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Gamification for teacher professional development: the case for narrative approaches

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Abstract. Although gamification and the use of serious games in education are usually recommended, according to the literature in the field it seems these approaches are hardly used in teacher training contexts. This might depend on the fact that the use of strategies such as Points, Leaderboards and Badges, do not fit well with a context where collaboration and practice sharing need to be encouraged, rather than hindered by competitive mechanics. In this sense, narrative approaches seem to fit better with these contexts. In this paper we propose a gamification approach for Teacher Professional Development based on a narrative approach. Thanks to an exploratory study, we have tested the proposed approach and collected preliminary data that are presented. The main results are encouraging, as teachers' reactions were positive in respect to the usefulness and effectiveness of the proposed approach and also in respect to their willingness to apply similar gamification strategies in their practice.

Keywords: Gamification, Teacher Professional Development, narrative approach, serious game.

1 Introduction

Game-based and gamified learning environments are increasingly mentioned as an important component of smart learning ecosystems [1], because they offer several benefits in terms of enhanced engagement, personalized and self-regulated learning experiences, social interaction and problem-based learning [2]. While these environments are widely investigated as a means to create smart learning experiences for students, according to three literature reviews [3, 4, 5], they are hardly investigated as a means to engage teachers in their own professional development, although they are frequently the subject of teacher training. This may sound like a contradictory state of things, at least for teacher educators who believe they should practice what they preach.

According to [6], adopting (or not) GBL and gamification techniques is a choice that should be made alongside with all of the other decisions pertaining the design of a training intervention. Hence, it should be informed by the aims, context and target population features, and the gamification approach adopted should be in line with these factors and go hand in hand with the educational approach adopted. Besides, achieving what Nicholson [7] calls "meaningful" gamification, that is, "the use of gameful and

playful layers to help a user find personal connections that motivate engagement with a specific context for long-term change" [7, p.1], requires intertwining design decisions with those concerning gamification to produce a coherent plan where the behaviours encouraged by gamification are the same that are regarded as desirable in terms of learning.

In this paper, we claim that the most widespread gamification techniques, that is, so called Points, Badges and Leaderboards (PBL) are rarely suitable to Teacher Professional Development contexts, and that the use of narratives can be, in many cases, a valuable alternative. The debate about the engaging and motivating power of PBL in general has been lively in recent years, with detractors of PBL claiming that there is a huge difference between what can be obtained with so called "pointsification" and motivation, let alone intrinsic motivation [7]. At the same time, other researchers have provided evidence of the effectiveness of PBL in engaging and/or motivating learners, even if they have also identified the conditions for pointsification to work [8].

Against this backdrop, we do not wish to contribute to this debate, because – in line with [9] - we believe that PBL is not generally good or bad, rather, it may turn out to be suitable or unsuitable according to the context, the target and the learning aims of a teaching intervention. However, we claim that most Teacher Professional Development (TPD) interventions are unsuitable to be gamified with PBL, while teachers' engagement and reflection can be triggered more easily by adopting a narrative gamification approach. Hence, even if gamification is hardly used in TPD, our claim is that gamification based on a narrative approach has more chances to be successful due to its features.

2 Theoretical background

Gamification has been defined by Kapp [2] as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems" [2; p. 10]. This definition is, at one time, wider and stricter than the other well-known definition by Deterding et al. [10, p.10], according to which gamification is "the use of game design elements in non-game contexts." In fact, while Deterding et al.'s definition binds the term to contexts that are not necessarily educational contexts, acknowledging its use in marketing, health, wellness, etc., Kapp's definition is focused on educational contexts, but it does not draw a clear line between gamification and GBL. In fact, according to Kapp, a gamified educational intervention may as well include the use of one or more (serious) games, provided that there is a common thread binding together the whole gamified approach. This definition is in line with Kim et al.'s [11] broad vision of the relationship between (serious) games and gamification according to which applications of gamification in learning can comprise the use of (serious) games.

While there is agreement that approaches to gamification can differ a lot, an interesting distinction has been proposed by Kapp [11] between "structural" and "content" gamification. The former is realized by applying a layer of gamification on top of content without requiring any change to it, while the latter requires to change the content

of the training, by strictly intertwining gamification elements and mechanics with learning content and learning aims.

Regardless the definition adopted, the findings of some recent reviews of applications of GBL and gamification in educational and training contexts [6, 12, 13, 14] converge on the conclusion that structural gamification based on Points, Leaderboards and Badges is the most frequently adopted approach, while content gamification is adopted less frequently. This is not surprising, given that designing content gamification must be done in parallel with the design of the educational intervention, bearing in mind that the aims of gamification should be aligned with the educational aims of the intervention, while structural gamification may be limited to adding a structure to course content, possibly even reusing the same structure on different content.

In line with this vision, narrative gamification is one of the possible game elements that can be used to implement content gamification in an educational intervention [15]. This element, also associated to the terms "plot" or "storytelling", is not frequently used [14]. According to Palomino et al. [15] "narrative is a sequence of events transmitted by an individual. This sequence may undergo modifications and be modified in quantitative or qualitative terms through the way, i.e. how it is told, aka storytelling". The events composing a narrative often relate to the emotional sphere, fulfilling a range of possible functions (relaxation, excitement, fear, empathy, etc.), and it is crucial to help learners understand their role in the environment and relate it to their emotions, attitudes and motivation. In learning contexts, narrative can be used to free learners from the typical constraints of "serious" learning by allowing them to adopt a playful approach in acting their role in the narrative and, at the same time, express their feelings, expectations, and open up to their fellow learners [16]. Deliberately crafted narratives can also be used in games to provide players with more agency and encourage them to individually express themselves in a playful way [17]. In addition, the use of digital storytelling to create a thread of continuity between in-school and out-of-school activities has proved effective [18].

Given these features of narrative approaches, we wanted to investigate whether and to what extent they fit well with the specific context of Teacher Professional Development. Generally speaking, there is agreement that effective TPD needs to be long term, self-directed, trigger collaboration and practice sharing, and should intertwine with reflective practice [19, 20, 21, 22, 23]. Carrying out this type of TPD initiatives is expensive and time-consuming, and exposes to the risk of drop outs when teachers are not strongly motivated. In addition, this type of TPD initiatives goes against teachers' consolidated habits. For example, teachers are not used to collaborate with colleagues working in different contexts and cultures, and their practice sharing habits are limited [24, 25]. Thus, collaboration and practice sharing are often key behaviours to be encouraged in teachers' training paths. This cannot be done through competitive approaches, but rather though collaborative ones. It is no coincidence that many TPD initiatives rely on or envisage the creation of communities of practice of teachers [26, 27]. Hence, game mechanics that promote competition like those based on Points, Badges and Leaderboards and extrinsic motivation run the risk to be inadequate to these contexts, while alternative approaches should be applied to foster collaboration among teachers and intrinsic motivation.

In this paper we advocate the use of gamification and specifically narrative approaches in TPD contexts as an alternative to be applied in TPD contexts. The underlying hypothesis is that these approaches can help trainees to gradually appropriate the aims of the gamification; then the objectives of each individual training activity; the general aims of the TPD pathway and, finally, the goals of the whole TPD initiative. This way, the gamification approach would help learners to embrace and feel responsible for the aims of the training.

In the following we describe the approach we propose and then describe the exploratory study aimed to confirm or deny our hypothesis and report our preliminary data of evaluation.

3 The proposed gamified approach

In this section we describe a Teacher Professional Development experience based on the above hypothesis that was carried out within a European Erasmus+ project called PLEIADE (https://pleiade-project.eu/). A gamified narrative approach was used as a backbone for the teacher training path envisaged in the project.

The main aim of the training path was to introduce teachers to the methods and tools proposed by the project, with the ultimate goal to support them in the design of collaborative and inclusive activities for their students. A complete description of the pathway can be found in [28]. The path strived to create a positive, open community of teachers, encouraging them not only to reflect and collaborate towards the design of new activities, but also to share, explore and experiment in a safe, collaborative environment. To this end, the training path included gamified elements to help both engage participants and create a positive social atmosphere driven by curiosity and mutual support.

The pathway lasted 13 months, from May 2021 to May 2022, and took the form of blended training activities (face-to-face and online), involving — as learners — 90 teachers from the four project partner schools (in Bulgaria, Cyprus, Greece, and Italy).

Several gamification elements were adopted and integrated in the training path structure, namely:

- a narrative metaphor;
- a gamified platform;
- a game, called I4Ts game, to support the design process by teachers of collaborative and inclusive activities for students;
- a number of gamified face-to-face events.

These are described in the following.

3.1 The narrative metaphor

The training path used the metaphor of “space exploration” as a narrative thread. A narrative component is an important part of engaging gamification [15]. Space exploration was chosen because it seemed an apt metaphor for the project aims, being a collaborative, cross-country endeavour in which tight-knit communities of teachers were asked to push the boundaries and strive to transform apparently hostile environments in places in which students could feel welcome. Representing a learning process as a

journey is not a new idea, previously used in teacher training [16, 29, 30]. Participants were encouraged to adopt this metaphor throughout their journey, and all the proposed training activities and phases had titles and descriptions matching this overarching metaphor. For example, the team of trainers and tutors was called ‘Ground Control’, the synchronous training events were called ‘Space rendez-vous’, and the graphical interface of the hosting platform was personalized to reflect the metaphorical theme, as described in the next section.

To launch the metaphor, an ice-breaking activity was proposed where participants were split in international groups of around 7-8 participants (labelled ‘spaceships’, in line with the metaphor). These small groups served the function of gradually introducing participants to one another, as getting to know seven other people is a less daunting task than getting to know eighty from the start. These teams were guided in the construction of a group identity: first, group members shared their expectations and emotions regarding the training, by positioning themselves on a “wheel of emotions” (see Fig. 1) and disclosed to the team a self-assessment of their own starting skills and beliefs (Fig. 2).

Afterwards, each group was asked to choose a name for their spaceship and to present themselves to the other groups during the first synchronous event (‘opening up’ interaction beyond the group’s boundaries). This way, the metaphor of the spaceships helped group members identify with the group as a whole and strengthen their bonds with other group members.

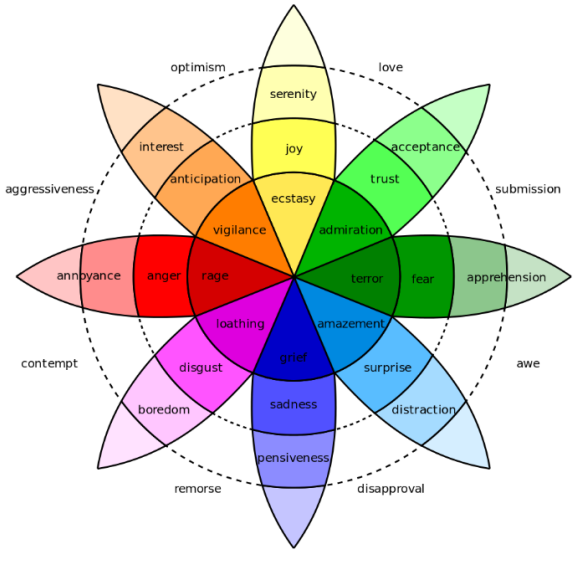

Fig. 1. The wheel of emotions: each participant was asked to position their initials on the picture to obtain a visual representation of the team’s feelings

Fig. 2. One group competence map: each member is represented by a colour

3.2 The gamified platform

The platform hosting the interactions between participants was a customization of Moodle (https://moodle.org/), a very well-known Learning Management System. A complete description of the platform can be found in [31]. Gamifying Moodle by adding Points, Leaderboards and Badges is common practice [32]. However, in line with our hypothesis, the platform interface was customized to reflect the chosen space journey metaphor. In particular, themed icons elaborated according to the metaphor where added, as shown in Figure 3.

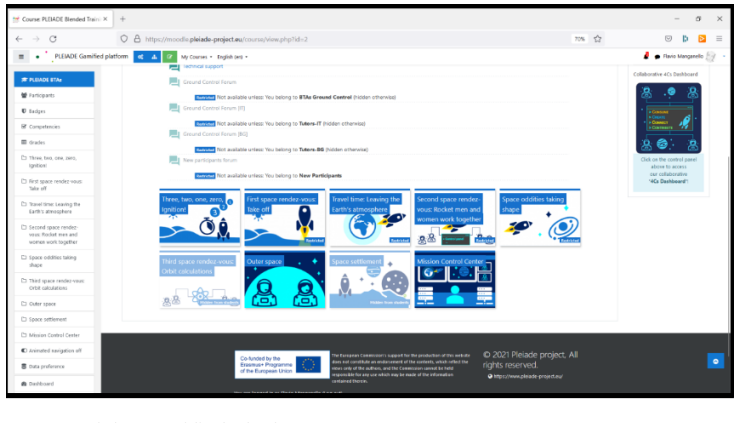

Fig. 3. Home page of the gamified platform

In order to encourage participants to enact practice sharing behaviours, the platform was endowed with a dashboard (fig. 4), keeping track of both individual and collective practice sharing actions. Thanks to this tool, individual participants were able to self-monitor their practice sharing actions and compare their performance to the collective behaviours [33]. Practice sharing was monitored according to the 4Cs model described by [34].

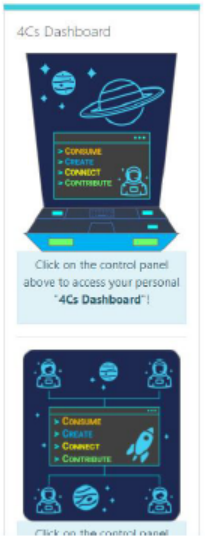

Fig.4. The dashboard implemented to allow participants to self-monitor practice sharing actions

3.3 The I4Ts game

One of the main tools proposed by the project to support teachers' capacity to design inclusive and collaborative activities was a fully-fledged game, called the I4Ts game. A complete description of the game is provided in [35]. Thus, many training activities proposed during the path were innerly gamified, as they relied on the game.

The I4Ts game is a board game to facilitate teachers' learning design. It engages a team of teachers in collaboratively identifying the phases of a learning activity for their students and subsequently defining tasks, technologies and teams. The game, which is available in three formats (paper, full digital and hybrid, i.e. half-digital + half-paper) is composed of a board and four decks of cards. Players/teachers draw cards from the decks, manipulate and position them on the board, with ongoing decision making within the confines of an increasingly restricting design space. By providing information and feedback on the expected outcomes of key design choices, the game increases teachers' awareness of intended and unintended consequences of learning design chosen features. Additionally, the interactivity of the game helps engaging teachers in the co-decision making of learning design, as well as in consideration and reflection on the many variables at play when designing collaborative activities. The game is structured around 3

levels of difficulty and also allows to save and share the created learning designs, thus supporting their retrieval and reuse after collaborative gaming sessions [36].

Within the training path, the game was used mainly during face-to-face events. In Figures 5, 6 and 7, teachers playing with the 3 formats of the game are shown.

Fig. 5. Teachers playing with the paper version of the game

Fig. 6. Teachers playing with the digital version of the game

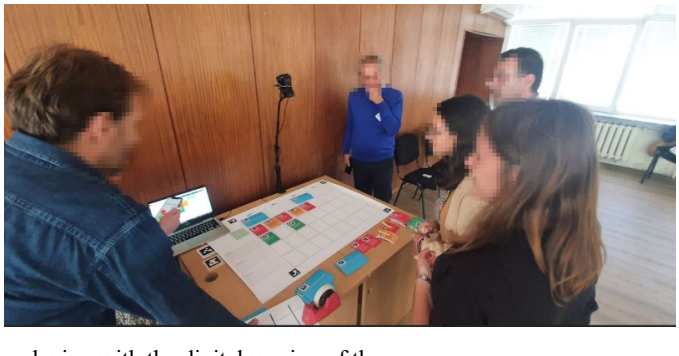

Fig.7. Teachers playing with the digital version of the game

3.4 The gamified face-to-face events

As already mentioned, the training path was conceived as blended, i.e. it was designed as an alternation of face-to-face and online activities [28].

Unfortunately, some of the envisaged face-to-face events were necessarily converted into online synchronous activities, due to the pandemic. This forced the designers of the training path to re-design on the fly the original events and – in an attempt to mitigate the fatigue of a 3-day online meeting – the gamification component was pushed even more than planned.

This was implemented by alternating presentations and group work sessions with gamified sessions. For example, during the first online event, instead of introducing the trainers' team, a number of 'funny Identity Cards' were prepared, containing hints (personal and professional anecdotes) and participants were asked to guess the identity of the various team members. Presentations were always featured with 'Activation phases', polls and short guessing games related to the tackled topics, and were aimed to break the monotony and trigger participants' attention. At the end of each day, winner(s) of the day were proclaimed and awarded (Fig. 8).

Fig. 8. The 'Award of the day' of the online meetings

Fig. 9. Teachers engaged in the "escape room"

During the face-to-face events, we also proposed games, such as for example an escape room (actually in our case it was an "escape garden", see fig. 9), where teachers

were engaged in the retrieval of clues they could derive from what they had learnt, to solve tasks and quizzes in an attempt to find the way out.

4 Methods

4.1 Context and participants

As already mentioned, the pathway was delivered from May 2021 to May 2022 and targeted 90 teachers from four schools based in Bulgaria (20), Cyprus (23), Greece (24), and Italy (23) respectively.

The involved teachers were all working in primary and secondary schools and constituted the population for our study.

4.2 Measures

In our exploratory study, in order to evaluate teachers' reactions to the proposed approach, we administered two surveys:

- after each face-to-face event, a final survey was delivered aimed to collect participants' opinions and reactions in respect to the activities proposed during the event and in particular in respect to the I4Ts game;
- at the conclusion of the training path, a final survey was delivered to capture overall satisfaction and opinions regarding the whole training experience and in particular the gamified approach.

Each item in both surveys required participants to rate their agreement with a statement on a Likert scale (from 1 = low to 5 = high).

Data were collected anonymously and managed according to the GDPR rules.

5 Results

In Table 1 we report the ratings regarding the overall gamified approach adopted in the training path.

Table 1. Participants' opinions at the conclusion of the training path

Item	Mean	SD	[Min, Max]
The teaching strategies adopted in the training path were effective to achieve the learning aims	4.04	0.68	[3, 5]
Tutoring of the training path was useful for achieving the learning aims	4.00	0.87	[2, 5]
The training learning environment (i.e. the gamified platform) was useful to achieve the learning aims	3.88	0.67	[2, 5]
The training learning environment (i.e. the gamified platform) was easy to use to achieve the learning aims	3.80	0.87	[1, 5]

I felt comfortable during the gamified activities	4.04	1.24	[1, 5]
I think the gamified activities were effective (i.e. allowed me to achieve the learning objectives)	3.96	1.10	[2, 5]
I felt comfortable with the narrative space metaphor	3.80	1.15	[1, 5]
I think the narrative space metaphor was effective (i.e. allowed me to achieve the learning objectives)	3.48	1.29	[1, 5]
I would use gamification in my practice	4.00	1.15	[1, 5]
I would use the narrative metaphor in my practice	3.64	1.11	[1, 5]

In Table 2 we report the ratings regarding the gamified activities proposed during the face-to-face events and regarding the I4Ts game.

Table 2. Participants' opinions after each face-to-face event

Item	**event A**	**event B**
The gamification activity was enjoyable and in line with the training aims	4.10 ± 0.94	5.00 ± 0.00
The I4Ts game session was useful	4.12 ± 0.88	4.73 ± 0.47
The I4Ts game session was enjoyable	4.12 ± 0.99	4.82 ± 0.40

6 Discussion

Looking at the data, it seems overall the proposed strategies were all well accepted by teachers, as all the scores are higher than the median point.

In particular, teachers felt comfortable with the narrative metaphor and the gamified platform and they enjoyed the I4Ts game and the activities proposed during the face-to-face events.

According to the data, they also think these strategies helped to achieve the learning objectives, although the effectiveness of the narrative metaphor was the item which got the lowest score (=3.48). We believe this might depend on the fact that most of our participants were not particularly fluent with English (which was the official language of the training initiative) and this probably caused some difficulties to handle with a terminology (related to the 'space' metaphor) they were not particularly familiar with. This can stand as a useful indication for those who want to adopt narrative approaches in contexts where participants are not native speakers, to adopt metaphors that do not need a vocabulary that is too far away from their own.

Participants were also rather positive regarding the contribution provided by tutors; in this respect we would like to point out the overall proposed approach was quite demanding as it required the involvement of many tutors who were in charge of supporting all the proposed activities. This should be taken into account when proposing this kind of approaches.

Moreover, we would like to stress the fact that even in terms of design of the gamified activities, this was very time consuming: given that – as explained above – we opted for a "content gamification" [2], this implied changing the content of the training, to strictly intertwine gamification elements and mechanics with the learning contents and learning aims.

Last but not least, we would like to stress the fact teachers declared they are inclined to apply gamification and the metaphor approach in their practice, which is quite a remarkable result, especially if we consider that the adoption of the approaches was not a direct aim of the training initiative, but it came out as a "collateral effect" of our proposed approach.

7 Conclusions

In this paper we have proposed a gamification approach intended to be applied in teacher training contexts. In our exploratory study we have collected preliminary data that are encouraging and support the idea that these approaches can fit well with the teachers' target population. In addition, we have provided evidence of the positive side effect of teachers willing to adopt gamification in their practice, despite this was not an intended, direct aim of the training. This should encourage to invest on these kinds of approaches, especially in contexts where serious games and/ or gamification are the main target of the teacher professional development initiatives.

Among the limitations of the study, we should acknowledge the limited number of participants and the non-randomized involvement of participants, who were recruited as their schools were partners in the project.

Thanks to our data we have detected and discussed some criticalities that should be taken into account and that deserve further attention and research. In particular, the study has helped pointing out language fluency of participants should be taken into account when a narrative approach is adopted, in such a way that the use of metaphors or the adoption of sectorial languages doesn't prevent effective communication.

Moreover, given that we have detected the effort required to design and implement these approaches is high, further research should be devoted to understand whether and how this aspect could be mitigated.

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