Gamification to Increase Engagement and Impact on Students through Education Process

Rania Ezzat
Lecturer in October university for modern sciences and arts (MSA),
rania.designer@gmail.com

Abstract:
the research Discuss topic on how interactive games can be a useful tool used in education to assist in the learning process of students and discuss what useful games are and how they affect the learning environment of the students as well as consider how interactive games in education give motivation and motivation to learners. This research paper will also discuss the behavioural and social effects of video games, by utilizing students' passion for interactive games, gaming in the classroom increases engagement and learning. Games and play are not new concepts in the field of education. These methods have long been used by educators and other stakeholders to reach learning objectives. And due to its many benefits, online education (with gamified tools) is currently fully taking control. Research has demonstrated that the use of gaming and digital media in the classroom may significantly increase student engagement. As a matter of fact, it facilitates the personalization of lessons for diverse learners who have varying learning styles and paces. By utilizing students' passion for interactive games, gaming in the classroom increases engagement and learning. The integration of esports clubs and courses into educational institutions improves cognitive abilities like strategic thinking and problem-solving.

Keywords:
Gaming, mmotivational theories, behavioural theories, educational technology, digital games

Paper received July 18, 2024, Accepted September 10, 2024, Published on line November 1, 2024

Introduction:

Gamification in education has great clear-cut importance due to its different educational approaches alongside its entertainment impact. Uniquely, Video games have a wide variety of genres that can be specially designed to teach a certain skill. Some data provide the perspective that video games successfully establish or reinforce a set of skills. For example, special visual ability, developing hand-eye coordination, and increasing player's self-esteem (Griffiths 2002). The learning process becomes almost subconscious and involuntary. This helps with teaching a set of valuable skills without the need for a long-winded lesson, it comes naturally via the engaging atmosphere video games provide. Ever since the booming of the Video Game industry and its growth in popularity among kids and adolescents alike, parents all across the world feel the need to tell their kids they can only play right after they finish their homework. But what if playing video games becomes the assigned homework (Mayer, 2018)? The term gamification of education comes to mind when considering adding gaming elements such as points, badges, leaderboards, and storylines to a learning environment. Increasing engagement and providing the opportunity for a learner to have a better learning outcome is the main reason many educational institutions are interested in the gamification process of the classroom (Nah et al., 2014).

Research Problems:

The research will discuss the reasons why gamification in education is a lot more effective than traditional education and look into the motivational and behavioral effects digital games have on children. Focusing on theory-based research and how kids reimagine themselves in another world helps with growth and self-esteem "In a video game, people have an opportunity to relive another identity, and this is a positive for gamers because they have developed social skills and personal growth"

Research Aim and Objective:

1- Spreading awareness regarding the benefits of gamification in education on children
2- Dissecting the motivational and behavioral theories that are involved in the gamification of education, and show how they both create a positive learning experience for the learner.

Research Methodology:

1- Quantitative Methodology:

The quantitative method will focus on statistics using a survey.

2- Qualitative Methodology:

Utilizing resources of reputable studies, academic articles, and books.

Research Hypothesis:

The research hypothesis consists of 3 main points:

1- Acknowledge that digital gaming is a beneficial learning medium their kids enjoy learning from.

2- Creating a more entertaining learning experience allows learners to learn better and faster and achieve engagement through education process

Theoretical Framework:

1- What Are Digital Games?

We will use Salen and Zimmerman's (2004) definition of games, which states that they are a "system in which players engage in artificial conflict, defined by rules, that results in a quantifiable outcome" (p. 80) for the purposes of this essay. Therefore, a digital game further defines the term by needing technology to be included into the gaming system. This concept includes simulations, augmented reality, and classic video games. Purely virtual worlds, like Second Life, do not qualify as games since there is no measurable result. Components of "gamification" include the use of game-like mechanics (such as leader boards, points, and badges) to traditional instruction in order to boost motivation or engagement, or the use of games as a means of extrinsic reward systems. (Such as receiving game time as earnings for performance)—are likewise excluded from this definition of games. While making learning more enjoyable is a great way to increase motivation and engagement, this kind of approach is outside the purview of this study. (Larsen, Katie.)

2- How Does Gaming Affect Education?

According to an interesting analysis by Forbes, educational computer games have been around since the 1980s. In general, the goal of gaming in education is to incorporate game features and tools into the curriculum or the way that learning is delivered. By doing this, the advantages of the teaching and learning process are increased. because it incorporates elements of gaming into a non-gaming setting. Students comprehend the material better when these components are included in the curriculum. And that too using a methodical manner. The main goal of educational games is to give students something interesting to do while they are studying. Actually, these components/tools significantly increase their general drive to learn. All things considered, learning games with a strong design increase the likelihood of reaching the desired results. The nice aspect is that these components enable this to happen even with a diverse set of students. (Priyanka ,2024)

Figure 1: Effect of Gaming in Education Process

3- Useful of digital games:

With the sudden influx in the application of technology in everyday life, there has been an urgent need to investigate technology-assisted learning and all the solutions it could offer in a classroom environment. Useful video games can be considered part of the development of technology-assisted learning. They are games specially designed solely for educational purposes. They can be seen as entertaining tools with an educational aim. useful video games follow the same formula as regular video games with a challenging task and a reward given upon completing the task in the form of scores, achievements, or powers. Educational elements are also added to the game and get subsequently acquired by learners through the gameplay (Zhonggen, 2019). Although traditional learning and learning through useful video games are similar in many cognitive aspects, they differ in style and structure. For example, useful video games are based on “trial and error” with little to no instructions and the capacity to freely investigate the learning conditions, while traditional learning mainly focuses on knowledge transfer with no facilitating medium. useful video games’ success is shown in players' involvement, which increases their cognitive links and relevant association along with the implied use of the mnemonic strategies (Ypsilanti et al., 2014).

4- The Use of Gaming in Education (Gamification)

As most of us already know, one of the most important variables influencing student achievement in all age groups is engagement. But once more, a variety of circumstances influence how well students are taught and learned. Enhancing students' enthusiasm to study is the purpose of gaming in the classroom. In actuality, these components also enhance pupils' total capacity for learning. Additionally, a lot of pupils experience fewer problems with focus our attention. The Results of Bloom's Digital Taxonomy

Regarding Video Games in Education. Benjamin Bloom, a renowned educational thinker, provided a flawless contribution. His well-known Bloom's Taxonomy is renowned for its theoretical framework on learning goals. Additionally, his Digital Taxonomy clarifies some of the consequences that games have for learning.

The theory's experimental studies demonstrate that gamified ideas can:

- Increase student satisfaction with the course
- Encourage participation
- Increase the ability of students for learning
- produces excellent learning results

This hypothesis also draws attention to a hidden benefit of game-based learning that takes care of a student's basic requirements. Among these are the demands for relatedness, competence, autonomy, etc. The main lesson to be learned from this theory is that the degree to which students' needs are met determines how well gamified learning experiences work. The foundation for creating captivating and incredibly successful educational games for children is laid by these discoveries. For this reason, pioneering online schools construct the appropriate tools and material based on the intended student groups, resulting in a highly engaging learning environment (including gaming aspects). All sorts of learners' demands are met by well-researched online learning tools. The majority of online learning systems include these components in their learning environments primarily through interactive virtual features, quizzes, and puzzles that may be completed during or after classes, modules, evaluations, etc. (Priyanka ,2024)

Figure 2: the benefit of using game in education

5- The transfer models:

Transfer is the process of applying learned information in a problem-solving context or applying the understanding in a new context. Promoting transfer is the fundamental goal of any educational environment. Take into account educational situations such as reading textbooks, viewing a slide show, watching a computer-based tutorial, or even using educational video games. These multimedia educational situations all involve the use of words and visuals. The words used can be spoken or written down making them trigger two sensory memories: hearing and seeing. Similarly, visuals such as pictures, videos, and graphics also trigger the seeing sensory memory.

Figure 3 is a model showing the transfer process of information through multimedia learning based on three principles from the science of learning. (Mayer, 2018).

A) the dual channels principle states that people have separate channels for learning and processing visual and verbal materials. For example, a child might be a better visual processor and prefer a visual channel of learning that involves more dynamic elements

such as graphics or animation more than an adult who is most likely prefers written text.

B) The limited capacity principle states that learners only can process small amounts of information in each channel at one time. For example, presenting the learner with audio narration or a series of pictures, the verbal/auditory channel can manage to intake a few

phrases, while the visual can only process a few images at a time.

C) The active processing principle states that people start to learn when the subject itself or the way it’s presented is engaging or interesting. This means that the learner can continue to process more information. Once the information is integrated it can be meaningful for the learner which leads to active cognitive pprocessing taking place so the learners pay more attention, and organizes new information in a comprehensive way, in relation to prior information.

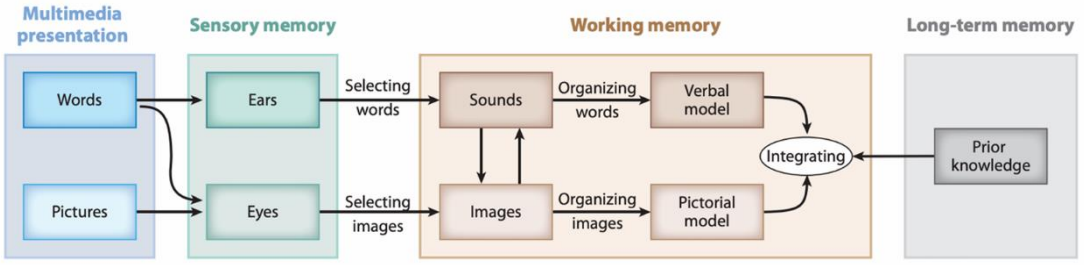


Figure 3: transfer model showing cognitive process and mental representation of leaning.

6- Motivation and Metacognition:

In order to grasp game-based learning, two additional elements are put into the context of the transfer model: motivation and metacognition. Firstly, motivation is an internal condition that starts and manages goal-directed behavior. It also describes the learner's ability to put effort to understand and learn the material at hand. In Figure 1 motivation can, be displayed in the movement of the arrows. Motivation is what allows a learner to absorb the information and let it transfer. The advantage of using games in an educational environment is the persistence they created so the learner continues to obtain more information. (Mayer 2014, Wentzel & Miele 2016). Secondly, metacognition describes the learner's cognitive processing and awareness while learning (Mayer 2011). Per Figure 1, metacognition is the process of selecting, organizing, and integrating the data in addition to adjusting the data to reach the learning goal.

Metacognition in game-based learning has a great impact. It allows the learner to become self-regulatory and take responsibility for being aware of their own cognitive process and learning cycle. Increased research on serious games and game-based learning will help educators to incorporate metacognitive processes into the learning environment.

7- The Motivation theories:

Motivation is the idea of maintaining a high level of devotion and enthusiasm in order to reach organizational goals and accommodations by satisfying one's individual needs and demands. In accordance with pinder (1998 in Ambrose & Kulik, 1999) motivation is a collection of internal and external forces that allow for the initiation of work-related tasks and then determine its form, direction, intensity, and duration. Motivation appears as an ethereal, subjective, and speculative construct that manifests itself in the form of observable, and then quantifiable, behavior. As discussed previously, motivation is one of the major aspects of game-based learning. There are five classes of motivation-related theories that emphasize the motivational influence of games. To widen the horizon of understanding game-based learning, we need to understand how can the limited processing capacity is allocated.

Expectancy-Value theory:

Two key concepts when discussing motivation, especially learner's motivation, are Expectancy and Value. A student with the expectancy that they will do good in a task simply because of their own preconceived notions about their own abilities gives the drive to achieve a task or a goal. On the other hand, students with values like understanding the importance of learning and education also provide an incentive for accomplishments. So, to put it simply, the expectancy part of the model determines whether or not the learner can achieve a goal base on their own expected thoughts and behaviors. While the value part is the part where students ask themselves why should I do this task? is there something special or a hidden potential within the final goal or achievement? (Brett D. Jones, 2021).

The expectancy part of the model can also be referred to as expectancy for success because it counts on the beliefs of an individual student on how well they will be able to accomplish a task or in s specific domain such as math, science, reading, etc.

The value part of the model is divided into four parts:

- Intrinsic interest value: which is the anticipated enjoyment that a student gets or expects to get when doing a task. often just refeed to as interest value.
- Attainment value: the extent to which a task gives a chance for a student to express or confirm their core self and identify.
- Utility Value: the usefulness of the task or the goal that might benefit a student's present or future.
- cost: the loss of a particular asset such as opportunities, effort, or emotions when partaking in achieving a task.

Gamification of education applies this theory in the sense that it focuses on the process of achieving the task rather than the end result. Students who struggle with the pressure to achieve a certain goal might get discouraged when faced with challenges they feel they might not be able to bypass. The entertaining element of games allows students to

get a boost to try again. Teachers using game-based elements or serious games to teach a lesson or evaluate the learned content gives students confidence and allows them to understand the value of participating in the activity and motivates them to achieve the learning target.

Self-efficacy theory:

when learners believe they are capable of completing a task and their effort will be successful, they are more motivated to learn. The higher the self-efficacy the more likely a leaner will fill compelled to finish a task, in contrast, lower self-efficacy will result in less willingness to accomplish a task. A student viewing an assignment as impossible or hard to achieve gives him/her the impression that they are incapable of completing the task because of their own insufficiency. Increasing students' self- efficacy increases self-esteem and confidence to finish an assigned job.

The level of self-efficacy is determined through four factors. These factors can measure one's performance on a task. Figure 4 shows the self-efficacy model.

- Experience: the most important factor. If a student has come across a similar task in the past, this makes them more likely to be confident when trying to achieve a similar task.
- Vicarious experience: similar to the experience factor except it deals with the experiences gained from observing others accomplish a task successfully or observing mistakes if they fail to accomplish a task.
- Social persuasion: increasing self-efficacy through positive reinforcement or encouragement from others.
- Physiological feedback: experiencing a sensory response to a certain task like a gut feeling and the way these signals are interpreted.

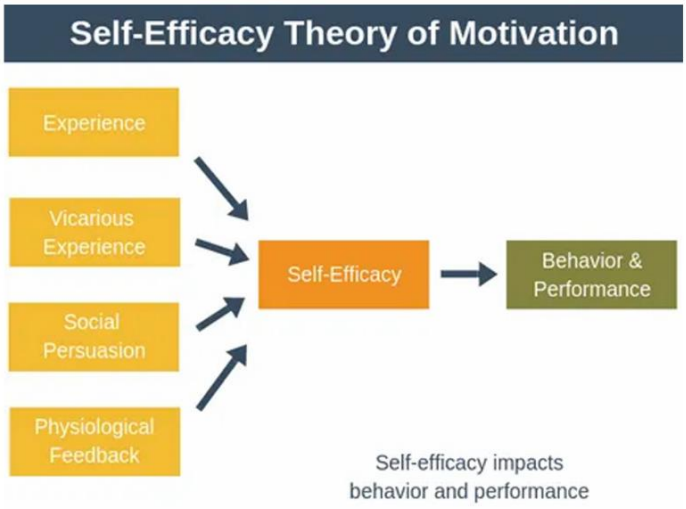


Figure 4: the theory of self-efficacy model including the four factors

Using this model to the student's advantage increases their willingness and determination to not only complete a task but also exude the most effort for maximum results. When implementing factors of the model to increase self-efficacy, it's an important note of caution to understand that a high level of self-efficacy may lead to negative results like overconfidence and reduced performance (EPM, 2021).

Games-based learning puts the learning material in a simple, easy-to-digest context that makes students feel they are capable of accomplishing the task at hand. A successful educational game doesn't overshadow the learning material but rather highlights it in an entertaining way and conveys the lesson in the simplest way possible. It also provides experience in the sense that it allows learners to understand the patterns of the game and how it works which increases their cognitive skill.

Goal orientation theory:

This theory asserts that learning occurs when the learner makes an attempt to master the learning task or content. It refers to a person's behavior when developing or validating their ability to perform. It also examines the motivation attached to student participation and accomplishment. The main idea of this theory is that individuals either want to: showcase their capabilities to others (performance orientation) or expand their competence or knowledge for the sake of learning (mastery orientation). Researchers Elliott and Dweck (Dweck, 1986; Elliott & Dweck, 1988) created two main goal orientations. A decade later, in 1999 Elliott expanded on the two orientations creating four types of goal orientations:

- Performance-approach orientation: where the goal is to showcase capabilities and skills by performing well. for example, students who

want to do well during class to get recognition from their teacher and peers.

- Performance-avoidance orientation: where the goal is to avoid demonstrating incompetence. For example, a student who does well in class because they don't want to be made fun of by their peers.
- Mastery-approach orientation: where the goal is the sole purpose of understanding and grasping the lesson being taught. For example, students who enjoy learning a subject that they like or are interested in.
- Mastery-avoidance orientation: where the goal is to avoid mistakes. For example, a student who learns to maintain their high academic level and avoid mistakes.

Goal orientation theory deals with the behavior of students towards accomplishing a task and therefore also focuses on their academic outcome. As a matter of fact, a meta- analytics study conducted by researchers Payne, Youngcourt, and Beaubien in 2007 showed that mastery goal orientation is positively linked to academic performance. It's important to mention that teachers are the primary influences for mastery goal orientation and as evidence suggests, mastery goal orientation promotes motivation and long-term interest and involvement in learning. Therefore, in order to maximize learning and student accomplishments, teachers should promote mastery goal orientations and minimize performance avoidance orientations.

Self-determination theory:

When discussing self-determination in the learning sphere, it suggests that learners work more when they feel in control of the material and when they receive positive reinforcement in the form of rewards. There are two main sub-theories derived from the self-determination theory that deal with students' abilities, self-control, and positive associations (Brett D. Jones, 2021).

1- The cognitive evaluation sub-theory: Deals with three main concepts which are competence, autonomy, and relatedness:

a. The presided idea is that a student feels that they are good at something or that they are competent.
b. The notion is that a student feels that they are in control and have the power of choice and autonomy over their actions.
c. The idea is that students should feel connected with others through positive relationships and having relatedness with their peers and superiors.

The three main concepts disused above, competence, autonomy, and relatedness lead to what is called intrinsic and extrinsic motivation. Intrinsic motivation describes engaging in a task for the reward that will be granted inside the task itself such as interest or enjoyment. On the other hand, extrinsic motivation describes engaging in the task for rewards outside of the task such as grades, points, or toys. For example, a child can have intrinsic motivation when they partake in an engaging activity such as playing video games while having extrinsic motivation from the points and rewards granted.

2- Organismic integration sub-theory:

this sub-theory is used to make the distinction between intrinsic motivation, extrinsic motivation, and an additional term called amotivation. Figure 5 shows the Organismic integration model.

- **Amotivation:** includes non-regulation which is the lack of motivation. The learner doesn't take any action because they don't feel competent or they don't value the activity and they don't expect the outcome to be desirable.
- **Extrinsic motivation**: includes four different levels of regulation
  i. external regulations: instinctive behavior.
  ii. introjected regulation: avoiding guilt or anxiety.
  iii. identified regulation: valuing the goals.
  iv. integrated regulation: the importance of the behavior
- **Intrinsic motivation:** includes intrinsic regulation which is when a learner is fully immersed in a task because they enjoy it or find it interesting.

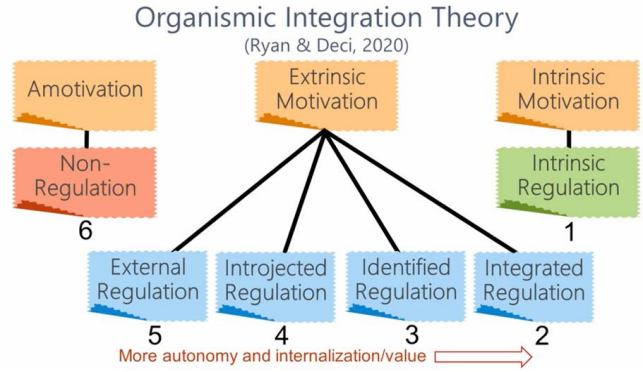


Figure 5: The Organismic integration model (Ryan & Deci,2020) showing the different levels of regulations starting from 6 (non-regulation) the lowest to 1 (intrinsic regulation) the highest.

Useful games have a great impact on students' intrinsic and extrinsic motivation due to their reward-based nature. Using points, badges, scoreboards. boosts students' performance and enjoyment factors. It also ensures that students feel they are competent due to the simplicity of the format, they feel autonomous due to the control factor children get when partaking in an educational game, and finally, it makes them feel equal to their peers.

Social cue and embodiment theory:

Social cues are a form of communication used to help someone "read" other people or a certain situation and react appropriately. They include expressions, body language, tone of voice, and personal space or boundaries. The social cues theory helps in preparing the social response in learning resulting in deeper cognitive processing. Hence why serious games created in a more conversational format result in a deeper learning experience than those who choose the formal approach.

On the other hand, the embodiment theory is demonstrated in the use of characters or avatars in serious games that represents the player they are known as on-screen pedagogical agents. Researcher Richard E. Mayer states that these characters only help in learning when they exhibit human-like characteristics such as gestures, movement, expressions, and eye contact. The use of this technique helps increase the player's motivation since they live vicariously through the character that they embody in the game.

When combining social cues and embodiment theories in game-based learning, learners put more effort because they feel a social partnership with the on-screen pedagogical agent and can use their entire bodies while learning. Serious games such as Google's Interland, which will be analyzed and discussed further in a case study, follow this method of gamification through their use of Internauts the main protagonist of the game.

8- The Behavioral theories:

In addition to the five motivational theories, there are two behavioral theories that also affect the game-based learning process. The theory of reasoned action (TRA) and the theory of planned behavior (TPB). As demonstrated in Figure 6, TRA and TPB with cognitive absorption exhibit different constructions assessing intrinsic motivation (Putz 2015). The combination of these two theories gives an explanation as to why students choose to use and continue to use a certain learning technique or technology.

The theory of reasoned action (TRA):

The theory of reasoned action (TRA) describes the behavior-tied process where attitudes and subjective norms determine the intention of an individual to display a certain behavior (Fishbein & Ajzen, 1975). This theory focuses on the idea that people behave in a sensible and rational way and try to make use of all the information available to them. This theory focuses on what is called an "A to B" relationship. "A" stands for Attitude and "B" stands for Behavior meaning that in this relationship a person's attitude determines their behavior. As mentioned previously, learners who use serious games or gamified elements in education tend to feel more confident in their abilities to achieve the task. TRA demonstrates this further by emphasizing a person's intentions towards using gamified elements and how this then affects their behavior and performance during the learning process. there are two main factors that affect a person's intentions when performing a task.

- **Attitude:** This is described as the positive or negative feelings or thoughts concerning a certain behavior. For example, if a student feels that serious games will help him/her develop their skills they will be more likely to use them as a learning tool.
- **Subjective norms:** refers to the social pressure attached to performing a task or behavior. For example, a student who feels that everyone in their classes uses serious video games to develop their skills he/she will be more likely to also participate in the game.

This theory can successfully determine a person's behavior through their intentions but only in single-instance activities, meaning that this theory becomes obsolete when faced with predicting behaviors that are repeating or continuing. Therefore, the theory of planned behavior (TPB) was invented.

The theory of planned behavior (TPB):

The theory of planned behavior (TPB) is an extension of TRA with the addition of presided behavioral control which is the degree of control one perceives to have over the behavior in question meaning how well an individual believes they can accomplish a behavior (Fishbein and Ajzen 1975). In this case, Gamification has the capacity to impact a learner's attitude, subjective norms, cognitive absorption, and perceived behavioral control which means it creates the perfect environment for a learner to reach the learning goal. It gives students the perceived behavioral control of being able to successfully complete a task rather than being influenced by someone to accomplish a task.

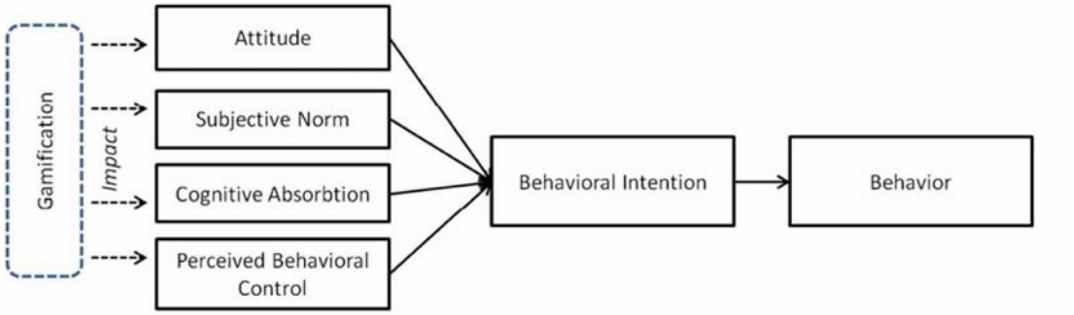


Figure 6: Gamification and theories dealing with behavior (Ajzen, 1991)

The advantages of using Gamification:

Playing video games enhances problem-solving abilities and social interaction.

enhanced digital competency and technological proficiency.

We now use technology in many aspects of our daily life. The gaming business is always evolving to keep up with the newest technological developments. By incorporating gaming into the classroom, you may help your pupils improve their technical proficiency, which will be essential for them in the rapidly changing digital world. enhanced ability to solve problems and think creatively. Students can learn from their mistakes by reflecting on their past actions. For most games, in order to go to a later level, you'll need to solve certain puzzles and use your imagination. Or perhaps they require you to test your abilities against one other!

9- Case study:

Joko's World

A collection of digital learning resources called Joko's World combines geography, history, music, and culture. Joko, the blue nightingale, is positioned in the middle of the apartment. Joko visits many nations to introduce pupils to musical instruments and cultural activities. A worldwide renowned and numerous award-winning collections of instructional gaming applications is called Joko's World. Using interactive games on their smartphones, kids may learn new skills, test their knowledge, and explore our amazing world. Playing games that target literacy and numeracy as well as intercultural competences, flying over festivals, solving spinning-globe puzzles, and using your device to play a tambourine or flute are all fun ways to learn geography, music, culture, and history. Ideal for starting a conversation about a variety of topics. A wide range of interactive educational tools are available on Joko's World. Engaging smartphone apps like World of Instruments and Pocket Planet are fascinating instrument and geography simulators that offer chances for in-depth cultural learning at every turn. Alternatively, investigate further narrative-based education by means of Travels with Joko's interactive tales. Lastly, learning tools in the shape of different in-class exercises and activities supplement each of them. (Learning lands by cultural infusion)

Figure 7: Screenshot from Joko's World digital learning resources

Google's Interland:

In this current media-centered microcosm, we are bombarded with a consistent stream of disinformation, misinformation, and mal-information. With added fake news, rumors, and chaotic manifestations from "the digital underbelly of the networked web" as stated by Mihailidis, 2018. This, in turn, creates confusion and disastrous outcomes, especially in kids and adolescents. hence, providing this age group (and others) with the skills and techniques to navigate the internet and equipping them with the necessary

knowledge to overcome internet dangers. Fake news, hate speech, and uncivilized online discourse are often placed under the umbrella term media and information literacy (MIL) (Carlsson. 2019). so to prevent these matters and open a discussion of internet safety for kids, Google created an online campaign called "Be Internet Awesome" that teaches kids all about being safe on the internet.

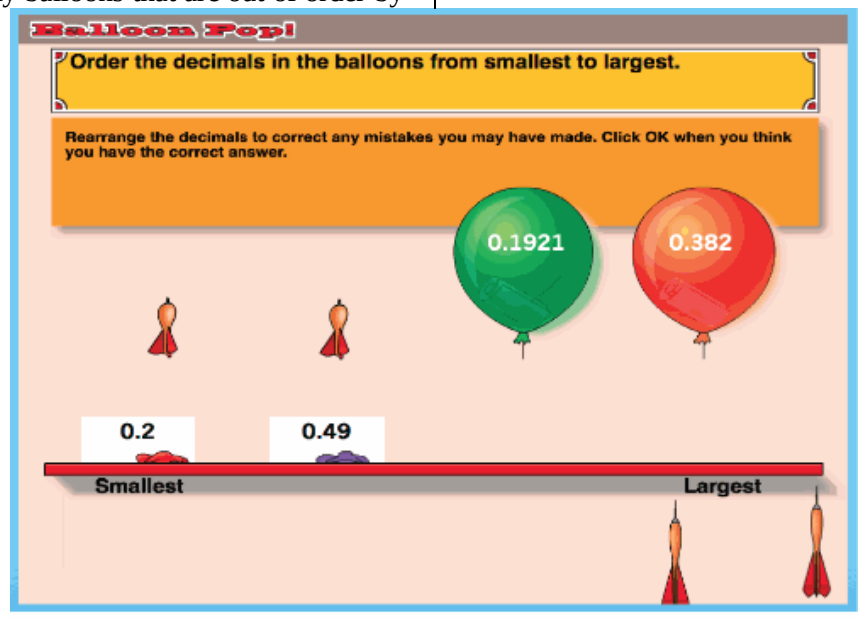
In this campaign, Google created the educational online game called Interland which deals with five different lessons kids might come across when browsing the internet. lessons such as sharing with care, don't fall for fakes, securing your secrets, being kind online, and sharing doubts with adults you trust. The game is divided into landscapes where each landscape visited is responsible to teach the learner about one of the lessons. Kind Kingdom, Reality River, Mindful Mountain, Tower of Treasure. Each is comprised of minigames and tests to teach the learner about "digital safety and citizenship" by flowing the character of "internauts" and helping them face hackers, phishers, overshares, and bullies.

Figure 8a: Google's online game Interland

Figure 8b: Internauts Interland's protagonist

Decimal Point educational game:

In Decimal Point, the player navigates a theme park, making pauses to enjoy different games at the arcade's attractions. For instance, the player places balloons with decimals on them from smallest to largest in the Balloon Pop booth (shown in Figure 5) and corrects any balloons that are out of order by tossing darts at them. In the Entertainment Park, every arcade game teaches the player how to dispel a different kind of myth. Players have gained plenty of experience with decimal problem solving by the time they navigate Decimal Point Entertainment Park. (Richard E. Mayer ,2019)



Mayer RE. 2019.
Annu. Rev. Psychol. 70:531–49

Figure 9: Screenshot from Decimal Point, an educational computer game aimed at teaching decimal fractions and decimal arithmetic.

Design-a-Plant educational game:

Imagine playing a desktop computer game where you are required to create a plant that will live on a far-off planet with specific climatic conditions (such regular wind and rain). You must choose the right roots, stem, and leaves for the plant. Next, you see an animation of what transpires with your plant as Herman-the-Bug, a local, uses onscreen subtitles to explain the principles of plant growth. This type of scenario occurs in the Design-a-Plant game, as

Figure 2 (Moreno et al. 2001) illustrates. If you were to switch Herman's remarks from being shown as text on the screen to speech, what would happen? We want to determine if switching from written text (control group) to spoken text (experimental group) will have an impact on learning, which makes this a value-added question. In this instance, the student's comprehension is evaluated by displaying a plant with certain roots, leaves, and a stem, and then asking the learner to identify the ideal environmental conditions for the plant's development. Nine tests revealed that using spoken words instead of printed ones when playing Design-a-Plant improved student performance on a learning outcome posttest, with an average effect size of d = 1.4 (Moreno & Mayer 2002, Moreno et al. 2001). (Richard E. Mayer, 2019)

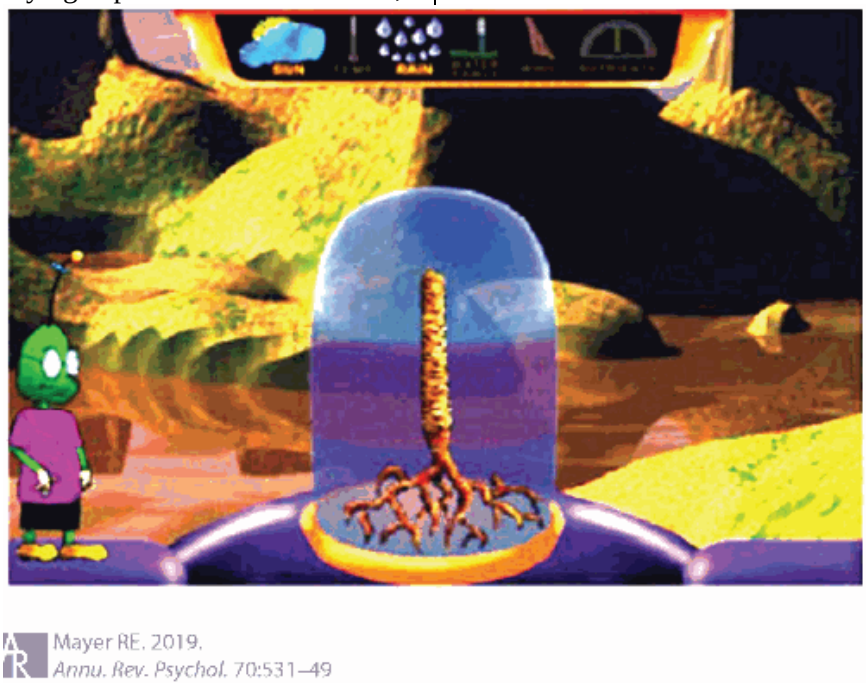


Figure 10: Screenshot from Design-a-Plant, an educational computer game aimed at teaching environmental science principles about plant growth in different environments

Finally, is Gaming useful for education:

Kids' educational games are really helpful in a lot of ways. These resources are really beneficial for schooling. and improve learning without requiring excessive conscious effort (e.g., lesson preparation according to various student needs). Permit me to present some data about the practical effects of educational games on pupils. Related research conducted with postsecondary and business school students and reported on ScienceDaily states:

Gamification that is challenge-based raises student achievement by about 89.45%.

An overall improvement of about 34.75% was shown by the gamified application (mean values of performance). (Priyanka ,2024)

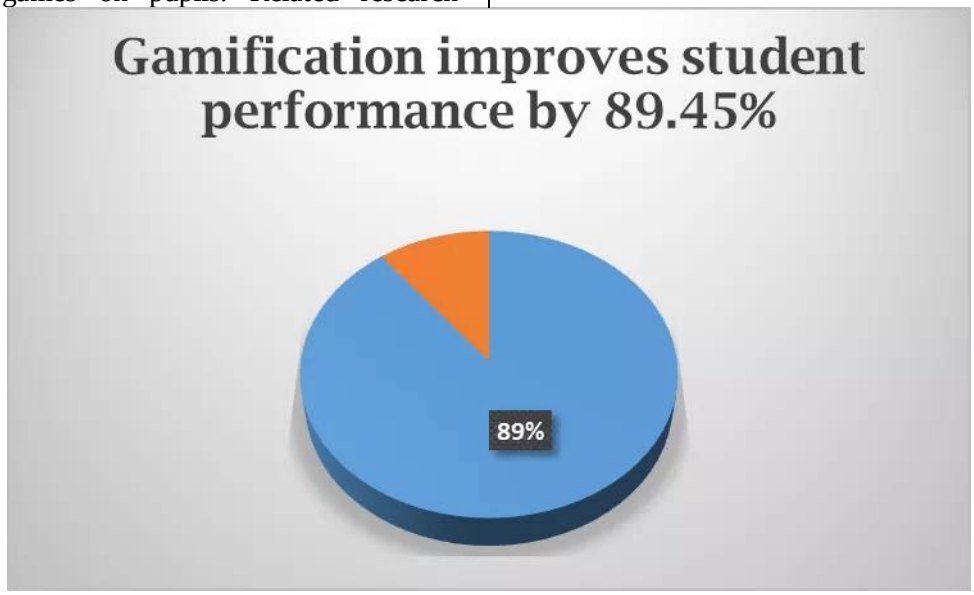


Figure 11: Gamification improves students' performance

Children's learning games also aid in their social and emotional growth.

Renowned social psychologist Susan Rivers provided some insightful information on this. According to her, game-based designs and aspects promote really social and emotional growth. Students can also build connections using these effective techniques. And ultimately, all of this greatly improves their understanding of both the outside world and oneself. (Refer to UNESCO) (Priyanka, 2024)

Playing video games enhances problem-solving abilities and social interaction.

Enhanced digital competency and technological proficiency.

We now use technology in many aspects of our daily life. The gaming business is always evolving to keep up with the newest technological developments. By incorporating gaming into the classroom, you may help your pupils improve their technical proficiency, which will be essential for them in the rapidly changing digital world.

Enhanced ability to solve problems and think creatively.

Students can learn from their mistakes by reflecting on their past actions. For most games, in order to go to a later level, you'll need to solve certain puzzles and use your imagination. Or perhaps they require you to test your abilities against one other!

Enhanced social interaction and confidence:

Social skills may be enhanced by gaming! Collaboration and interpersonal communication are essential in many games. In a more laid-back environment, some children may find it easier to speak when they are gaming and can develop their social skills. (Gaming in education)

Results:

1- After conducting the research, what can be inferred is that the use of games-based learning does indeed have a huge positive impact on the learner's experience.

2- Implementing gaming elements in an educational environment gives children the incentive to learn and continue to grasp more information consistently.

3- Not only is game-based learning an effective learning tool that manages to convey valid information, but it also provides the entertainment aspect that allows kids to stay engaged and interested in the topic or the subject being taught.

4- Creating an entertaining learning environment for children allows them to better their understanding of the topic and learn faster through trial and error, as opposed to the traditional way of learning that doesn't measure a child's understanding capabilities and capacity but rather tries to convey as much information as possible with no regard to the child's abilities and understanding process.

5- The use of game-based learning allows a child to explore their own potential and gives them the chance to learn from their mistakes and advance through their own analysis of their skill.

Conclusion:

Understanding how gamification in education can be beneficial for children can have a huge impact on how the education system works. There has been a noticeable success when games are specially made solely for educational purposes for example, implementing game-based learning tools like useful games that work on trial and error can be specially designed to target a certain skill or address a certain problem as well as help children discover their weaknesses and strengths points and aid teachers in the assessment process. All in all, gamification in video games should be implemented more in schools and educational environments and have a prominent role in helping children both learn and enjoy what they're learning. The increasing use of gamification and skill development can be attributed to its ability to draw students into a more participatory and immersive learning environment. Students may gain the technical and social skills necessary for success in today's world, as well as critical thinking, problem-solving, and decision-making abilities, through educational games. Additionally, gaming has been shown to improve pupils' cognitive function, making it an excellent tool for skill development for people of all ages.

References:

1- Caluwé, L. d., Hofstede, G. J., & Peters, V. (2008). WHY DO GAMES WORK? Deventer: Kluwer.

2- EPM. (2021, March 2). Available at:

3- https://www.youtube.com/watch?v=Wd4A_m7RjLg (Accessed 14 Aug 2024).

4- Gaming in Education, Available at:

5- Gaming In Education the Rise and Benefits | Coconnect) (Accessed 14 Aug 2024).

6- Gameplan team, 2023: leveraging gaming for education, Available at: Leveraging Gaming for Education (gameplan.com) (Accessed 14 Aug 2024).

7- Griffiths, M. (2002). The educational benefits of videogames. Forsman, M. N. (2020). With a Critical Mindsetin Google's Interland: The platformization of media literacy.

8- Haque, M. F., Haque, M. A., & Islam, M. S. (2014). Motivational Theories – A Critical Analysis.

9- Jr, W. A. (2020). A Survey of Serious Games for Cybersecurity Education and Training.

iberdrola. (n.d.). Why your children really should play videogames. THE BENEFITS OF VIDEOGAMES IN LEARNING.
10-Jones, B. D. (2021, March 11). Available at:
11-https://www.youtube.com/watch?v=De5U-GE4YkE (Accessed 14 Aug 2024).
12-Katie Larsen,2012, A Literature Review of Gaming in Education, Available at: Pearson Assessments US (Accessed 14 Aug 2024).
13-Learning lands by cultural infusion, Available at: The Benefits of Gaming in Education | Learning Lands (culturalinfusion.org.au) (Accessed 14 Aug 2024).
14-Ly, S. (2022). The Social Problems and Benefits of Video Games. Steven Ly: San Jose State University.
15-Mayer, R. E. (2018). Computer Games in Education. Annual Review of Psychology. Putz, L.-M., & Treiblmaier, H. (2015). Creating a Theory-Based Research Agenda for Gamification. Savannah: Twentieth Americas Conference on Information Systems.
16-MIGUEL DE AGUILERA AND ALFONSO M…NDIZ University of Malaga. (2003,). Video Games and Education (Education in the Face of a ìParallel Schoolî).
17-Mueller, M. (2017, June 18). Available at: https://www.youtube.com/watch?v=BZt8htsrf2k, (Accessed 14 Aug 2024).
18-Nah, F. F.-H., Zeng, Q., Telaprolu, V. R., Ayyappa, A. P., & Eschenbrenner, B. (2014). Gamification of Education: A Review of Literature. Missouri: Springer International Publishing Switzerland.
19-Peña, J., & Hancock, J. T. (2006). An Analysis of Socioemotionaland Task Communicationin Online Multiplayer VideoGames. Ithaca: ornell University.
20-Priyanka ,2024) Gaming in Education: Exploring the Benefits of Gamification in Learning Available at: Gaming in Education: A Useful Tool in the 21st Century? (k8school.com) (Accessed 14 Aug 2024).
21-Richard E. Mayer, 2019, Computer Games in Education, Annual Review of Psychology, Vol. 70:531-549 (Volume publication date January 2019) https://doi.org/10.1146/annurev-psych-010418-102744, Available at:
22-Computer Games in Education | Annual Reviews, (Accessed 14 Aug 2024).
23-Salen, K., & Zimmerman, E. (2004). Rules of play: Game design fundamentals. Cambridge, MA: MIT Press.
24-Zhonggen, Y. (2018). A Meta-Analysis of Use of Serious Games in Education over a Decade. Hindawi.