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Learning, Play And Gamification At School

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Abstract: In recent years, digital competence has taken hold in society, politics and research. In particular, it focused on the importance of offering children and adolescents the opportunity to possess digital skills capable of making them an added value for society (Pedone, 2024). To ensure that this is feasible, the focus has been on game-based learning, as it is capable of exploiting the playful aspect to improve the student's experience (Elena, Gaggioli, Maria, 2023). The aim of this work is to track and analyze the emerging trends of gamification and game-based learning in the field of educational training. The results lead to the conclusion that gamification and game-based learning strategies can improve students' academic performance, engagement and motivation.

Keywords: Teaching-learning process; Game; Gamification; School.

1. Introduction

Every day, technology grows rapidly, producing changes and advances (Omar et al., 2022) to which those responsible for the formation and identity construction of children and pupils who represent the future of society must necessarily adapt. This rapid diffusion generates, as a result, a dependence on technology, especially on the Internet (Buzzi, 2024) and all its positive effects.

Education systems need to evolve along with technology to adequately prepare current and future workers for the digital transition. In this regard, numerous technological advances have been made in the educational sphere in recent years, allowing the invention and development of effective teaching-learning models capable of meeting the expectations of future generations (De Serio, Odini, 2024).

This transition was already underway before the advent of the Covid-19 pandemic since it was and is necessary to converge digital technologies with pedagogical practices in order to be able to offer a teaching proposal that is inclusive and adapted to the potential of each learner (Chiu & Lim, 2020; Sage et al., 2021).

Analyzing the peculiarities of many countries, it has been observed that a large part of them, including developed ones, do not have continuous basic access to the Internet (Vijayan, 2021), and in the education systems of rich countries there is a lack

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of digital preparation of teachers and strong deficiencies from the point of view of infrastructure, aspects that are necessary for learning through the digital environment (Garzón-Artacho et al., 2021; Shagataeva et al., 2021).

Table 1. Seven cluster of Dubé e Wen (2022).

Cluster		*Forecasts*
1	Mobile Technology	Most Important Educational Technology from 2011 to the Near Future
2	Manufacturers' Techno-logy	Influence on education from 2015 to 2018
3	Analysis Technology	Strong growth and influence on learning
4	Games	Influence on education from 2012 to 2016
5	Simulation Technology	Strong growth and influence on learning
6	Artificial Intelligence	Strong growth and influence on learning
7	Other Technologies	Strong growth and influence on learning

Looking at the seven clusters identified by Dubé and Wen (2022) concerning the technological predictions for the most important educational technologies from 2011 to 2021 (see table 1), this work focused on educational gamifcation and game-based learning for the formation of the pupil-future citizen.

2. Digital skills and gamification

The task of the educational institution is to provide pupils with the knowledge, skills and competences necessary to be included in society (UNESCO, 2015). In this way, the school will be able to generate the future qualified worker as he possesses skills, both technical and interpersonal, necessary to improve his employability through the development of skills and, consequently, improve the economic development of his country and increase its competitiveness in the world. To ensure that what has been said is feasible, it is necessary to improve from the point of view of digital skills since they allow the teacher to facilitate the teaching-learning process of students and encourage the development of these skills in the latter. Obviously, it is necessary for teachers to have up-to-date training and a specific degree of preparation in the digital field, which is why in recent years the technological training offer for teachers has expanded, in order to bring out new perspectives and methodological proposals (Gómez-Carrasco et al., 2020). Having a qualified teacher with a high level of digital and technological competence is essential to generate practical experiences (Kulyk et al., 2022), capable of fostering in turn the acquisition of new technological skills and pedagogical tactics necessary to direct education towards principles of sustainability and social inclusion (Mancini, 2024).

To produce an improvement in students' learning outcomes, it is necessary that they have a good understanding of technology, and as far as the teacher is concerned, a high level of computer skills (Wardoyo et al. 2021). Compared to practical skills, the implementation of technological skills among students is more effective in the development of cognitive learning (Yasak, Alias, 2015), although no link has been found

between the learning objectives of the latter and the level of knowledge of teaching techniques (Yousef, Sumner, 2021).

According to the Digital Competence Framework, the key components of digital competence are identified in five areas: information competence; communication and cooperation; creation of digital content; safety; and problem-solving (European Commission, 2022).

According to the International Labour Organization (2020) six areas of digital learning offer great benefits for learning: distance learning and assessment, simulation, rigged classrooms, games, open education (resources), and personalization.

The global educational games market reached $697.26 million in 2020 (Blue-weave, 2021) which is coupled with an expansion of smartphones and mobile devices that has generated the creation of a huge market for gamifcation. This phenomenon highlights the need for teachers to improve digital skills also through the use of technologies such as gamifcation and next-generation digital learning environments (Educause, 2017), as they are capable of motivating and engaging all students in learning activities (Madimabe and modan, 2021). Such gaming technologies can be used by teachers to facilitate the teaching-learning process, enhancing the playful factor present in the game and making it accessible to all learners (Dipace, Fornasari, De Angelis, 2024).

Gamifcation is one of several innovative constructivist approaches to learning (Roodt, Ryklief, 2019) that has gained significant attention in recent years in a variety of subject areas, including research and education (Manzano-León et al., 2021; Wang et al., 2021). It bases the moment of learning on play in order to be able to involve pupils, motivate action, solve problems and promote learning (Bellacicco, Repetto, Talarico, 2024). Recent scientific studies (Gupta, Goyal, 2022) have shown that when elements of digital games 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. Furthermore, it has been observed that for gamifcation to be effective, individual elements of the game must be linked to particular behavioural, motivational or attitudinal outcomes, which must then be correlated with learning outcomes, otherwise the inability to establish a connection could lead to the failure of gamifcation initiatives (Ma, Oikonomou, 2017).

Creating a form of play-based learning through structured and specially designed game learning materials can stimulate the development of students' thinking and self-study skills (Azizan et al., 2021). In this regard, it is necessary to mention Serious Games, which are the most widely used among the low-level learning on games in education, as they focus on the development of games with specific educational purposes in mind (Games, De Carvalho, 2022), leading to greater enthusiasm for games and the educational path.

Gamifcation and game-based learning, although they may seem similar, use two distinct techniques with multidimensional relationships (Krath et al., 2021), and represent an innovative and leading technology in education. If game-based learning incorporates games seamlessly into the educational curriculum to achieve specific learning outcomes, Gamifcation manages to turn the entire learning process into a game using the elements of the game itself such as levels, points, badges, leaderboards, avatars, quests (Krath et al., 2021). Despite this, both have a common goal: to en-

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courage participants and increase learning and inclusion through the use of game-based ideas and tactics.

Gamifcation can be a valuable tool for gaining knowledge and can improve necessary skills such as decision-making, cooperation, and communication (Saleem et al. 2022). Unfortunately, gamification in these educational proposals presents multiple difficulties inherent in the technological infrastructure, the provision of Internet services, and the intention of both students and teachers to use this tool.

3. Job description

The aim of this work is to analyze the emerging trends of gamification in the field of educational training. It was conducted in the 2023/2024 school year in five secondary schools in the Puglia region in the province of Bari and began in October 2023 and will end in May 2024. A qualitative-quantitative approach was used for the cognitive phase of the research, while only qualitative for the descriptive-explanatory phase was used. The mixed methodology made it possible both to give authenticity to the results during the cognitive phase, and to have a greater involvement of the participants in the multiple phases of the descriptive-explanatory research.

Two fifth grades were randomly selected for each school and a control class group and an experimental class group were created for each school. It should be noted that the substantial difference between the control group of the experimental group is that the former carries out traditional teaching activities, while the experimental group benefits from teaching proposals based on the use of gamification. The purpose of this distinction is to evaluate whether the didactic proposals of the experimental groups are of help to both teachers and students. In addition, we want to evaluate whether learning related to the use of gamification generates an inclusive form of learning so that all students can achieve their learning goals.

Table 2. Experimental Group-Class and Control Group-Class Data.

	Experimental group-class			*Control Group-Class*		
	Number of students	Class	Age	Number of students	Class	Age
S. S. di II° n. 1	23	5°	18/19	21	5°	18/19
S. S. di II° n. 2	27	5°	18/19	24	5°	18/19
S. S. di II° n. 3	21	5°	18/19	28	5°	18/19
S. S. di II° n. 4	26	5°	18/19	25	5°	18/19
S. S. di II° n. 5	22	5°	18/19	21	5°	18/19
Tot. Students	119	-	-	119	-	-

It is important to specify that each group has a similar number of pupils, in order to avoid over-representation of a specific class and consequently disorders from the point of view of the results of the study. The data collection took place and takes place every month, and was carried out by the teachers through direct observation and structured tests. As far as teachers are concerned, those who are part of the class council of the chosen classes were identified and selected on a voluntary basis, making sure that among them there were teachers of common and support positions, at least one teacher with overt digital skills and, if possible, a reference teacher in school inclusion.

Table 3. Data of teachers participating in the research work.

	Common place	Support post	Teacher with digital skills	Inclusion Coordinator
S. S. di II° n. 1	4	2	1	1
S. S. di II° n. 2	6	3	1	0
S. S. di II° n. 3	5	1	2	0
S. S. di II° n. 4	3	2	1	1
S. S. di II° n. 5	7	3	2	1

The didactic proposals, although different between the control and experimental groups, were conducted by the same teachers, therefore, the only difference between the two groups consists in the modality, means and tools used. For this reason, Table 4 shows the devices made available to pupils in the classrooms. By doing so, it is possible to introduce necessary information to better contextualize the different perceptions of both students and teachers. Furthermore, through the use of the model of De Pablos et al. (2010), it was possible to differentiate three degrees of integration of technologies in the educational context (introduction, application and integration), highlighting the differences in terms of pedagogical, communicative and organizational dimensions, but also for the presence of devices.

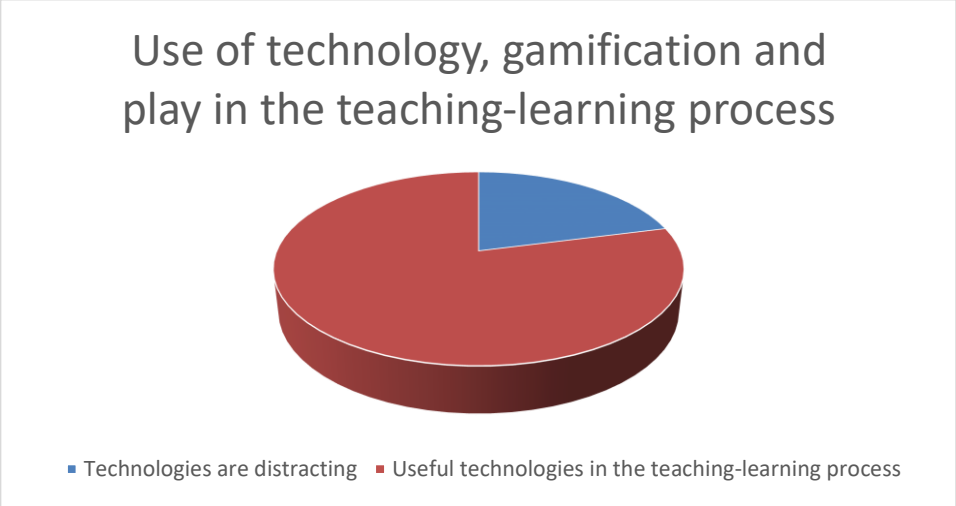
Table 4. Technological tools available in the experimental and control group classes.

Technological tools in the classroom	*Lim*	*PC*	*Tablet*	*Notebook*	*Degree of integration of technologies*
Class V - S. S. di	1	1	7	4	**introduction**

II° n. 1					
Class V - S. S. di II° n. 2	1	1	10	9	**integration**
Class V - S. S. di II° n. 3	1	1	8	3	**application**
Class V - S. S. di II° n. 4	1	1	5	7	**integration**
Class V - S. S. di II° n. 5	1	1	0	2	**introduction**

The first phase of the research, characterized by an analysis of the type of teaching by teachers, showed that 79% of them said they know and use both active methodologies and inclusive technologies, even the most advanced. They also reported that the combination of active methodologies and technologies can be very useful in facilitating and simplifying the learning of the different disciplines of study, as well as in enhancing the individual differences of each student. Finally, they confirmed that through the use of gamification and play during learning, cooperation between peers is simplified and at the same time the activation of useful teaching strategies is ensured to facilitate the inclusion of all students. For the remaining percentage (21% of participants), on the other hand, technologies are of little use, as they tend to distract from the learning process and transform the educational activity into a playful action.

Graph 1. Teachers for and against the use of technology in the teaching-learning process



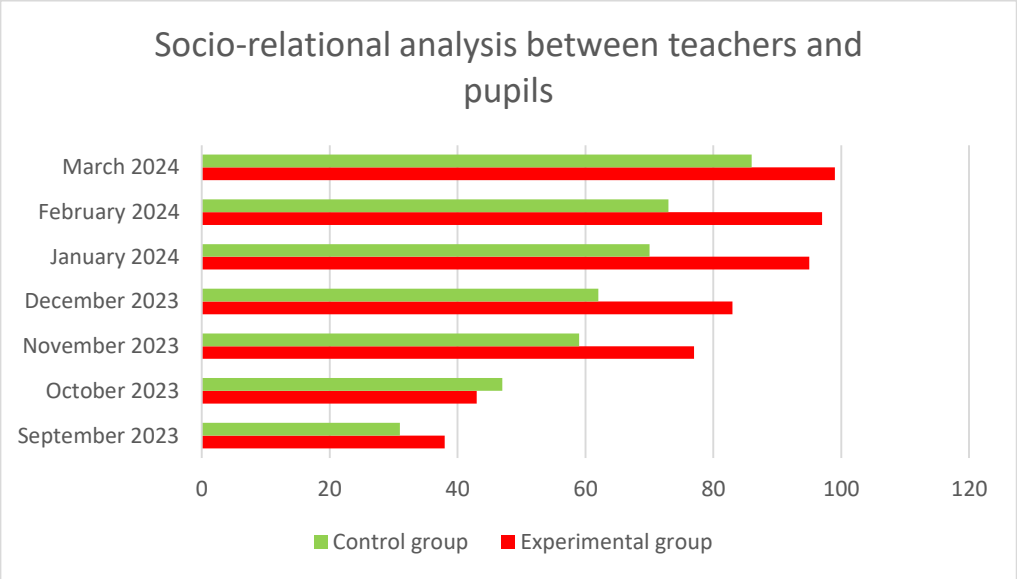
These data show the importance for teachers to rethink their teaching proposals according to an inclusive learning environment in which technology and play are present as learning tools. By doing so, it will be possible to foster new inclusive

teaching methods, effective for achieving motivating and participatory learning for all (Gómez et al., 2018).

In this regard, from the analysis of teachers' behaviour and evaluations, in order to ensure an inclusive teaching proposal, it emerged that teachers believe that collaboration between them is necessary to promote educational success and, at the same time, ensure the active participation of each student. In addition, it is necessary to guarantee each student a well-organized classroom environment in order to allow an active methodological choice characterized by the presence of technological tools appropriate to the context.

Analyzing the differences from a socio-relational point of view between the experimental and control groups, it can be seen that with the passing of the months the presence of the game during the learning moment favors the birth or strengthening of the bonds between teachers and students.

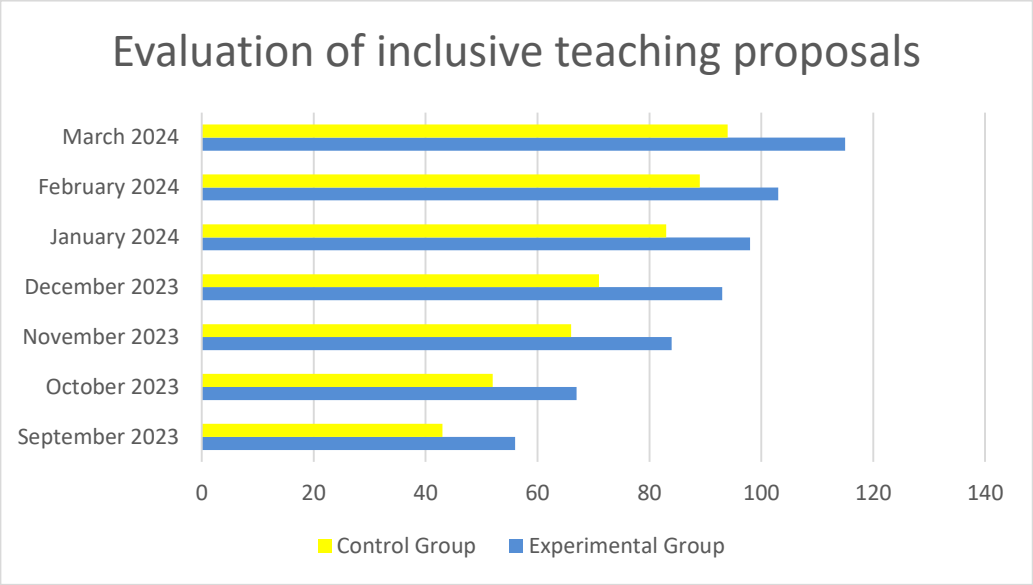
Graph 2. Socio-relational analysis between teachers and pupils



If in September 2023 it is observed that 31.9% of the pupils in the experimental group have a good relationship with their teachers, and in the control group this percentage is 26%, in March 2024 it is recorded that 83.1% of the pupils in the experimental group have a good relationship with their teachers, while this value stands at 72.2% in the control group (difference in September 2023 = 5.9%; difference in March 2024 = 10.9%). This disparity from the point of view of percentage growth is motivated by the use of gaming and gamification during the teaching-learning process.

In addition, there is a further point in favor of the use of technology as it is able to eliminate the temporal and spatial limits present in a classic traditional teaching proposal, resulting in a more inclusive and motivating one (Park, Shin, 2017).

Graph 3. Evaluation of inclusive teaching proposals



Looking at the data obtained concerning the role of the teacher in the control group and in the experimental group, it is observed that in the first there was not a totally inclusive proposal that considers the needs of each student, unlike the second, in which there are more inclusive learning proposals mediated by the playful and technological factor. In addition, there is a greater diversification of the educational proposal, since through technology and play it seems to be calibrated with greater accuracy on the potential of each student. In particular, it is recorded that in the two-month period September - October 2023 there is a disparity in inclusive proposals between the two groups of 10.9 percentage points (47% experimental / 36.1% control). This gap at the end of March 2024 appears to have increased (difference of 17.7 percentage points) in favor of the experimental group in which there are more inclusive educational proposals whose common feature is play and gamification (96.6% experimental / 78.9% control).

4. Conclusions

The main objective of this study is to highlight the potential of gamifcation and game-based learning, and the results, although research is still ongoing, lead to the conclusion that they can improve students' academic performance, engagement and motivation.

The factor and game-based learning can be used as effective and necessary teaching-learning strategies to meet pupils' needs.

Technology education can be considered as an important part of the overall development of the pupil, as it is capable of enriching educational content, promoting changes in traditional educational models in favour of a teaching-learning process centred on the needs and requirements of the learner (Altomari, Miceli, 2023). This work aims to highlight the importance of gamification and game-based learning in schools, as it is capable of incentivizing learners to learn and motivating them while also enhancing the emotional, social and relational aspects (Zhao, Kong, Zheng,

Ahmad, 2024). In this way, it is possible for the teacher to create educational proposals that are personalized, able to reduce distractions on the part of learners, but above all characterized by living learning experiences that stimulate and involve the emotional, social and relational axis (Ledger, Fischetti, 2020).

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