.
- Assign a follow-up writing assignment or reflective task related to Italian writers and their masterpieces.

Step 7 - Assessment and Feedback:

- Collect and assess students' collaborative writing outputs from the virtual escape room challenges.
- Provide constructive feedback on individual and group contributions.
- Encourage students to share their thoughts on the activity and its impact on their understanding of Italian literature.

Lesson Plan 16: Nutrition and Climate Change

Basic Information

Subject: Social and Political Education

Keywords: Nutrition, food, environment, climate change, natural resources

General description: Students-consumers have the opportunity, through a wide variety of foods, to choose those that are less burdensome for the environment. This behavior is characterized as Green Eating (GE, <https://www.eitfood.eu/>). To carry out this behavior, student-consumers can:

- choose food that is produced in their place (local products) (Edwards-Jones G., 2010), so as to avoid transporting them between different countries and producing additional pollutants.
- limit meat consumption.
- reduce the amount of food they will consume in order to minimize food waste (Monroe et al, 2015).
- follow dietary models such as the "Mediterranean diet" that have a small environmental footprint and a wealth of nutrients essential for human health.

In conclusion, it seems that consumer choices play a key role in addressing the problems created by the current way of food production. The subject of Social and Political Education offers the possibility to the students and also to their families, since the former will act as multipliers, to be informed so that through their dietary choices the EU goal of Green Europe and sustainable development can be achieved.

Suggested age group: 17 - 18 year old students

Prerequisite student knowledge: Not needed

School infrastructure: PC, projector, internet

Additional material needed: Not needed

Additional information from external sources/online tools: Not needed

Developed by: Stalika Maroula, Home Economics teacher

Educational Problem

This specific lesson plan can help students and, by extension, the households they belong to, to understand that the choice of food today more than any other time is of decisive importance for the environment in which they and later their descendants live. It will help them to understand that the right choice of food will strengthen their health on the one hand and curb climate change on the other by limiting air pollution and the waste of natural resources.

Learning Objectives

The students, at the end of this activity, will be able to:

120

1. define the concept of climate change and the relationship that connects it with the food choices of consumers.
2. acquire critical thinking regarding food choices.
3. enrich their diet with foods whose production or disposal burdens the environment less.
4. re-adopt dietary choices of older generations not only for health reasons but also for environmental protection reasons.
5. choose their food taking into account environmental factors.
6. adopt sustainable behavior in their daily lives to achieve their own well-being and the well-being of future generations.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 90 minutes

Detailed description:

The scenario approach is carried out with "cooperative guided discovery", in the context of which students through specific activities learn and acquire new knowledge. During the implementation of the scenario, the teacher acts as a guide, supporter, reinforcer and animator so that in 2 teaching hours the best possible result is achieved and the students acquire knowledge and skills as well as change their attitudes. Teaching through powerpoint, watching specific videos and also the EDUKANDY online game that the children will play twenty minutes before the end of the second lesson are expected to strengthen and facilitate learning.

Implementation Phase

Venue: School Classroom

Phase duration: 90 minutes

Detailed description:

Step 1:

On the video projector with the Power Point program, the students are informed about the relationship between nutrition and climate change.

In this step, the students working cooperatively record words, concepts and information that connect people's dietary choices with the climate change observed in recent years on the planet. The teacher records these words on the board and asks the students to then describe them in their own way orally.

Step 2:

In this particular phase of the teaching scenario, the students who work cooperatively are invited to watch the video "Don't Eat the Planet" by WWF: https://www.youtube.com/watch?v=Zh9V2nD3ppA&ab_channel=%CE%9A%CE%B1%CE%BB%CF%8D%CF%84%CE%B5%CF%81%CE%B7%CE%96%CF%89%CE%AE. At the end of the screening, the students are asked to record on a worksheet what impressed them. The teacher checks if what they saw in the video was understood by all the students. The teacher checks the correctness of the students' answers with questions.

Step 3:

In the third step, the students working cooperatively have to discover the hidden words in the theme crossword. This will be created by the teacher with the help of the "Educandy" program.

The teacher asks the students to reveal the hidden words and intervenes whenever and if he deems it appropriate by acting more instructively.

Step 4:

In this step, the students working cooperatively watch a video in which they are informed about food waste and the threat it poses to humanity and the planet: https://www.youtube.com/watch?v=gXbx00LrmeU&ab_channel=WWFGreece.

The teacher asks the groups to choose a representative from each group who, after a few minutes of discussion between them, will explain how they will change their daily life and their food choices in order to protect the climate and our planet.

Evaluation Phase

Venue: School Classroom

Phase duration: 15 minutes

Detailed description:

In the last phase, the teams are evaluated based on the above activities, according to the selected evaluation method of their teacher.

Lesson Plan 17: Representation of Numbers in the Binary System

Basic Information

Subject: IT

Keywords: Binary system, bit, zero, one

General description: Students' knowledge of the binary numbering system and matching to the states "current passes", "current does not pass". Converting numbers from binary to decimal and vice versa.

Suggested age group: 13 -14 year old students

Prerequisite student knowledge: Not needed

School infrastructure: PC, projector, Internet

Additional material needed: Worksheets, white reference stickers, markers, timer, cards, board

Additional information from external sources/online tools: Not needed

Developed by: Chara Georgaki, IT teacher

Educational Problem

First, reference is made to the information and the decimal and binary numbering systems, the number of digits used in each of them, emphasizing the digits 0 and 1 of the binary system. Each team gets a worksheet and 5 blank cards. A facilitator is appointed for each group and the children draw the dot cards. Children are explained to match the dotted side to the digit 1 and the white side to the digit 0.

Then the teams play the card game. One team gives the number in decimal and the other team forms by placing the cards either on the dot side or on the white side (in such a way that the sum of the dots on all the cards makes the number in decimal) the corresponding number in binary. Then each group completes the third activity on the worksheet with the appropriate combinations of 0 and 1 and in the fourth activity they do the reverse process by writing next to each binary number the decimal.

123

Learning Objectives

1. To recognize the need for digital representation of data
2. Students' familiarity with the binary numbering system and matching to the situations "current passes", "current does not pass".
3. The conversion of numbers from the binary system to the decimal system and vice versa

Phases of the Lesson Plan

Preparation Phase

Venue: School IT Classroom

Phase duration: 5 minutes

Detailed description:

The class is divided into groups of 5 (preferably) students. GROUP_A GROUP_B GROUP_C etc. Cards, markers, pens, board and computers, timer are needed.

Implementation Phase

Venue: School IT Classroom

Phase duration: 20 minutes

Detailed description:

Proposed activities are available at the activity sheets provided.

124

*Activity sheets have been created for the above phase and can be accessed at:
<https://drive.google.com/file/d/1eZPz0vwgMoGgQxH4vc-FvaOLmPMJw1zv/view?usp=sharing>

Evaluation Phase

Venue: School IT Classroom

Phase duration: 10 minutes

Detailed description:

The possible difficulties we are expected to face are in understanding the need and how to convert numbers from the decimal system to the binary system and vice versa, in understanding the game, in expanding the activities to create numbers greater than 31 and finally in gathering the children in the lesson and in the performance of the activities after the game process. The teacher must make sure to delve into these matters through the evaluation procedure of his/her choice.

Lesson Plan 18: Teaching FOR & AGAINST Essay

Basic Information

Subject: English Language

Keywords: Essay, linking words, group work, Padlet, Exit cards

General description: Teaching For and Against essay with the use of Padlet using gamification techniques

Suggested age group: 17 year old students

Prerequisite student knowledge: Structure/paragraph plan of the essay, linking words

School infrastructure: Wi-Fi connection, projector, laptop, mobile phones

Additional material needed: Revision handout outlining the structure, linking words

Additional information from external sources/online tools: The teacher must create an account on Padlet to send the students the link or QR code so they can access it

Developed by: Stavie (Stavroula) Metta, English teacher

125

Educational Problem

Many of problems that often students face, are brainstorming, organizing their ideas into paragraphs and using a variety of linking words to connect those ideas. In addition, collaborating in groups is rather challenging for them as usually the more confident and stronger students take charge. With the use of Padlet and gamification techniques and the use of the handout the students were all positively motivated and actively involved in the lesson, even the weaker ones. The aim was achieved as they all participated, used the linking words, managed to agree as a group on what to present and were introduced to a new more interesting way of practicing essay writing.

Learning Objectives

1. Introduction to the use of Padlet (illustrate, describe, explain).
2. Group work /cooperation between students (collaborate, evaluate, argue, select).
3. Brainstorming, develop ideas into paragraphs, critical thinking development (analyze, create, write, execute).
4. Proper use of linking words (connect, contrast, demonstrate, conclude).
5. Time management using gamification techniques.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom or Library

Phase duration: 20 minutes

Detailed description:

A handout is first prepared with the structure of the essay and various linking techniques the students can use. An online account on Padlet is created and all the necessary steps are noted so students can be instructed to login in. The aim of the lesson and instructions are given to the students.

126

Implementation Phase

Venue: School Classroom or Library

Phase duration: 90 minutes

Detailed description:

Students are divided into 4 groups of 4-5 students in each group. The instructions on how to join the Padlet are given as well as instructions on what they are expected to do in the lesson. Handouts are then distributed to the students.

- The students have 15 min to brainstorm, collaborate, argue, select and write down in bullet form their ideas as a group. The team that finishes first within given time gets 1 bonus point.
- The students then have 20 min to analyze the information, create and write down a paragraph selecting linking words from the handout to create and

write their paragraphs as groups. The team that finishes first within the given time gets 1 bonus mark.

- The teams have 20 min to name their groups, take a photo of their groups and upload it on Padlet as well as type their paragraph on the Padlet. The team that finishes on time gets 1 bonus mark.
- When all the teams complete their tasks, they then have to read aloud to the rest of the class their paragraphs and arguments.
- A padlet poll is set up for students to vote on the most convincing arguments and use of language used by the teams. The team that gets most votes gets a bonus mark.
- Winning team is announced.
- The teacher asks students to write down the whole essay as homework.

Evaluation Phase

Venue: School Classroom or Library

Phase duration: 7 minutes

Detailed description:

The students receive an exit card where they have to reflect on the winning arguments and consider why they were more persuasive. The students have to also say whether they liked the lesson (what they liked the most/least).

127

Lesson Plan 19: Tell me about your City

Basic Information

Subject: French language

Keywords: Languages teaching/learning

General description: This scenario aims to develop communicative language skills related to the basic vocabulary for describing a city, as well as the use of the present tense and local adverbs. The scenario activities were designed with the aim of developing digital interactive skills as well as cultivating exploratory and active learning.

Suggested age group: 17 -18 year old students

Prerequisite student knowledge:

- Language level of students: A1+ according to the Common European Framework of Reference (CECRL) / Cadre Européen Commun de Référence pour les Langues (CECRL) for the languages.
- Vocabulary skills: vocabulary about the parts of the city.
- Grammar skills: aller à + ville, en + pays genre féminin, au + pays genre masculin prépositions de lieu.
- Technical skills: web browsing, creating a document in GoogleDrive.
- Familiarity with synchronous and asynchronous distance learning.

School infrastructure: Laptop, projector

Additional material needed: Not needed

Additional information from external sources/online tools: Not needed

Developed by: Vasiliki Vazalouka, French language teacher

Educational Problem

This activity aims to develop communicative language skills related to the basic vocabulary for describing a city, as well as the use of the present tense and local adverbs.

Learning Objectives

Upon completion of the activity, students are expected:

in terms of knowledge and skills to:

1. Cultivate their thinking skills (thinking routines) through the observation-description-interpretation of images.

regarding the subject (French language) to:

2. Understand a multimodal text, and to produce sentences with a simple structure, with widely used words in order to be able to describe their city.
3. Develop visual and auditory literacy.

4. Understand and describe images thus developing oral and written language production skills.
5. Locate information in an oral text and be able to classify it correctly.
6. Build knowledge in an exploratory way (searching for information on the Internet).

Phases of the Lesson Plan

Preparation Phase

Venue: Asynchronously in the e-class. Application of the "flipped classroom" model. Also, a part in the school's IT Classroom.

Phase duration: 45 minutes

Detailed description:

Objective:

- repetition of vocabulary and grammar that has been taught (présent, vocabulaire de la ville – prépositions de lieu. present, city vocabulary – prepositions of place).
- Use of digital tools-resources

Vocabulary is reviewed with exercises in learning apps:
<https://learningapps.org/8782979>

language online: https://www.languagesonline.org.uk/French/Primary/En_Ville/2.htm

wordwall:

https://eclass02.sch.gr/modules/units/view.php?course=2001020238&res_type=exercise&exerciseld=2036127&unit=2129775

In the IT Classroom, we play in groups an activity in Quizizz:
<https://quizizz.com/admin/presentation/6577c174ced883580c95f350?searchLocale=>

Implementation Phase

Venue: Asynchronously in the e-class and in the school's IT Classroom.

Phase duration: 45 minutes

Detailed description:

I discover the city – (Work in groups)

Step 1: Start - Whole class

An image with characteristic monuments and products of Brussels is used as a trigger for introduction to the topic and discussion about these cultural elements. (Alternatively, we could provide some links for students to research on their own Digital educational content, tools, resources: <https://www.cityzeum.com/guide/monuments-de-bruxelles-1>).

Step 2

We invite the students to watch the video (duration 2:49') in which they will discover the city of Brussels and they are asked to create a word cloud with the monuments of the city they observed <https://wordart.com/>.

Step 3

Students in groups, either sharing a collaborative google document or in the e-class watch the video and ask the comprehension questions. The activities are then reviewed.

Step 4

A student summarizes the topic of the video.

Evaluation Phase

Venue: E-class

Phase duration: 45 minutes

Detailed description:

The students, in the manner of the reporter, present their city in 2 ways: create an interactive image and generate text with the Online tools Genial.ly and Thinglink, and upload their creations to a collaborative wall <https://padlet.com/vana4285/maville-3565s3eyqsii>

Tip: Before writing, we complete the list on the board together. We add the following columns: leisure places in a city (café, restaurant, theater, cinema, opera); places linked to transport (a bus stop, a tram station, a metro station, a train station); and cultural places (museum, church, cathedral, etc.).

The worksheets with the activities are in a lesson in our online classroom <https://eclass02.sch.gr/courses/2001020238/>.

Lesson Plan 20: Telling the Time

Basic Information

Subject: English as a foreign language

Keywords: Reinforcement, practice, fun

General description: It is expected that by the end of the 2 lessons, students will be able to tell the time in the target language. Traditional methods will be used to explain how to tell the time in English, using the school text book, and this will be followed by a game of Bingo using specially designed cards which students complete according to 'times' drawn at random by the teacher. The first student to complete a line of 5 is the winner.

Suggested age group: 12 years old (1st grade Junior High School)

Prerequisite student knowledge: Ability to tell the time in their mother tongue

School infrastructure: Interactive white board, internet

Additional material needed: Clock face, individual game boards, counters and bag of 'times' for Bingo, leader board (interactive white board), quiz

Additional information from external sources/online tools: Student's book (Think Teen – Level 1)

Developed by: Susan Chrysovitsinou, teacher of English as a Foreign Language at Pedini Junior High School, Ioannina

Educational Problem

Telling the time is part of the course material for Level 1 first grade Junior High School students but more practice is needed as they often have difficulty in differentiating between 'past' and 'to' when talking about the time in English. The difficulty appears to arise because in Greek the hour is stated before the minutes, which is the opposite of how time is spoken about in English.

Learning Objectives

1. Students will be able to 'tell the time in English'.
2. Students will feel a sense of achievement.
3. Students will be motivated to practice telling the time as they will have fun while doing so.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 45 minutes

Detailed description:

Presentation of lesson 1, Unit 3, page 28, Think Teen 1st Grade Junior High School Student's Book (Level 1) "Telling the time". Refer students to page 28 so that they can examine the clock face with annotated increments of 5 minutes. Explain that in English we say "5 past 4" to indicate that the time is 5 minutes past the hour and not the other way round as in Greek.

Pair work - Ask students to ask each other about their daily routines and at what time they engage in various activities.

Use analogue and digital clock faces to present the time in English with emphasis on increments of time 'past' and 'to' the hour. Ask individual students to say the time shown on the clock face. Students complete a multiple-choice quiz which requires them to choose the clock face that corresponds to the written time.

Implementation Phase

Venue: School Classroom

Phase duration: 40 minutes

Detailed description:

Depending on students' confidence, students could play in pairs or individually. Give each student a bingo card showing clock faces with different times and 15 counters. The teacher will randomly take out cards from a bag and read aloud the time written on the card. Each card will be read out twice. Students should cover the clock face which corresponds to the time read out, if they have it on their card, with a counter. The winner is the first student to cover 5 clock faces in a row (diagonally). On completion of a row, they shout "Bingo!"

If there is time, the game can be continued to determine who is second, third etc.

Direct the students' attention to the leader board on the wall. The winner(s) will receive a token which is placed on the leader board and represents a win or second/third place in the game. More games will be played to practice and reinforce other language skills in the course of the year's work.

133

Evaluation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Two phase quiz. On completion of the initial introduction of 'Telling the time' in English, using the student's book, students are asked to complete a quiz which requires them to express the time in the target language when shown different clock faces. After implementing the above lesson plan, students will be asked to complete the same quiz to ascertain how effective the lesson was.

Lesson Plan 21: The Paris 2024 Olympic Games

Basic Information

Subject: French as a second foreign language

Keywords: Escape games, Olympic Games, values, symbols, city, Panhellenic festival, Olympism

General description: After a pedagogical session dedicated to the Olympic Games in the French as a Foreign Language (FLE) class, students engage in a captivating escape game entitled: 'The Escape Game: The Olympic and Paralympic Games 2024.' This interactive escape game was developed by Julien Fumey for the French Institute of Greece in preparation for the Paris 2024 Olympic and Paralympic Games. Through this immersive experience, students have the opportunity to explore various sites related to the 2024 Olympic Games, deepen their understanding of sports, and gain insights into French culture.

This escape game provides an immersive and playful experience, enabling students to practice their language skills while building confidence in French. Furthermore, by integrating digital and communicative elements, the game enhances interactive and engaging learning in the FLE class, thus providing a rewarding teaching experience for the students.

Suggested age group: 15 - 16 year old students

Prerequisite student knowledge:

- A2/B1- level of French
- Lexical prerequisites:
 - Basic knowledge about the Olympic Games: vocabulary related to sports, sporting disciplines, participating countries, historical events, etc.
 - Vocabulary related to digital skills: terms associated with online research, internet browsing, use of digital tools, etc.
- Grammatical prerequisites:
 - Mastery of past tenses (compound past, imperfect) to discuss the history of the Olympic Games or past events.
 - Knowledge of grammatical structures to formulate questions and answers to solve puzzles.
 - Appropriate use of prepositions to indicate spatial and temporal relations when solving puzzles.
- Other prerequisites:
 - Ability to work in teams and collaborate with peers.

- Reading and comprehension skills in French to interpret game instructions and puzzles.
- Ability to use digital tools independently or with minimal assistance.
- Motivation to actively participate in a playful and interactive classroom activity.

School infrastructure: Interactive whiteboard, a tablet, internet connection

Additional material needed: Small prizes or rewards for teams that successfully complete the escape game within the allotted time or demonstrate exceptional teamwork and problem-solving skills.

Additional information from external sources/online tools:

- A random wheel is used to select players from among the group members before the start of the game. This grabs the attention of the students, creates a suspenseful atmosphere, and further mobilizes them: <https://wheelofnames.com/2y8-7qp>
- Students are encouraged to find information and solutions to the puzzles by following suggested hyperlinks that lead to safe and well-documented sources:
 - <https://www.paris.fr/l-hotel-de-ville>
 - <https://www.musee-armee.fr/votre-visite/les-espaces-du-musee/lhotel-national-des-invalides.html>
 - <https://www.grandpalais.fr/fr>
 - <https://www.rolandgarros.com/>
 - <https://www.chateauversailles.fr/>
 - Ang è le - Balance Ton Quoi [CLIP OFFICIEL] - <https://www.youtube.com/watch?v=Hi7Rx3En7-k>
 - Stromae - papaoutai (Official Video) - https://www.youtube.com/watch?v=oiKj0Z_Xnjc
 - #Paris23 world parathletic championship Gkavelas Nasos gold medal - https://www.youtube.com/watch?v=Fos_KYXfCZY
- Mentimeter for designing interactive assessment, <https://www.menti.com>
- Google Chrome or any other browser to look for information on the tablet

Developed by: Zampeta Tzakosta, French language teacher in Zosimaia Model General High School of Ioannina

Educational Problem

Our educational challenge lies in the creative utilization of educational resources and gamification within the French as a foreign language curriculum. The goal is to

engage students and enhance their communication skills, both orally and in writing, at an A2+ level. We are presented with a unique opportunity to immerse students in a cultural and sporting phenomenon of great significance: the organization of the Olympic Games in Paris in the summer of 2024. Indeed, in the digital age, the development of digital literacy poses a contemporary challenge in foreign language classrooms. Moreover, escape games offer a modern and engaging solution, resonating particularly with high school students, who are part of a generation characterized by screen overconsumption. By incorporating these elements into our teaching practices, we aim to bridge the gap between students' interests and language learning, ultimately benefiting their overall educational experience.

Learning Objectives

The students after the completion of the activity will be able to:

1. revise basic vocabulary related to the Olympic Games.
2. practice using the Present and Past Tense in the context of discussing Olympic events.
3. improve their reading and speaking skills through engaging activities focused on Olympic-related topics.
4. encourage teamwork by fostering collaborative learning experiences centered around the Olympic theme.
5. practice problem-solving skills through challenging tasks related to Olympic history and events.
6. explore additional resources to learn about iconic buildings in Paris and their history, as well as individuals associated with the history of the Olympic Games, expanding students' knowledge beyond the classroom curriculum.
7. introduce contemporary representatives of the French-speaking music scene, who will serve as inspiration for creating their own educational multimedia games.
8. create a fun and enjoyable learning environment where students can actively participate in learning activities while cooperating with their peers.

Phases of the Lesson Plan

Preparation Phase

Venue: In the classroom equipped with an interactive whiteboard connected to the internet, in addition, students have a sufficient number of tablets available for group work.

Phase duration: Utilizing gamification and learning in a fun way, four lessons (40 minutes each) focusing on the “Olympic Games - Paris 2024” theme are designed to achieve expected learning outcomes in thematic vocabulary and grammar, incorporating reading, listening, and writing activities. These lessons employ an interactive-exploratory approach, placing the student in the role of the active participant. Language development is viewed as the cultivation of multilingual skills in the French language.

Detailed description:

Before the implementation of the escape game titled "Jeu d'évasion: les Jeux Olympiques et Paralympiques 2024," the students worked collaboratively on the website of the French Institute of Greece, under the column "SPORTS EDUCATION - On the road to Paris 2024." They discovered, divided into groups, the Greek athletes preparing for the Olympic and Paralympic Games through video portraits of Greek athletes who inspire as they prepare for the Olympic and Paralympic Games in Paris, as well as the article from Wikipedia "Jeux olympiques." Additionally, they filled in thematic vocabulary on worksheets provided by the french teacher, and engaged in interactive communication activities specifically designed for this initial phase of stimulation.

- <https://youtu.be/qOhRILCRVKU?si=az85angAO9IWX-yc>
- <https://youtu.be/LuvQRZsaKvA?si=V24IMCAM6i9KxE80>
- Jeux olympiques — Wikipédia

Implementation Phase

Venue: School Classroom

Phase duration: 80 minutes

Detailed description:

The students will participate in an interactive game where they will need to answer questions and solve puzzles. At each location they visit, a historical figure or a famous French personality will give them instructions, and they will have to assist an athlete in their challenges. The game is presented in the classroom, and the rules are discovered by interacting with the application. The first team to solve the first quiz is selected using the "Wheel of Names" application, a digital tool for classroom drawings. The same process is followed each time the level changes, with the next team being selected by the wheel of fortune. It should be noted that the French teacher has already assigned the teams to be drawn in the preparation phase of the educational scenario. In this initial phase of the escape game, the students delve into the history and significance of the Olympic Games. They explore ancient

Greece and the origins of the Games, as well as the symbolism of the Olympic rings. Activities in this phase include quizzes, research tasks, and group discussions on the organization of the Games and Greece's contributions to them. Moreover, students learn about the categorization of athletes in the Paralympic Games and the traditional ceremonies of the opening events. Throughout this phase, students actively engage in exploring these topics, leading to a deeper understanding of the history and significance of the Olympic Games.

Evaluation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Students will conduct an online evaluation using the digital tool Mentimeter, which offers an engaging and interactive learning experience in real-time. This evaluation will provide immediate feedback. As a follow-up, they can be assigned additional homework to describe the game they have just played and write a brief review about it.

Lesson Plan 22: Walking with Einstein

Basic Information

Subject: Technology (coding), Mathematics, Italian

Keywords: Digital board game, coding, scratch, escape-room

General description: The game entitled "Walking with Einstein" is a digital board game, created by students with the collaboration of the teacher. It is an individual or couple game and the player is invited to tackle the various mathematics topics studied during the school year to test the ability to solve certain types of problems. So, the game aims to test the mathematical knowledge of students in their final year of primary school with more fun. The background represents a circuit: a road in the middle of a city traveled by a car which encounters obstacles to overcome which the player must find the solution key by responding to specific problems. If the

player is good and answers in a right way to everything, at the end he receives a personalized certificate as a reward.

Suggested age group: 12 year old students

Prerequisite student knowledge: Main mathematics topics (elementary level knowledge)

School infrastructure: Laptop, tablet, digital scanner, Wi-Fi

Additional material needed: All instruments for graphics realizations: pencils, colors, sheets, etc.

Additional information from external sources/online tools: Access to the Scratch online: <https://scratch.mit.edu/>

Developed by: Silvia Mazzeo and her students

Educational Problem

The microworld “Walking with Einstein”, created by students for students, is an interactive game that aims to:

1. introduce girls and boys to mathematics through play;
2. apply coding as an interdisciplinary tool;
3. make students protagonists of the teaching/learning processes;
4. introduce girls to STEM disciplines

139

Learning Objectives

The topics chosen are connected to those addressed during the school year:

1. encourage the development of problem-solving skills.
2. encourage the development of IT skills (metaskills) in the training process.
3. encourage the development of algorithmic-computational thinking as a general strategy for tackling problems.

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom and IT Classroom

Phase duration: 180 minutes

Detailed description:

Presentation of the challenge: create a micro-game world using mathematical topics.

Organization of the class into teams: each team hypothesizes the development of a part of the game (the mathematical topics, the scenario and the characters, the rules of the game, the structure to be developed with Scratch).

Return of the teams: the game is planned by assembling the various hypotheses developed by the teams; adjustments for the creation of the game are agreed upon.

Each team proceeds to work on the realization of their tasks by preparing the backgrounds and drawings of the characters, to carefully develop mathematical exercises and problems, and develop the lines of code through the Scratch application.

140

Implementation Phase

Venue: School IT Classroom

Phase duration: 300 minutes

Detailed description:

The implementation focused on the development of the interactive game on Scratch with the uploading of the drawings acquired in digital format and the creation of the various steps that the player will have to perform to move from one exercise to another until the end of the game.

The track is interrupted by obstacles composed of geometric figures or mathematical exercises. If the player enters the correct answer to the request formulated with the "ask" block, he overcomes the obstacle and the car moves forward to the next step. The journey ends with arrival at the finish line where you

receive Einstein's congratulations and a certificate is displayed which can be completed with the name and saved.

The code is made up of three main macroblocks:

- the code of the individual proposed exercises which, thanks to the "if... then... else..." block, if you answer correctly, the game proceeds, otherwise it proposes the question to answer again; for each answer the player receives positive or negative feedback from an Einstein-emoticon.
- the car code that moves from one step to another when it receives the message from the resolution of each individual problem; at each resolution the machine "slips" from one coordinate to another, changing direction.
- the code that manages the printing of the name on the certificate and which allows the user to retain recognition for the mathematics skills required in the game.

*A video of the implementation and a link to the game are provided below:

- https://www.canva.com/design/DAFeIPo7F7Y/bnx4V6E90AMKElgV136cJQ/watch?utm_content=DAFeIPo7F7Y&utm_campaign=designshare&utm_medium=ink&utm_source=publishsharelink
- <https://scratch.mit.edu/projects/826982137>

Evaluation Phase

Venue: School Classroom

Phase duration: 60 minutes

Detailed description:

The students invite their classmates of the same level to test the game and try to reach the end of the journey; once all the exercises have been completed, the player can write his name on a certificate template and save it.

The game was evaluated as follows:

- Difficulty level of the exercises
- Game structure (rules, paths, etc.)
- Fun and involvement
- Graphics

Lesson Plan 23: What Influences our Diet?

Basic Information

Subject: English

Keywords: Reading for Orientation, Identifying Cues and Inferring (spoken, signed and written), Informal Discussion

General description: The lesson aims to help students consolidate the basic reading strategies of skimming and scanning and figuring meaning from context in an entertaining and fun way. Through the game "Reporters on the Run" the students divided in pairs try to answer the questions about a text within a time limit and the use of their memory skills. The winners of the game get a reward for their successful work. The reason why I chose to include this game is to get all students involved and interested in the reading comprehension task, which they do not often do because they are bored reading long texts and looking for information.

Suggested age group: 16 year old students

Prerequisite student knowledge:

- Present, Past and Future tenses
- Expressing and justifying opinions
- Basic knowledge of vocabulary related to food, cooking and diet
- Skimming and scanning strategies
- Inferring meaning through context

School infrastructure: PC, projector, speakers

Additional material needed: Material provided in the activity sheets (from Course book Teacher's book and Student book "Oxford Discover Futures 3") and a brief questionnaire found in the following link - https://docs.google.com/forms/d/e/1FAIpQLSfXyB7ABmWU3G_F3ISWxcxilflfSz7MFM3RJn8p-sVgEaP7A/viewform?usp=sf_link

Additional information from external sources/online tools: - Course book's software (Interactive Whiteboard Software)

Developed by: Yiota Efstathiou, English teacher

Educational Problem

The activity will contribute so that students can scan texts in order to locate desired information, and gather information from different parts of a text in order to fulfil a specific task. They will also use a variety of strategies to achieve comprehension, including watching out for main points and checking comprehension by using contextual clues (e.g. figuring meaning from context). Finally, they will follow much of what is said around him/her on general topics, and can give or seek personal views and opinions in discussing topics of interest (e.g. healthy diet).

Learning Objectives

By the end of this lesson students will be able to / are expected to:

1. identify the main and specific points in an article about processed food and healthy diets.
2. explain vocabulary figuring meaning from context, giving synonyms.
3. skim and scan the text about "What would a weekly diet look like in a photo" to identify specific information and/or the main points. Interpret character's actions and motives.
4. talk about the influences on people's diets worldwide and how they make them different.

Phases of the Lesson Plan

Preparation Phase

Venue: Teachers' Hall in the School

Phase duration: 30 - 40 minutes approximately

Detailed description:

The teacher reads the article and decides which questions to write down so that the students get the most important information from it as well as make the game more challenging. He/She writes the questions on the computer and prints them out as handouts. Then he/she makes 3 enlarged copies of the article and cuts them out into 4 strips each in order to stick them all around the classroom or school yard. Thinks, decides and writes down the Rules and Goal of the game as well as the prize of the winning team.

Implementation Phase

Venue: School Classrom / School Yard

Phase duration: 32-35 minutes approximately

Detailed description:

Activity 1

The teacher asks students not to open their books and close their eyes- She tells students she is going to say a word and they must write down the first word or idea that comes into their head when she says it. The teacher tells students not to think much but just to write their first idea. The teacher says the word COOKING and asks students to open their eyes and write down their first thought or idea. She writes students' ideas on the board in a word cloud writing items that are mentioned several times in bigger letters. She points to the cloud on the board and asks: "Who does the cooking in your house? What is your favourite recipe?" The teacher elicits answers from students and then asks "Can you cook? Who usually teaches us to cook? How many different ways of cooking can you think of?" (boil, bake, fry, roast, steam). The teacher writes them on the whiteboard and students write them in their notebooks.

144

Activity 2

The shows a picture on projector which shows 2 young people of different nationalities who follow different daily diets (the picture is taken from their S/B p. 29)- T asks "Where do you think the young people are from? What type of food can you see? Why do you think they eat this food?"- The students express their opinions by justifying them and asks them if any of them follows any of these two diets and explain why.

Activity 3

Having stuck chunks of the text from p. 29 from S/B on the walls and trees around the school yard which is outside their classroom before the lesson begins, the teacher informs the students they are going to play a game practicing and testing their reading and comprehension skills. She divides students in pairs with the person sitting next to them and gives each pair of students the handout with questions and tells them that this activity is called "Reporters on the Run".

The teacher clarifies the instructions and rules of the game to students:

- One student will be the secretary and the other will be the runner- reporter. The secretary will be sitting in the middle of the yard or at his/her desk if the weather is rainy.
- The runner/reporter will read a question from the handout and run around the classroom or school yard (depending on the weather conditions) to find the relevant chunk of text where he/she could skim and scan and trace the answer to the question.
- Then, he/she runs back quickly and reports/whispers the answer to the secretary who writes the answer on the handout. Then the runner-reporter follows the same procedure with the rest of the questions on the handout.
- The runner-reporter is not allowed to carry with them any paper or pens- they have to trace and remember the answer.
- After covering half of the questions, the students exchange roles so that they both experience the thrill of the activity and practice their skimming and scanning skills.
- The teacher allocates 15 minutes for this activity/race.

The goal/aim of the game: the fastest pair which will have all or the most correct answers will be the winner.

Scoring: When the race is over, the teacher tells the pairs to exchange their handout and then the teacher puts the correct answers and the points they earn from each correct answer on the projector for students to correct and find the winner. The reason why opponent pairs correct each other's answers is because they will be fairer and stricter while correcting. The pair which will gather the most points will be the winner. Speed will be another factor or extra bonus of declaring the winner when there is a draw.

Prize: the winning pair will be awarded their favourite chocolate bar and no homework for 2 days.

Then, the teacher collects all the handouts to have a look after the lesson to verify the winner and to check that the "rival" pairs have corrected honestly.

*Activity sheets have been created for the above phase and can be accessed at:
https://drive.google.com/file/d/1h7jO35nQw0zQ3NiRZb6m1_MTK25LhuMD/view

Evaluation Phase

Venue: School Classrom

Phase duration: 13 minutes

Detailed description:

Activity 4

The teacher goes over revising the reading strategies “Skimming and Scanning” and “Figuring out meaning from context” which the students have practiced earlier in the game- the teacher asks the pairs to do ex. 3 p. 28 (see Activity Sheet 2)- They should read the article and find the words of the exercise in the article. Students should figure out their meanings using context within the time limit of 5 minutes. The teacher then checks students' answers.

Activity 5

The teacher gives students exit slips which represent one of Ss' favourite snack- a chocolate bar. On the back side of the chocolate bar there is a paragraph about chocolate asking students to figure out the meaning from context of 2 underlined words and a link of a brief questionnaire evaluating this day's lesson and game attached to it - When students finish, they give it back to their teacher for her to check in her own time.

146

*Activity sheets have been created for the above phase and can be accessed at:
https://drive.google.com/file/d/1h7jO35nQw0zQ3NiRZb6m1_MTK25LhuMD/view

Lesson Plan 24: Zoo Quest - Explore German with Animals

Basic Information

Subject: German as a Foreign Language

Keywords: German Vocabulary, Animals, Question Pronouns, Question Formation, Language Learning, Fun Learning, Teamwork, Active Participation

General description: The lesson is a dynamic and engaging approach to German language acquisition, focusing on vocabulary expansion and question formation. Tailored for students learning German as a foreign language, the lesson incorporates a game-based structure where teams collaborate to identify animals using specific German question pronouns. Through rounds of interactive play, students not only enhance their German vocabulary related to animals but also develop critical language skills by formulating questions and responding in the target language. The lesson combines teamwork, communication, and strategic thinking, creating a lively and immersive learning environment that transforms language acquisition into a fun and memorable experience. The incorporation of a time limit adds an element of challenge, encouraging students to think on their feet and reinforcing the practical application of language skills within a thematic context. Overall, the lesson plan strives to foster a positive and interactive atmosphere, promoting enjoyment and effectiveness in learning German as a foreign language.

Suggested age group: 12 -13 year old students

Prerequisite student knowledge:

- Ability to ask and answer simple questions in German
- Awareness of common question words in German, such as "Wer" (who), "Was" (what), "Wo" (where), "Wie" (how).
- Familiarity with basic German vocabulary and phrases.
- Knowledge of simple sentence structures in German.
- Recognition of common animal names in German

147

School infrastructure: Sufficient space for students to gather in groups, availability of a multimedia setup for the introduction and review portions of the lesson, whiteboard

Additional material needed: Game materials: animal cards and the wheel of fortune, a whiteboard or flipchart for summarizing key points, keeping score

Additional information from external sources/online tools: Student's book (if needed)

Developed by: Maria Theodorou, teacher of German as a Foreign Language at Pedini Gymnasium

Educational Problem

The educational problem addressed by this lesson plan lies in fostering an engaging and effective method for language acquisition, specifically targeting German vocabulary and question formation. Language learning often faces challenges when it comes to sustaining student interest and participation. Traditional methods

may fail to provide a dynamic and immersive experience that captivates learners. The lesson plan aims to address this issue by incorporating a game-based approach, integrating elements of teamwork, communication, and interactive learning. By focusing the lesson around a fun and challenging game, students are encouraged to actively use the German language in a practical context, making the process of acquiring new vocabulary and honing question-forming skills more enjoyable and memorable.

Learning Objectives

1. Students will enhance their German vocabulary by learning and practicing the names of various animals in the German language.
2. The lesson aims to improve students' ability to form questions in German
3. Students will actively engage in verbal communication in German, by asking questions and responding to inquiries. This will contribute to the development of their speaking proficiency in the target language.
4. The game-based approach fosters collaboration and teamwork among students
5. By introducing a game element, the lesson seeks to make language learning enjoyable and motivating. This can positively impact student engagement for learning German

148

Phases of the Lesson Plan

Preparation Phase

Venue: School Classroom

Phase duration: 15 minutes

Detailed description:

Repeating common animal names, if it is necessary (for example use visuals, like showing images of the animals while saying their names).

Introduce the wheel of fortune, which includes different question pronouns in German such as "Wer" (who), "Was" (what), "Wo" (where), and "Wie" (how) and "Yes-No Questions" Explain that this wheel will determine the type of questions the teammates will ask during the game.

Team Formation: Divide the students randomly into teams to ensure fairness and unpredictability (for example distribute playing cards to each student. Students with

the same animal or number are part of the same group). Each team typically consists of four players.

Explanation of Rules: Clearly explain the rules of the game, including the objective of identifying the animal on the player's card and the role of the question pronouns in guiding the teammates' questions. Emphasize the time limit for each round (2 minutes).

Allow a brief period (2-3 minutes) for teams to strategize and discuss potential questions they can ask based on the anticipated question pronoun revealed by the wheel of fortune.

Game link: <https://maria-theodorou-game.netlify.app/>

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1KE0pernjhXIOc5QUBUJtIZITdK5PRZi9/view?usp=sharing>

Implementation Phase

149

Venue: School Classroom

Phase duration: 25 minutes

Detailed description:

Teams take turns participating in the game rounds. One player from each team, holding an animal card, becomes the "answerer" for that round.

The implementation stage incorporates a time constraint of 2 minutes for each round. This adds an element of challenge and encourages students to think quickly and efficiently.

Allow the first group to spin the wheel of fortune. The result indicates the type of questions (pronouns or yes/no) the group will use. They can spin the wheel of fortune as many times as they want within two minutes and formulate different questions.

Students in each group use the pronouns or yes/no questions associated with the wheel of fortune to extract information about the animal on their card.

The player with the animal card responds to the questions posed by the group, providing information to help them identify the animal.

The group attempts to identify the animal based on the information gathered during the questioning phase. If successful, they earn a point.

If a group cannot identify the animal within the 2-minute time limit, the opportunity is given to the other group. The other group can try to steal the point by correctly identifying the animal based on the provided information.

Rotate the roles within each group to ensure that each student gets the opportunity to be actively involved in different aspects of the game (spinning, questioning, answering).

Keep track of points earned by each group. Provide constructive feedback after each round, discussing effective strategies and areas for improvement.

Repeat the rounds as needed, allowing all groups to experience the various roles and maximizing language practice.

Conclude the game after all teams have had the opportunity to participate in multiple rounds.

Reward the winning team (for example provide each member of the winning group with certificates recognizing their success in the language game or grant the winning group a special privilege, such as selecting the next game).

150

*Activity sheets have been created for the above phase and can be accessed at: <https://drive.google.com/file/d/1KE0pernjhXIOc5QUBUJtIZITdK5PRZi9/view?usp=sharing>

Evaluation Phase

Venue: School Classroom

Phase duration: 10 minutes

Detailed description:

Summarize the German animal vocabulary covered during the game. Reinforce the vocabulary by engaging students in interactive activities (for example by asking them to create sentences with the animal names or by playing a quick matching game).

Provide constructive feedback on students' language use, question formation, and participation. Acknowledge efforts and improvements, fostering a positive learning environment.

Facilitate a class discussion on the game experience.

Assign relevant homework or extension activities to reinforce the learned vocabulary and language skills (for example writing short paragraphs about favorite animals or researching additional German animal names).

REFERENCES

Barab, S. A., Thomas, M. K., Dodge, T., Carteaux, R., & Tuzun, H. (2004). Designing for Dialectic: The Co-evolution of Inquiry and Narratives Within Immersive Learning Environments. *Journal of the Learning Sciences*, 13(4), 405-441.

Bunchball, I. (2010). *Gamification101: An introduction to the use of game dynamics to influence behavior*. Whitepaper

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125(6), 627-668.

Dempsey, J. V., Haynes, L. L., Lucassen, B. A., & Casey, M. S. (2002). Forty simple computer games and what they could mean to educators. *Simulation & Gaming*, 33(2),

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining "gamification". In *Proceedings of the 15th international academic Mind Trek conference: Envisioning future media environments* (pp. 9-15).

Dichev, C., & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. *International journal of educational technology in higher education*, 14(1), 1-36.

Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380–392.

Doran, G. T. (1981). There's a S.M.A.R.T. way to write management's goals and objectives. *Management Review*, 70(11), 35-36.

Dimitra, K., Konstantinos, K., Christina, Z., & Katerina, T. (2020). Types of Game-Based Learning in Education: A brief state of the art and the implementation in Greece. *The European Educational Researcher*, 3(2), 87–100.

Farrell, T. S. C. (2002). Lesson Planning. In J. C. Richards & W. A. Renandya (Eds.), *Methodology in Language Teaching: An Anthology of Current Practice* (pp. 30-39). Cambridge University Press.

Fullerton, T. (2014). *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*. CRC Press.

Gee, J. P. (2003). *What Video Games Have to Teach Us About Learning and Literacy*. Palgrave Macmillan.

Gee, J. P. (2005). Learning by Design: Good Video Games as Learning Machines. *E-Learning and Digital Media*, 2(1), 5-16.

Groh, F. (2012). Gamification: State of the art definition and utilization. Institute of Media Informatics Ulm University, 39, 31.

Gupta, P., & Goyal, P. (2022). Is game-based pedagogy just a fad? A self-determination theory approach to gamification in higher education. *International Journal of Educational Management*, 36(3), 341-356.

Guskey, T. R. (2003). *Evaluating Professional Development*. Corwin Press.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81-112.

Hunter, M. (1982). *Mastery Teaching*. SAGE Publications.

Jayasinghe, U., & Dharmaratne, A. (2013, August). Game based learning vs. gamification from the higher education students' perspective. In *Proceedings of 2013 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE)* (pp. 683-688). IEEE.

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and Competition: Theory and Research*. Edina, MN: Interaction Book Company.

Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons.

Kim, S., Song, K., Lockee, B., Burton, J., Kim, S., Song, K., ... & Burton, J. (2018). Engagement and fun. *Gamification in Learning and Education: Enjoy Learning Like Gaming*, 7-14.

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.

Krath, J., Schürmann, L., & Von Korflesch, H. F. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behavior*, 125, 106963.

Mayo, M. J. (2009). Video games: A route to large-scale STEM education? *Science*, 323(5910), 79–82. doi:10.1126/science.1166900

Nah, F., Telaprolu, V., Rallapalli, S., Venkata, P.: Gamification of Education using Computer Games. In: Yamamoto, S. (ed.) *HCI 2013, Part III. LNCS*, vol. 8018, pp. 99–107. Springer, Heidelberg (2013)

Piaget, J. (1954). *The Construction of Reality in the Child*. New York: Basic Books.

Prensky, M. (2007). *Digital Game-Based Learning*. Paragon House.

Qian, M., & Clark, K. R. (2016). Game-based Learning and 21st century skills: A review of recent research. *Computers in Human Behavior*, 63, 50-58.

Salen, Katie/Zimmerman, Eric (2004): *Rules of Play: Game Design Fundamentals*, Cambridge/London: MIT press.

Schell, J. (2008). *The Art of Game Design: A book of lenses*. CRC press.

Sheldon, L. (2004). *Character Development and Storytelling for Games*. Course Technology PTR.

Squire, K. (2006). From Content to Context: Videogames as Designed Experience. *Educational Researcher*, 35(8), 19-29.

Su, C., & Cheng, C. (2015). A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning*, 31(3), 268–286. doi:10.1111/jcal.12088

Tauer, J. M., & Harackiewicz, J. M. (2004). The effects of cooperation and competition on intrinsic motivation and performance. *Journal of Personality and Social Psychology*, 86(6), 849-861.

Van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless. *EDUCAUSE Review*, 41(2), 16-30.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.

Whitton, N. (2012). *Digital Games and Learning: Research and Theory*. Routledge.



Game-based Learning and Gamification Techniques in Education
2022-1-EL01-KA210-SCH-00084562



Co-funded by
the European Union



"The material of the project reflects only the author's views. The European Commission's support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission or the Hellenic National Agency cannot be held responsible for any use which may be made of the information contained therein."