Teacher training on AI and gamification

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Abstract. Technologies have contributed to the spread of new tools. This led to the demand for new methodologies and approaches in education, in the same way that it is happening with the more recent spread of artificial intelligence tools. In this work, we reflected on how the integration of artificial intelligence technologies with gamification strategies could provide teachers with tools to realize more adaptive and engaging didactic activities. In particular we present two recent experiences with 100 Italian teachers of all levels and disciplines on the topics of AI and gamification. We tried to investigate the combination of these two themes to improve teacher training. In order to carry out our research, we analyzed how teachers employed gamification strategies in designing didactic activities and their pedagogical purposes. Our findings suggest how AI tools could support teachers in creating increasingly engaging, motivating and personalized didactic activities for their students. They can also help teachers to integrate specific gamification strategies that they consider to be essential for the motivation and engagement of their students.

Keywords: Artificial Intelligence, AI Tools for Gamification, Didactic activities, Gamification, Teachers Training.

1 Introduction

Gamification refers to the use of the typical mechanisms of the game, such as the challenge, the use of points, levels and prizes, in a context that is essentially not a game [1]. In recent years, gamification has gained considerable interest in various fields, including industry, healthcare, business and education. Today, it is an innovative and a popular educational approach that can be adopted to different disciplines across multiple school levels [2]. It represents a new kind of teaching and learning in different ways, for face-to-face, online, blended or hybrid lectures. The gamification approach can be applied to a single unit or teaching activity, or to an entire course [3,4]. Gamification does not necessarily require the use of technology, although the proliferation of technological and IT tools has contributed to the demand for new methods, approaches and tools, such as games, in education. In fact, technology can enhance the various elements of gamification that research has shown to be the most

commonly used and effective (e.g. use of points, leaderboards, challenge, rules, rewards etc.) [5].

The affirmation of gamification as a teaching approach combined with the recent and explosive development of Artificial Intelligence (AI) has given rise to specific AI tools designed for gamification, in both educational and non-educational settings. Gamification AI tools are the integration of AI technologies with gamification strategies, in order to create a personalized, adaptive, and engaging experience for users. This fusion of AI and gamification can support the use of this approach by teachers in the creation of increasingly engaging, motivating and personalized teaching activities, with the aim of increasingly improving the student experience. There are already applications of AI and gamification in the educational field [6,7] and the future will certainly be in that direction. From this perspective, the role of the teacher in the planning and evaluation of teaching activities is even more important. In this research we present two recent experiences with more than 100 Italian teachers of all levels and disciplines on the topics of AI and gamification. Based on the results obtained, we reflect on how these themes can be combined to train teachers in the use of gamification with technologies and make them aware of the impact of AI in the educational field.

2 State of the art

The term gamification refers to the use of the typical mechanisms of the game, such as the challenge, the use of points, levels and prizes, in a context that is essentially not a game. It represents an approach that involves the application of characteristic elements of the game within modules or learning units that were not necessarily born as games [1]. Sümer and Aydın [5] found that gamification contributes positively to students' motivation and engagement, and they brought out some design criteria related to the most common gamification elements to consider when designing gamification strategies in distance learning. Game elements are important to engage and motivate students. People who play are motivated by certain factors that characterize games:

- Involvement: players like to feel they have an active role in the game and they are therefore encouraged to participate dynamically.
- Challenge: it is one of the key elements to engage users within the game.
- Control: players like to feel they have power and control over their actions.
- Rewards: prizes, even small ones (e.g. badges or achievements) encourage players to keep going, especially when the rewards are regular.
- Fun: users enjoy the game because it is interesting and they will continue to play as long as there is interest.
- Progress: players are stimulated to continue the game if they have the impression that they are moving forward, getting better, gaining skills. The use of levels in the game is an incentive factor for the user who can be motivated by the progression in the challenge.
- Leaderboard: it is useful to stimulate users to play and get better and better results.

- Accumulation: those who play appreciate the possibility of being able to accumulate rewards (e.g. money, treasure, points).
- Personalization: players like to customize the game, for example by choosing an avatar to develop an own identity.
- Adaptability: players like the possibility of making the game vary depending on their decisions, whose path is the result of their own choices.
- Feedback: it is an important element for users in particular to motivate them to keep playing. The timing of feedback can vary: there are those who need immediate feedback or those who are satisfied with weekly or daily feedback

Although it is not essential to use storytelling as a means of gamification, it represents another important gamification strategy: telling a story, event, myth, legend, or mission is one of the most used ways to involve the user [8]. A gamification activity can also be an opportunity to favor collaborative learning among students and for the achievement of specific common goals, for example by taking part in a challenge that involves teamwork. In fact, many games make available chats, forums or other tools to allow communication and interaction between users that helps to create a community that plays [8].

In education, AI began producing new teaching and learning solutions that are now undergoing testing in different contexts. The connection between AI and education involves three areas: learning with AI (e.g. the use of AI-powered tools in classrooms), learning about AI (its technologies and techniques) and preparing for AI (e.g. enabling all citizens to better understand the potential impact of AI on human lives). To prepare teachers for an AI-powered education while preparing AI to understand education is a two-way road: teachers must learn new digital skills to use AI in a pedagogical and meaningful way and AI developers must learn how teachers work and create solutions that are sustainable in real-life environments [9]. With the increase in studies about AI in the educational field, many scholars in the field want to study how the role of teachers, school and leaders in education will change, and what benefits there may be (see for example [10]). It is certainly important to study what kind of implications it can reveal for the future of schools. However, it is important to introduce the topic in schools, training students and teachers and investigating their perceptions towards AI. The application of AI in education is envisaged as an opportunity to provide students with adaptive and personalized learning, especially in the context of mobile learning and assessment [7].

Teachers are often attracted by gamification but do not know how to put it into practice. It is therefore necessary to train teachers above all on how to plan didactic activities in order to adopt innovative didactic approaches. When using a gamification approach, it is necessary to design targeted and personalised strategies as much as possible to ensure that students can get the benefits and not risk this approach compromising the learning process [11]. It's important to consider the benefits and risks if using AI tools to gamify online activities or courses. These AI tools help in the creation but the role of the teachers in the design is fundamental, as well as in the evaluation of the output they return

3 Research context and results

The DELTA Research Group organized two immersive 3-hour workshops for teachers on the theme “Mathematics and AI” and “Gamification and education”, with the participation of 54 and 52 different teachers from all over Italy, from primary to secondary schools [9, 12]. The workshops took place face-to-face, and they were structured as follows:

- filling in an initial questionnaire;
- theoretical introduction on the topic with group discussion and interactions by teachers;
- illustration of several examples of educational activities of different levels on these topics;
- group planning of a didactic activity through the compilation of a guided form;
- filling in a final questionnaire.

The findings of the gamification workshop are that half of the teachers already had some knowledge of gamification before the workshop and that the sample consisted of teachers who are willing to actively involve and motivate their students in the learning process. Perhaps all that is needed is to make them more aware of the methods they already use, and to train them in innovative educational approaches and practices. Teachers were asked to design a gamification activity for their students and explain the gamification elements used. 36 activities were created and the most common gamification factors were identified. In particular teachers' difficulties in achieving an adaptability of learning emerged [12]. In addition to asking teachers which gamification elements they used in designing their gamification activity, we also asked them how they used them in the activity and for what purpose.

The findings of the AI workshop are that teachers do not treat AI-related topics a lot with their classes. All the teachers said they wanted to receive more training on AI and how AI intervenes in daily life. They believe it is important to understand the role of AI in everyday life and how it is changing the world of education. One of the difficulties that emerged in the workshop was designing educational activities on AI topics or using AI tools that are engaging for students [9].

More details about the results of the research will be detailed in the full paper.

4 Conclusions

In conclusion, our experience is driven first and foremost by the need to innovate the learning experience of students who are increasingly accustomed to using technology in their everyday lives in every field. It is important to train teachers in the use of new teaching approaches, such as gamification, supported by technology, to engage and motivate students and provide increasingly adaptive teaching. We considered how AI could support the use of an innovative approach such as gamification in education, particularly in the creation of increasingly engaging, motivating and personalized didactic activities, thereby enhancing the student experience. Furthermore, a future

challenge could be to study if and how AI tools for gamification can help to establish gamification as a credible teaching approach, rather than a means of entertaining students. The spread of AI is increasingly strong and cannot be ignored. It becomes fundamental to know them and study their strengths and weaknesses, in order to be able to use them more and more in the educational field. AI tools can in fact enhance teaching approaches such as gamification, but the role of the teacher remains fundamental in the planning of teaching activities.

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