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The Role of Games in Professional Education in the GameDev Industry

[Role her v profesionálním vzdělávání ve videoherním průmyslu]

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Abstract: The paper highlights the idea of using game design principles to enhance learning experiences for the younger generation. With the increasing popularity of games, traditional methods of learning are becoming less effective and less engaging. To address this issue, we propose an interactive guide to the world of games that incorporates game design mechanisms to motivate and activate young learners. Specifically, the authors focus on the GameDev industry and subsequently present professional paths in a modern and interesting way. By leveraging the elements that make games appealing, individuals can be encouraged to acquire knowledge while having fun. The article aims to demonstrate the potential of game-based learning and the benefits of applying game design principles to education.

Keywords: computer games, GameDev, mechanics in scenes, vocational education.

JEL classification: O10, O30 , Y10

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Introduction

Over the last few years, a dynamic development related to the video game production sector in Poland has been observed. The Polish video game industry is gaining popularity in the international arena, especially in the field of asset production and external game development. According to a recent report from the Polish Agency for Enterprise Development, Poland is leading the way of gaming industry. the Polish game market is now worth EUR 470 million, the home of gaming giants such as CD Projekt, PlayWay, 11 bit studios, and Ten Square Games. 96% of games produced in Poland are exported abroad. Considering the fact that the majority of young people enjoys entertainment offered by modern computer games, as shown in the PARP report from 2021 on the gaming industry in Poland, the prospects for further development of this part of the economy seem to be very optimistic. Along with the growing consumption of video games, the fields of study that prepare young people for a career in the GameDev industry are gaining popularity. The development of cooperation between science and business sectors has meant that, out of the concern for the further development of the Polish gaming market, Polish universities are more and more eager to create new majors that are often a combination of graphics, multimedia and computer game design that are gaining more and more popularity among the young generation.

The Institute of Management and Information Technology in Bielsko-Biała constantly promotes and develops its educational offer, taking into account the professional interests of its candidates, the dynamics of the local labour market and the comments of internal and external stakeholders of the university. Therefore, as a part of the dynamically developing computer graphics specialization, specific subjects closely related to the design and programming of

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computer games have been introduced to the current offer. As a part of practical classes for students of the second and third year of studies, workshops with specialists from the GameDev industry and sponsored competitions are conducted. Their purpose is to present the entire process of designing, programming and introducing computer games to the available market. In addition, as a part of engineering projects, proprietary productions are made and they are published and promoted on the itch.io and Steam platforms. Among the graduates of the University there are prop artists and concept artists working in companies such as Jujubee S.A. in Katowice, Bloober Team SA in Kraków or MegaPixel Studio S.A. in Wrocław.

1 The educational role of computer games

Due to the growing popularity of computer games, productions are created not only for entertainment, however, they are also designed for education in various areas of human life and activities. The benefits of using games in stimulating intellectual development and personality training are no longer questioned by anyone. Nevertheless, the continuous use of games as a medium in pedagogical practice still arouses controversy (Złotek 2017). Some types of educational games are an attractive alternative to traditional forms of knowledge transfer and are used as didactic tools for learning such school subjects as biology, chemistry or physics, allowing the faster understanding of issues and phenomena by performing experiments in the virtual world. Computer games as new media are also used in the prevention of proper psychophysical and social development of young people that helps them to be aware of cyber threats and the consequences of inappropriate online behaviour as well as it helps them to develop an assertive attitude. It is important to be aware of the positive and negative effects of using the Internet.

Introducing gamification into educational systems requires following certain steps. First of all, it is necessary to define the educational goals that should be achieved. It is also important to indicate what skills and knowledge we want to pass on to students, which is crucial for the effective design of educational games. Consequently, selection of gamification is followed by choosing the appropriate gamification method which suits the previously formulated educational goals best. Game elements such as tasks, challenges, rankings, rewards, etc. should be designed in such a way that they are appropriately adapted to the educational level of the participants.

The game elements must be integrated into the curriculum so that they are consistent with the educational content. After introducing gamification, tests should be carried out and its effectiveness in achieving educational goals should be assessed. Based on the obtained statistics, changes can be made to improve the efficiency of the gamification system and provide the best learning experience for participants. Introducing gamification into educational systems can be an effective tool in encouraging students to become active and involved in participation in the educational process. It also increases the effectiveness of learning. However, it should be remembered that the introduction of game elements is not always the best solution and requires proper design, testing and optimization.

A successful use of gamification in education includes e.g. “Duolingo” which is a popular mobile language learning application that uses game elements to motivate users to exercise regularly. The application offers interactive lessons, quizzes, rewards and rankings that make learning a fun and engaging game. Another application worth mentioning is “Classcraft” which is a gamification platform that allows teachers to create virtual classrooms where students can earn points for their positive behaviour such as helping friends or getting a good test score as well as for completing homework and projects. These points translate into progress in the game

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which motivates students to work and cooperate in a group. “Minecraft: Education Edition” is a popular video game which has been adapted for educational use allowing teachers to create virtual lessons and tasks that can be solved in the game. Thanks to this, students learn by doing and exploring the virtual world. “kahoot!” is another example of an educational tool that allows teachers to create interactive quizzes and games where students can compete against each other or work in groups. The application offers different game modes such as quick answer, race or tournament which makes learning a fun and engaging game. “The Walking Classroom” is an educational program that allows students to listen to podcasts and educational materials while walking in the fresh air. The program uses game elements such as points, rewards, and leaderboards to motivate students to regularly participate and complete assignments. These examples prove that gamification can be an effective educational tool that motivates students to work and improve their performance. However, it is important to always remember about students’ individual needs and adjust the elements of games to educational purposes.

A good example of research studies and references to studies supporting the claim that games have a positive impact on intellectual development and personality formation is included in the study by the American Psychological Association which finds that gamers often manage to complete tasks that require attention, information processing, and decision-making faster and more accurately than non-gamers. The authors of the study recommended that teachers and parents consider games as a positive element of life and educational activity (Granic et al. 2014). Another study that showed the positive impact of games on mental development was a study conducted by the University of Rochester (VanderWeele 2017). In this study, researchers showed that people who played video games, especially those that required strategy and decision-making, had a greater ability to solve problems and make decisions in real-life situations.

According to a report published by the Entertainment Software Association, 70% of parents say that their children learn new skills through games. This report shows that games can help develop creativity, logical thinking, planning and decision-making skills (Marchand, Hennig-Thurau 2013). The modern labour market also benefits from the phenomenon of computer games, in particular, from their positive impact on the user who is highly engaged and motivated and effectively assimilates the knowledge. An extremely popular genre of games in professional environments are simulation games which are often used in training future specialists and leaders of production companies, e.g. to present effective methods of production and quality management in ongoing projects, e.g. https://polscy-inzynierowie.pl/lean-manufacturing/. The catalogue of games that is available on the market and that supports the processes of strategic thinking, planning activities in the organization and developing managerial competences is constantly growing. The use of gamification for business purposes, collaborative learning, recruitment and employee training is becoming commonplace (Frania 2017).

2 Computer games for the GameDev job market

Contemporary companies are looking for committed and conscientious employees who are likely to set and achieve new goals every day and who are not only enthusiastic about implementing changes but also inspired to act for the development of the company. The GameDev industry is also open to young, enthusiastic developers who would like to use their passion and talent in breathtaking game productions. However, young artists who are looking for their place in the computer games industry tend to have problems with recognizing their strengths and planning their own career path in this sector of the market. The closed world of GameDev industry specialists who seem to be reluctant to share their knowledge and experience with younger colleagues is also a big disadvantage. It is, therefore, difficult to expect young

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recruits to understand principles and challenges in their future work. The solution here may be the implemention of game which gives a user the opportunity to learn the tasks related to individual roles in the GameDev team. Using the game as a medium for sharing knowledge about professions in the GameDev industry seems to be fully justified. Also, companies operating in this sector want to find the most talented candidates, so they should go beyond the traditional forms of the recruitment processes and propose a more engaging and interesting form of presenting the future workplace with the possibility of initial recognition of the candidates' professional predispositions (Frania 2017).

Considering the above and the fact that the Institute of Management and Information Technology supports the professional development of its students with interests focused on designing and programming computer games, tools are created to help young game developers start their professional careers. Such tools include the Interactive Game Designer Guide in the form of a desktop application as a part of an engineering project whose task is to educate future generations in the field related to GameDev. The author of the guide is B.Sc Marcin Olma who was responsible for both designing the graphical interface (visual side) of the application and programming its functionality (programming side). The entire project was completed in one year, from requirements analysis to implementation on the itch.io platform.

Being a kind of compendium of knowledge about the industry, it speeds up the decision-making process related to the career development in this area of the IT market. The use of information technology in the implementation of the above-mentioned educational tool is described in the article.

3 The interactive game designer guide

The computer games market is growing more and more dynamically, the range of tools to be used in game design and programming as well as the number of career paths related to this is constantly growing. The first question to be answered is what exactly one would like to do, what position to work in or what role in the GameDev team to assume. Then, it is important to know whether there are purely artistic or visual challenges, or whether the plot and mechanics of the game need to be invented, or maybe required tasks need to be programmed. Moreover, it is important to find out if there is a place where all knowledge about individual career paths is clearly presented and helps to delve into the specifications of such professions as: a concept artist, character artist, environment artist, prop artist, texture artist and a level artist. An interactive guide can be a very effective tool for young people who want to develop their skills and abilities in the gaming industry. One of the ways an interactive guide can help them is introducing them to various fields related to gaming. The interactive guide may provide information on various fields such as environment design, concept art, character art, etc. It may also contain descriptions of these fields, their importance in the gaming industry, as well as examples of what skills are needed to become an expert in a given area. In addition, the guide may use visual effects such as animations, 3D graphics and interactive elements to help users understand difficult concepts and imagine people related to a given profession in the Gamedev industry. For example, 3D graphics can show various game elements such as characters, locations, or items, allowing users to see what they look like in a three-dimensional environment. Interactive elements can represent the process of creating an asset, from the initial concept to the final product, which helps to understand what steps are needed to create an asset. You can show an artist mapping a concept onto paper or screen, creating a 3D model, texturing it, lighting it, and then exporting it to the game. In this way, the user can see the entire process of creating an asset which allows for a better understanding of the artist's work and the game elements themselves. Thanks to the visual effects and game elements used in the application,

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users can learn about different ways of working and decide which one they would like to learn or develop in the future.

While the interactive guide has advantages over classic forms of education, it does not provide an opportunity to interact with people in the industry who could give advice and guidance to people interested in working in a specific field related to GameDev. Moreover, an interactive game designer guide cannot provide personalized tips and advice for every person who uses it. The interactive guide was designed so that the excess of information does not overwhelm the user and, at the same time, allows them to learn the basic and advanced aspects of working in the gaming industry. It is also important to note that the information contained in the interactive guide may quickly become outdated as the gaming industry is constantly evolving and this information needs to be updated regularly. The itch.io platform on which the guide was published is known in the gaming world not only as a place where creators can publish their creations but also as a social hub that allows developers, testers and game lovers to connect quickly and easily. Thanks to this, the tool has a chance to become a valuable source of knowledge for people who are just starting their adventure with game development.

The interactive guide was made with the use of the Unity engine, in WebGL technology. It was divided into sections corresponding to six career paths related to the visual or artistic field of GameDev. The current state of the application is available on the itch.io website at https://przewodnikgier.itch.io/ippg.

The GUI application (Figure 1) was designed in accordance with the latest UX design trends (Tidwell et al. 2020) to provide the user with a positive experience in interacting with the application. Also, it was designed in accordance with the principles of UX/UI design. The guide interface makes its use intuitive allowing users to fully engage in learning about the world of GameDev competitions. The guide user has three types of views at its disposal: full (the content of the section with GUI elements), partial (only the content of a single section is visible), limited (view of animations in the background of the guide, for each section there is a different, thematically related animation).

Figure 1: GUI of the guide

Source: Olma 2022

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In addition, in order to meet the expectations of the target group (representatives of generations Y and Z) (Boguszewicz-Kreft 2020), when designing the application interface, the fact that the application is displayed on various devices equipped with different screens their resolution was taken into account. For this purpose, the GUI application is programmed to automatically scale down from the resolution of 3840 x 2160 px. Table 1 shows the range of resolutions supported by the application.

Table 1: The list of resolutions supported by the application

No.	Width [px]	Height [px]	Format
1	3840	2160	16:09
2	2560	1600	16:10
3	2560	1440	16:09
4	2048	1536	4:3
5	1920	2160	X
6	1920	1440	4:3
7	1920	1200	16:10
8	1920	1080	16:9
9	1680	1050	16:10
10	1600	1200	4:3
11	1600	1024	16:10
12	1600	900	16:9
13	1440	900	16:10
14	1366	768	16:9

Source: Olma 2022

Let's take a closer look at the sections in the guide. Each section is divided into the background information section, it means, into the section of responsibilities, the software section and the section of other implemented tools as well as the section of useful skills. The first section regarding GameDev competitions is the concept art section which is intended to present the user with the silhouette of a concept artist who visualizes the character and all the elements that are used in the game. This role requires the ability to use 2D graphics tools to create illustrations of characters, objects and scenes (Figure 2).

Figure 2: The background view for the Concept Art section

Source: Olma 2022

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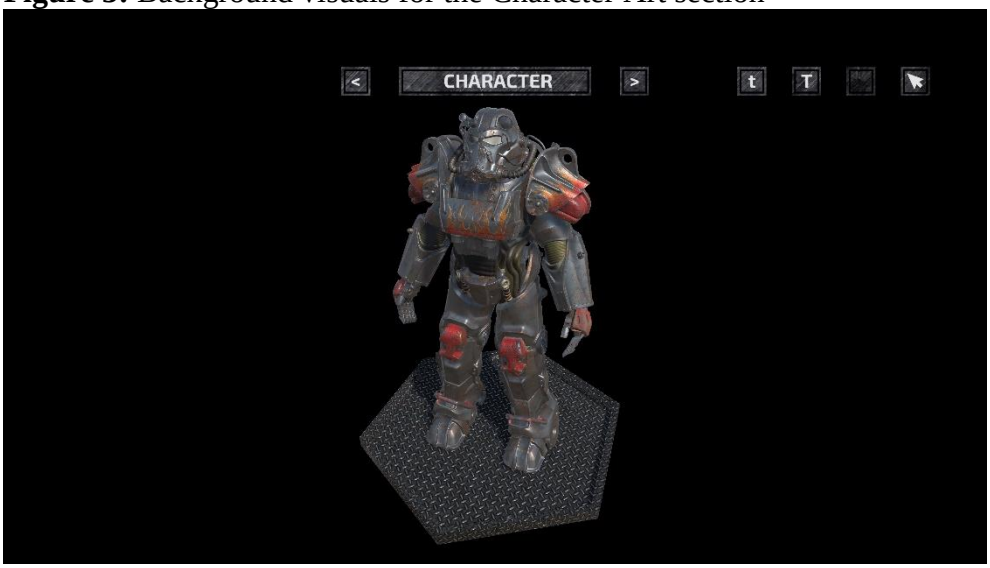
The main purpose of the next section of character art is to introduce the user to the role of a character artist whose job is to create 3D models of characters with materials and textures to give them a realistic appearance and authenticity depending on the story they tell in the game (Figure 3).

Figure 3: Background visuals for the Character Art section



Source: Olma 2022

The Environment Art section focuses on presenting the profile of an environmental artist, i.e. a person who creates various kinds of scenery for the game. Depending on the plot of the game, this task is to create indoor or outdoor scenes, i.e. to build an entire city, create a mountain landscape or the interior of a mine and build the atmosphere of the scenes using various types of lighting and atmosphere of the scene. The scenery which is finally created should surprise and encourage the player to interact with the virtual game world (Figure 4) (Sailer et al. 2017).

Figure 4: The planet created in the Unity engine is the background for the Environment Art section

Source: Olma 2022

The Prop Art section is devoted to the tasks of the prop artist who fills the scenes prepared by the environmental artist with objects that match the game's scenery. These are both simple and

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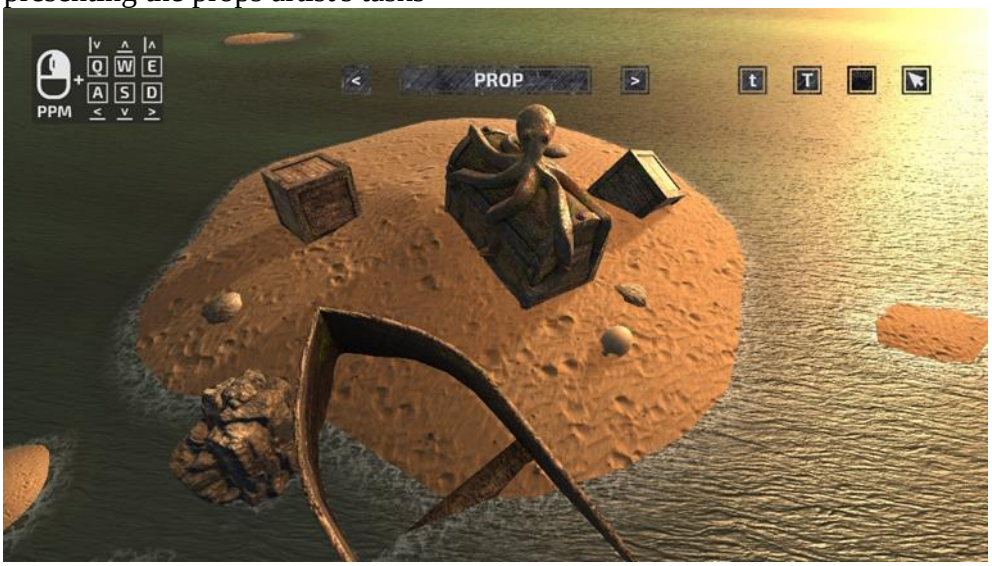
small elements of still life, such as a chair or a backpack, but also these can be larger objects such as a rusty, dilapidated truck. This position requires knowledge not only of 3D object modelling but also of animation, either 2D or 3D because some of the objects used in the game scenery are animated objects to which interaction can be added. (Figure 5).

Figure 5: An example of a diorama-type scene filled with assets made for the purpose of presenting the props artist's tasks



Source: Olma 2022

The Texture Art section presents the specifics of a texture artist's work. Usually, the preparation of materials and textures for objects is the task of the prop artist but sometimes this task is entrusted to a specialist who can "breathe life" into the object by realizing their artistic vision and by adding for example traces of wear or dirt which additionally indicate the age of the asset to the player (Figure 6).

Figure 6: A scene as a background to the Texture Art section

Source: Olma 2022

The Level Art chapter presents a profile of a level artist, i.e. a person responsible for arranging game levels from models previously prepared by other artists. The tasks of this specialist focus

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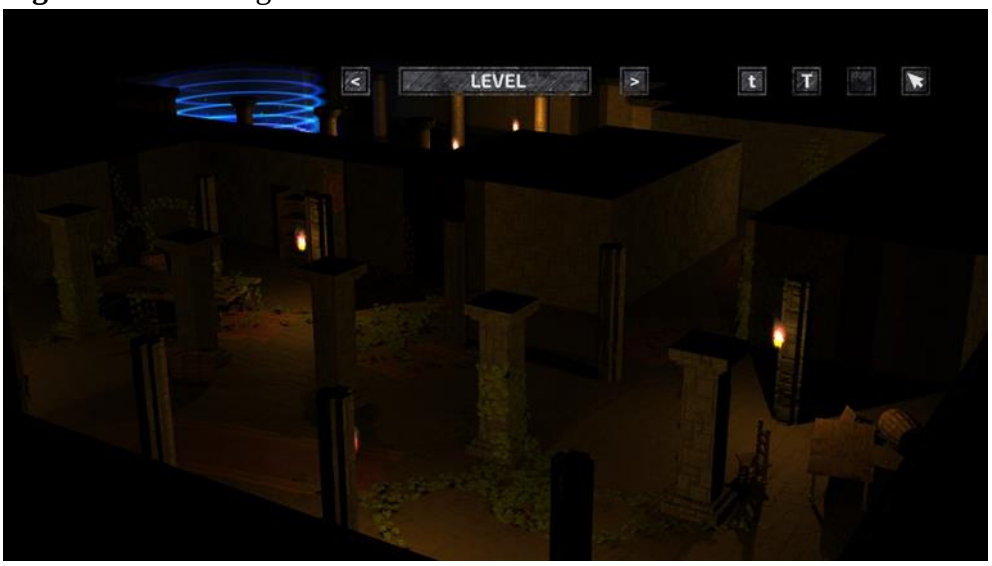
on creating a layout of prototype objects in appropriate locations and planning their distribution in relation to each other, taking into account their proportions. The working environment of this artist are primarily popular game engines such as Unreal and Unity (Figure 7).

Figure 7: The background of the Level Art section



Source: Olma 2022

Additionally, in the Others section, other career paths in GameDev are presented to be focused more on the perspective of developing gameplay mechanics, software for player interaction with the virtual world of the game or inventing a plot for it.

4 Mechanics in scenes and additional guide special effects

Modern applications should be made aesthetically and in accordance with the latest UX / UI trends. Moreover, they should be fully usable. However, as most application developers believe, the key of success today is originality and creativity in making it easier for the user to perform even basic activities in the application itself. Therefore, it is sometimes worth trying to add interesting visual effects or mechanics which make the user's contact with the created application more pleasant. In addition, according to (Meri 2018), the use of interesting visual effects increases the value of each game and makes it more real for the user. The interactive guide combines the functions of entertainment, characteristic of computer games, and education. It allows the user to combine business with pleasure which increases their interest in the content of individual sections of the application. The mechanics used in the guide is applied to selected scenes and may be visible in several or one scene view of the section. The full list of mechanics used in the application is presented in Table 2.

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Table 2: The list of mechanics used depending on the view and type of scene

Mechanics	Model rotation	Camera rotation	Material change	Slow camera	Model rotation
Scene view	1-3	1-3	3	3	3
Concept Art			+		
Character Art	+			+	
Environment Art		+			+
Prop Art		+		+	
Texture Art	+		+		
Level Art				+	

Source: Olma 2022

The first type of mechanics listed in Table 2 is the rotation of the object in the background of the scene while maintaining its good lighting from the front. This type of animation can be found in all views of the Character Art and Texture Art sections. Another mechanics is the rotation of the camera around the central point of the scene. Unlike the previous mechanics, its task is to show elements of the scenery from different perspectives with constant lighting. This type of effect has been implemented in the Environment Art and Prop Art sections.

Another effect used in the Concept Art and Texture Art sections is to change the material on the sheet of paper and the box which are elements of the background of the section. In the case of an effect added to a chest object, in the Texture Art section, it gives the user the opportunity to compare different texture maps which make up the final appearance of the model. On the other hand, the script presented in the Character Art, Prop Art and Level Art sections, responsible for the so-called free camera, allows the user to freely move around the scene and view it from every perspective. The last mechanics used is the rotation of the model occurs only in one view of the Environment Art scene. It allows you to freely rotate the planet model in order to view its details more calmly.

All the effects used in the interactive guide have a positive effect on the recipient's concentration, increasing their involvement in working with the guide. When working with a guide, the user, on the one hand, feels like a hero who has an impact on the world he is "immersing" in, assuming one of several roles, e.g. evaluating their abilities by learning the rules of work in various positions in the GameDev team.

Despite the lack of motivational elements of gamification the application can still be attractive to users thanks to its visuality and interactivity. 3D graphics and animations can grab users' attention and interactive elements can allow for a more engaged experience. The application aims to be useful as an educational tool that allows users to easily understand the difficult concepts and processes involved in working in the GameDev industry. In addition, the lack of a point and reward system can be a positive element as users can use the application without the pressure of earning points and rewards, which can allow for a better focus on the learning process itself.

It is difficult for us to evaluate the usefulness of visual effects in educational applications until we understand the mechanisms used in game design to activate and motivate users using this type of entertainment (Tidwell et al. 2020, Olma 2022). Psychological research shows that elements of games transferred to educational tools positively affect the processes of

remembering and associating their content (Vlachopoulos, Makri 2017). Using practices already proven on the gaming market is equipped with two types of effects commonly implemented in computer games to attract the user's attention and to work with the product in a more attractive way. These are the teleport and the fire effect which the user encounters only in the section dedicated to Level Art. Both effects use a system of particles that are the source of additional light illuminations creating the atmosphere of the scene and evoking positive associations in the viewer. The teleport effect is also usually associated with enormous energy and supernatural forces which further fuels interest and encourages you to explore the content of the guide. However, the fire effect is one of the basic visual effects without which the game's scenery seems to be unrealistic. In the interactive guide, the fire blends perfectly with the mysterious scenery of the level.

The visual effects and game elements used in the project of the application were selected in such a way that, by providing users with positive visual stimuli, could encourage them to act and motivate them to achieve the goals of the application. Providing the user with visual cues and information is to allow for faster and easier assimilation of domain knowledge. Although the publication does not contain enough data and statistics to clearly confirm that the use of visual effects and game elements increases the motivation and concentration of application users, there are many scientific studies and analyzes that indicate the positive effects of using these elements, and let the user increase engagement in these types of educational tools. However, it should be remembered that the use of these effects may also have potential negative effects, such as distracting users with too intense or complicated visual effects, which may make it difficult for them to focus on relevant information. In addition, application users may feel confused if visual effects or game elements are unclear or difficult to understand. Therefore, it is worth considering both positive and negative aspects of using visual effects and game elements in the design of the application to provide the best experience for users and minimize possible negative effects associated with its use.

Conclusion

There are undeniable benefits of gamification in education. Gamified education is one of many useful learning strategies. First of all, there are higher levels of engagement and improved retention. Additionally, it connects learning to the real world as well as provides instant feedback and reinforcement. It also gets students hooked on learning. Although the article focuses on one educational application related to the gaming industry, general conclusions regarding the design of educational applications can be drawn from it. For example, the article can help you understand the importance of adapting educational applications to the needs of users, including students and teachers. In addition, the article points out that educational applications should be accessible to different age groups and abilities, which may be crucial for designing other types of educational applications. In addition, the article emphasizes the importance of using modern technologies, such as games, to encourage students to learn and increase their involvement in the educational process. This can be useful for designing other educational applications that use different technologies to improve the efficiency of the learning process. Finally, the need to consider educational goals in the design of educational applications is emphasized, which can also be useful for the design of other educational applications. In conclusion, although the article focuses on one educational application related to the gaming industry, it can help you understand important issues that are crucial for designing other types of educational applications. Gamification seems to have the largest motivation effect on students. Moreover, there is also indispensible academic achievement, however, the least effect is visible in the area of students' cognitive load. It is expected that the reasoning strategy games are most effective for academic achievement whereas puzzle games are most effective on

motivation. The gamification of learning allows employees to work towards real-time, measurable, meaningful targets, and get upper-level feedback as those targets are achieved. It is assumed that the project will be continued and the current Internet elaboration will be equipped with an audio and video version, thus supporting the text and illustration version.

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