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"Let's do this together and see what we can come up with!" Teachers' Views on Applying Game–based Pedagogy in Meaningful Ways

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Game-based pedagogy offers a promising approach to renewing school education and making it more engaging. However, teachers' ways of using game-based pedagogy have been rather traditional, not making use of its full potential. This paper presents initial findings on the experiences of teachers who participate in a project that aims to promote the meaningful use of game-based pedagogy. The findings suggest that game-based pedagogy could indeed play a key role in changing traditional practices in schools. Game-based approaches can support differentiated instruction, enhance pupils' motivation and effort, provide new perspectives to assessment, and transform traditional roles in the classroom by encouraging pupils' active participation and by giving them more responsibility and independence. However, in order to use the full potential of game-based pedagogy, a broader range of new approaches should be used, including not only educational games but also entertainment games, gamification, and activities where students make their own games.

1. Introduction

Many areas of culture and society are being exceedingly penetrated by playfulness, or *ludification* (Frissen et al., 2013). At the same time, researchers have highlighted the need to renew education with pedagogical innovations that make learning more meaningful, enhance motivation, and support learners' confidence in their own competences (e.g., Kupari et al., 2013, p. 70). As game-based approaches have been shown to have potential in terms of both learning outcomes and motivation (see e.g., Connolly et al., 2012), they provide a promising approach to enriching school education. In the development and successful implementation of new educational innovations, teachers play a key role. In this paper, we will examine how teachers have applied game-based pedagogy and discuss its potential for enhancing and renewing education.

1.1 Game–based pedagogy

Van Eck (2006) has defined game-based learning to include 1) *educational games*, 2) *the use of entertainment games in education*, and 3) *learning by making games.* Game-based pedagogy can also make use of 4) gamification – the use of game elements in non-game contexts (e.g., Deterding et al., 2011; Kapp, 2012). Figure 1 illustrates these four different forms of game-based pedagogy.
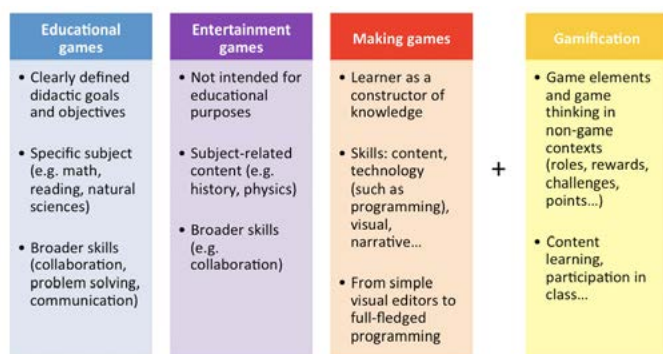
Figure 1. Different forms of game-based pedagogy.

The most common approach is the use of *educational games* that aim to deliver "specified learning goals, outcomes and experiences" (De Freitas, 2006, p. 9). Educational games have had positive effects in many school subjects; for example, they have improved mathematics achievement (Kebritchi et al., 2010; Shin et al., 2012) and helped students understand certain scientific phenomena better than traditional teaching tools (Corredor et al., 2014). Especially with skills that require plenty of repetition, such as early literacy and basic arithmetic skills, educational games have shown a great deal of potential in motivating the learners to keep practicing by dynamically adapting to their skills (e.g., Richardson & Lyytinen, 2014, Shin et al., 2012). However, the main challenge with many educational games is that once the novelty wears off, the motivational effects may not be very long-lasting (Ronimus et al., 2014).

To expand the scope beyond educational games with specific didactic goals, we can use *entertainment games* for educational purposes (Van Eck, 2006). They have been applied especially in subjects like history and social studies (e.g., Charsky & Mims, 2008; Fisher, 2011). One of the main reasons for bringing entertainment games into the classroom is their flexibility: it is up to the teacher how and when the game is used and integrated into other practices (e.g., to introduce a new topic, to illustrate and provide practical examples, or to synthesize things that have been learned) (Van Eck, 2006). However, as entertainment games are not intended as educational tools, they usually need to be complemented with additional activities that connect the game to the content (Charsky & Mims, 2008). Ideally, these activities are part of the game world or shared narrative so as to not interrupt the game flow (Charsky & Mims, 2008; Van Eck, 2006).

A third approach to using games in education is having learners *build their own games* (Van Eck, 2006). In many cases, making games can be a more efficient way to learn than merely playing them because in the process of creating a game, the learner constructs new relationships with knowledge (Kafai, 2006). Several studies support this view, providing promising results on the usefulness of game creation, for example, in terms of motivation and deeper learning strategies (Vos et al., 2011) as well as critical thinking and academic achievement (Yang & Chang, 2013). Moreover, game building taps into several different areas of interest. For example, it may help promote boys' interest in creative writing and girls' interest in ICT (Robertson, 2012).

Finally, *gamification* refers to using game thinking and game design elements in non-game contexts with the aim of engaging and motivating people – and, especially in the context of education, to encourage learning (Deterding et al., 2011; Kapp, 2012, pp. 10, 15-16). Gamification is often associated with mere mechanics such as points, badges, and rewards, neglecting elements like storytelling, challenge, problem solving, and character development even though the latter aspects are often more crucial for the learner's engagement (Kapp, 2012, p. 12-13). In education, the role of gamification can be related to guiding learners through the process of mastering a new skill (cognitive area), providing learners with positive emotional experiences and encouraging them to try without fearing failure (emotional area), or allowing learners to try on different roles and providing opportunities for receiving recognition from others (social area) (Lee & Hammer, 2011). Especially the emotional and social dimensions of gamification have been found effective (Domínguez et al., 2013).

Despite the increasing amount of research, few schools have thus far made game-based activities an integral part of their everyday activities. While teachers do acknowledge the usefulness and motivational benefits of games, in practice the ways of using games are still fairly limited and traditional: games have mainly been used as light snacks between "serious" tasks in order to make classes more fun, or as tools for revising things that have already been taught using traditional methods (Nousiainen, 2013). Thus, we need to focus on examining how to translate the educational potential of games into practice on a broader scale.

1.2 Teachers' views and attitudes toward game–based pedagogy

According to Dondi and Moretti (2007), there are three types of teachers in terms of integrating games in education: 1) those who use games as an integral part of their teaching and have a good understanding of their potential, 2) those who have discovered one game or one type of games that they find useful but are reluctant to venture beyond this comfort zone, and 3) those who are not at all interested in trying games and do not see games as a serious approach to learning. The point is that we cannot only count on the most active user category to make game-based pedagogy a more widespread practice; instead, we will have to address all these perspectives (Dondi & Moretti, 2007). Moreover, technological tools and resources (including game-based ones) are not always used very creatively. The ways of using these tools are static and unidirectional despite the fact that their creative potential is seen to manifest especially in such situations where learners are allowed to explore them in an open-ended way (Cachia et al., 2010).

When it comes to spreading game-based pedagogy and other innovative pedagogical approaches, the challenge often lies in the notion that the teacher must be more competent than the learners – while, in fact, the greatest potential for learning may emerge from exploring things together (Cachia et al., 2010). According to a recent survey (Hamari & Nousiainen, 2015), teachers' openness towards technology and the extent to which they saw technology as compatible with their own teaching had an effect on both the perceived value and the actual use of games in education. The actual use of games was also influenced by a supportive school culture and the teacher's ICT self-efficacy (Hamari & Nousiainen, 2015). The results of the international Innovative Teaching and Learning Research (ITL) study showed that innovative teaching flourishes in school environments with a collaborative and supportive overall culture especially in terms of 1) peer support and sharing, 2) teachers' direct involvement in practicing new teaching methods, and 3) a common vision that encourages novel approaches (Shear et al., 2011). A key question is what kind of approaches and practices facilitate the spreading and application of game-based pedagogy in schools in such a way that both teachers and pupils see value in it.

2. Case 'Game-based Pedagogy and Portfolio-based Learning'

In this paper, we will present initial research findings from a project called *Game-based Pedagogy* and *Portfolio-based Learning* (2013-2016) carried out in Helsinki, Finland. The project involves 15 comprehensive schools, 32 teachers, and approximately 700 pupils (between 6 to 16 years of age). The main goal is to develop teaching practices that enrich learning and make learning more meaningful by using game-based pedagogy.

Each school has prepared their own development plan based on their pedagogical goals, general interests, and specific challenges they want to address with the aid of game-based pedagogy. On the basis of these plans, the teachers develop their teaching methodology together with experts of game-based pedagogy and different companies operating within the field. These new teaching methods are applied and experimented with in authentic teaching/learning situations. Experiences and results are then shared through open blogs, seminar presentations, and study visits to other schools.

3. Methodology

To examine the use of game-based pedagogy in the schools participating in the project, we have used a mixed-methods (Creswell & Plano Clark, 2007; Johnson et al., 2007) approach, collecting both qualitative and quantitative data. This section presents the process of data collection and analysis.

3.1 Data collection

Overall, our data consists of online questionnaires to teachers and pupils, thematic interviews with teachers, as well as teachers' portfolios and fixed-format activity descriptions. The data was collected in May–June 2014. This paper is based on the initial analysis of two the aforementioned data sets: teacher questionnaire and teacher interviews. The aim of the questionnaire was to ask the teachers of each school about their activities and experiences regarding the use of game-based approaches. The *questionnaire* included quantitative Likert-scale items as well as open-ended questions. In order to delve deeper into teachers' approaches, we selected teachers from four schools for additional *interviews*. Due to the small number of participants, the emphasis is on the qualitative data, and the quantitative data serves to illustrate the overall picture.

3.2 Analysis

The aim of the analysis was to shed light on two themes: 1) the types of game-based pedagogy used by the teachers and 2) the teachers' views on the role and value of game-based pedagogy as part of the school culture. The analysis was conducted in two cycles: we started by analysing the questionnaire data (N=19), and this initial categorisation was complemented and expanded with the interview data (N=6).

Analysing the types of game-based pedagogy: The categories presented in Figure 1 (i.e., educational games, entertainment games, making games, gamification) were used as the framework of analysis. Altogether, four questionnaire items were included in the analysis. A quantitative Likert-scale item *(To what extent have you used the following types of game-based pedagogy)* demonstrated the frequency of each type of activity. Three open-ended questions *(Briefly describe one or more particularly positive experiences on implementing game-based pedagogy; Briefly describe one or more particularly challenging or problematic experiences on implementing game-based pedagogy; General comments or feedback related to the project)*, along with the interview transcripts, were coded using the aforementioned categories in order to provide qualitative descriptions of how the different game-based activities were carried out. The results are presented in Section 4.

Analysing the value of game-based pedagogy: The perceived value of game-based pedagogy was analysed using a data-driven approach, categorising qualitative questionnaire and interview data into themes emerging from the content. The data consisted of the three aforementioned open-ended questions and the interview transcripts. The first cycle of analysis (the questionnaire items) yielded three main categories, and a fourth category emerged from the analysis of the interview data. Finally, we conducted one additional cycle of analysis in order to uncover the teachers' views on the main barriers and challenges to adopting game-based pedagogy. The results are presented in Section 5.

Table 1 shows the gender, job type, and age distribution of the teachers who responded to those questionnaire items that were included in the analysis for this paper. The language of the questionnaires and interviews was Finnish. The direct quotes included in this paper have been translated by the authors.

Table 1. Questionnaire respondents

Gender		Type of job *)		Age	
Male	5	Class teacher (primary)	16	under 30	1
Female	14	Subject teacher (primary)	4	30-39	11
		Subject teacher (lower secondary)	2	40-49	2
				50-59	4
		*) Some teachers belonged to more than one category		over 60	-
				no answer	1

4. Results: Types of game-based pedagogy

The first question to address was the extent to which the different types of game-based pedagogy (see Figure 1) manifested in the activities carried out in this group of schools. Figure 2 illustrates the frequency of each type of activity, based on the responses of 19 teachers.
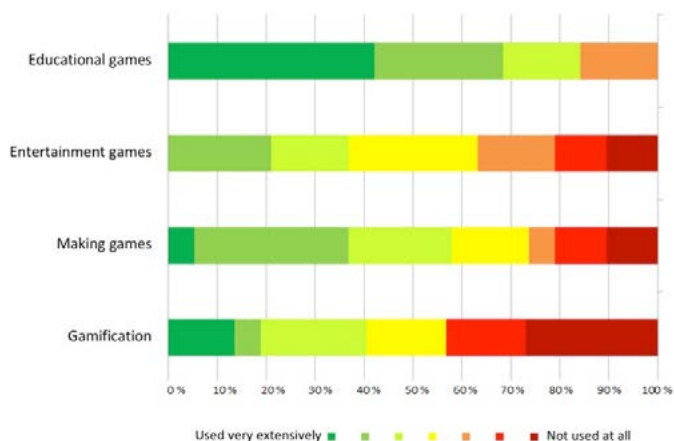

Figure 2. Teachers' (N=19) ways of applying game-based pedagogy.

As Figure 2 shows, all four types of game-based pedagogy were present. The use of educational games was clearly the most prevalent approach but a majority of the teachers had also carried out activities in which the pupils were creating games themselves. *Entertainment games and gamification* were used less frequently. In the following subsections, we will present each of these categories in more detail.

4.1 Educational games

Educational games were widely used: 16 out of the 19 teachers (84%) had used them at least somewhat extensively, and none of the teachers said they had not used them at all (Figure 2). In the interviews and open-ended answers, the teachers particularly emphasised the potential of educational games for differentiated learning due to their ability to adapt to the pupils' skills and motivate them to practice more.

With second-and-third-graders, learning multiplication tables is one of the key things, and that's where a game like SumDog works really well. It's all about repetition, repetition – but because it's a game, it's fun and you want to keep going. – Primary school teacher, F

Many of the positive examples described by the teachers were related to learning mathematics (using games such as SumDog, King of Math, and 10Monkeys). This reflects the suitability of educational games for such topics where repetition and rehearsal play an important role, and where there may be considerable differences in learning pace between individual pupils.

4.2 Entertainment games

As stated above, the use of entertainment games was not as frequent. Five teachers (26%) had used them very or somewhat rarely and two (11%) not at all, while seven teachers (37%) had used them extensively or somewhat extensively (Figure 2). Also in the interviews and open-ended responses, the teachers mentioned fewer examples of using entertainment games than they did of using educational games. When entertainment games were used, they were integrated as one element in broader gamified activities where their role was to establish a narrative context or provide a mystery for the pupils to solve.

In human biology, *I've used [a game based on the television series] House, M.D., which basically works very well as a role-playing game for the pupils. The very best feedback I have ever received in my job was when [we were using the game] to find out what had happened to Mr. Mäkinen who was hosting a travel programme and got sick.* – Primary school teacher, M

4.3 Making games

More than half of the teachers (58%) had at least sometimes carried out activities related to making games (Figure 2). Based

on the interviews and open-ended responses, these activities ranged from the creation of GPS-based outdoor learning paths (see quote #1 below) to the use of visual programming tools to create playable digital games (quotes #2 and #3). Visual programming was used in several ways: after-school clubs, optional courses, cross-curricular projects, and even as peer tutoring where a group of pupils taught pupils from another school to make games.

[1] *The kids designed a 'signs of spring' game with me, using a tool called ActionTrack. They were very excited to borrow nature-related books and to design tasks for the game. They successfully played their games in pairs or small groups in the vicinity of the school.* – Primary school teacher, F

[2] *A year ago we started doing visual programming with Scratch. It started out as a club, and then it was made into an optional subject that we have tied with other classes, mainly history. We have also visited another school to teach programming to another 5th-grade class.* – Primary school teacher, M

[3] *Kodu generated a lot of collaboration, [pupils] began to help each other. I hadn't used the programme myself for more than an hour or so […], so they have more experience with it than I do.* – Lower secondary school teacher (mathematics, computer science), M

4.4 Gamification

Gamification was an infrequent approach as well: as many as 27% of the teachers had never tried gamification and 16% had used it very rarely (Figure 2). It is noteworthy, however, that there was a small but very active group of teachers who had adopted gamification as an integral part of their teaching: 14% of the respondents used gamification very extensively. The qualitative data revealed that the gamification activities entailed various types of role-play and story-based activities as well as collection of experience points based on different criteria (mastery of subject content, active participation in class, good behaviour, etc.). In terms of scope, gamification varied from activities related to one school subject (e.g., history, see quote #1) to gamifying nearly all classroom activity (quote #2). In some cases, gamification provided a framework for collaboration across different grade levels (quote #3).

[1] *In history class, we had a role-playing game that began in the Middle Ages. We created a narrative about a fictional village, and the pupils were members of that society. The pupils were*

assigned different estates, and based on those, they started writing characters for themselves, coming up with a backstory, personal characteristics, and things like that. – Primary school teacher, M

[2] *I have gamified pretty much everything starting from regular classroom activities, and experimented with collecting experience points based on good behaviour in class. The pupils set goals for themselves and got experience points. It worked very well but required a lot of work. In a way, [assessing and giving feedback on pupils' behaviour] is something you'd do anyway – but now they have this extra incentive that they can use their experience points to buy something for their character.* – Primary school teacher, M

[3] *We had an extended space adventure between second-graders and fifth-graders. The fifth-graders organized it, implemented it, and designed the tasks. Second-graders were 'space agents' and solved different kinds of tasks. We experimented with many different methods, using digital tools too.* – Primary school teacher, M

5. Results: The value of game-based pedagogy

The second main focus of the analysis was examining teachers' experiences on the value of game-based pedagogy for enriching school education. This analysis was conducted using a data-driven approach in two cycles. First, in the analysis of the open-ended questions from the questionnaire, three main categories emerged: 1) *supporting differentiated learning*, 2) the ability of games to *motivate* pupils and to meet individual abilities and preferences, and 3) the role of games in transforming and *challenging existing classroom practices*. The analysis of the teacher interviews provided support for these three categories and yielded an additional one: 4) bringing new approaches to *assessment*. We further complemented the analysis by establishing a separate category for 5) the main *barriers* to adopting game-based pedagogy.

5.1 Differentiated learning

One of the reasons for using games was their usefulness for differentiation. This applied particularly to educational games. On the one hand, fast learners were able to independently proceed further at their own pace with the aid of a game, and on the other hand, pupils that struggled with learning were motivated to practice more.

We were practicing exponentiation [with the aid of a game] before a test, and the fastest pupils proceeded beyond the things we had studied in class. Together, they managed to work out the exponent and root rules by trial and error. – Lower secondary school teacher (mathematics, physics, chemistry), F

5.2 Motivation and individual preferences

The main value of gamification, entertainment games, and making games was seen to lie in the ability of these activities to motivate and engage even those students who had difficulties focusing on traditional classroom activities. Teachers reported improvement in the classroom climate and enhancement in collaboration between students, and several teachers had noticed that the pupils put more effort into their tasks during game-based activities (e.g., quote #1). The increase in motivation and effort was also reflected in learning outcomes (quotes #2 and #3).

[1] *They actually come here in their free time, or stay after school, to make [their games], saying 'we want to finish this!' And we're not talking about one or two active students here, but the whole group.* – Primary school teacher, M

[2] *Role-playing games enhance immensely the quality and length of writing tasks.* – Primary school teacher, F

[3] *The pupils' performance level has improved when their tasks have been game-based.* – Primary school teacher, M

5.3 Challenging the traditional roles of students and teachers

The dynamic and open-ended nature of game-based pedagogy also challenges the traditional unidirectional relationship between pupils and teachers. Especially gamification and making games allow students to learn to take more responsibility (quote #1); to reflect on their own characteristics, strengths, weaknesses, and preferences as learners; and to share their knowledge and skills with others (quote #2). At the same time, the teachers are challenged to rethink their established practices and to reflect on their teacher identities (quotes #1 and #3).

[1] *The emphasis has been especially on [the pupils] doing things for themselves and taking responsibility. And [the teacher] has to learn to give responsibility – that's another aspect in it. –* Primary school teacher, M

[2] *Pupils who play games a lot and are really enthusiastic about it have received positive feedback from their classmates and shared their knowledge to the benefit of the whole group. –* Primary school teacher, F

[3] *The project transformed my teacher identity a lot, and the game-based activities will continue! –* Primary school teacher, F

Transformation is not only happening between teachers and students but also among teachers. The introduction of game-based pedagogy, and especially establishing it as a sustainable practice, requires increased collaboration. The teachers saw mutual support, collaborative idea creation, and demonstration of concrete practices as key aspects in spreading game-based pedagogy and making it sustainable.

I think the key [to encouraging other teachers to try game-based pedagogy] is to involve them, like 'let's do this together and see what we can come up with' […] If you only give a fifteen-minute or half-an-hour lecture on what you have done, the other teacher will certainly feel a bit left out. – Primary school teacher, F

5.4 New approaches to assessment

Many educational games collect usage data and include learning analytics that enable teachers to monitor their students' results and progress. However, this is not the only way in which game-based pedagogy can support assessment: gamification and making games allow the teacher to observe the whole learning process – not just the final product – and thereby gain new insight into their students' skills (quote #1). The open-ended nature of these activities makes it possible for the pupils to demonstrate their abilities in ways that are compatible with their styles and preferences, and as a result the teacher may be able to identify hidden potential that has not had an outlet before (quotes #1 and #2).

[1] *You can better assess how active and how interested the students are, and what their interaction skills are like. […] Also, some surprising skills may emerge in some students that are not revealed in normal classroom situations, and that can, of course, affect assessment just as much. And why not, if someone turns*

out to have more skills than he/she [normally] shows. – Primary school teacher, M

[2] *They have had quite a lot of freedom in planning the final outcomes of these game-based projects. […] Is it a video, is it a presentation, is it a game, is it some kind of a booklet. They've been free to reflect on what their particular strengths are. –* Primary school teacher, M

5.5 Barriers and challenges

Finally, we examined the data from the point of view of barriers and challenges, aiming to uncover the main issues seen by the teachers as hindrances to the use of game-based pedagogy. By far the most frequent concerns were related to technology (e.g., lack of devices or suitable apps/games, unreliable network connections, inadequacy of technical support).

When the network or the devices don't work, the pupils get frustrated very easily. […] One teacher isn't always enough to solve all problems and simultaneously come up with an alternative plan if the original one doesn't work. – Primary school teacher, F

Student-related issues were also mentioned. Some teachers had observed significant differences between pupils in terms of how successful the game-based activities were and how the pupils experienced them. Despite the positive experiences with most students, not all of them preferred game-based pedagogy; some pupils would rather have studied using traditional methods of instruction instead. For some of them, the reason for this was that they did not consider game-based activities a serious method of learning (quote #1) whereas for others, these activities were too dynamic and they were missing the familiarity and stability of traditional classroom instruction (quote #2).

[1] *Pupils who are used to 'basic school assignments' did not get that the game-based tasks were also school assignments, and they didn't complete them. The same pupils keep asking for normal 'fill-in-the-book lessons', as they call them. –* Primary school teacher, M

[2] *I have a few pupils in my class who have autistic characteristics. For them, it was extremely difficult to participate in games they could not directly influence. Also, whenever situations changed within the game, they were not able to adapt [to the changes]. –* Primary school teacher, M

Finally, the respondents identified some barriers related to teachers and school leaders. It was pointed out that even though close collaboration between teachers can make plenty of difference, not every teacher is going to feel at home using game-based pedagogy (quote #1). In some cases, the more active teachers also felt a lack of involvement and support from the school leadership and/or the school community at large (quote #2).

[1] *This might not be an approach that suits all teachers, and I think that's something we just need to accept.* – Primary school teacher, M

[2] *Everything works great with those classes that participate [in the activities] but not at all on the level of the whole community in our school.* – Primary school teacher, F

6. Conclusions and implications of the findings

Pedagogical innovations that enhance the meaningfulness of learning and promote learners' engagement and confidence have been called for (e.g., Kupari et al., 2013). Our initial findings suggest that game-based approaches could have potential for changing traditional practices in schools in terms of motivation and effort, learning results (e.g. by supporting differentiation), assessment, and the role of students (responsibility, independence, active participation). Thus, game-based pedagogy could be one of those pedagogical innovations that play a key role in renewing school education. In the following, we will discuss the implications of the findings for adopting game-based approaches in schools.

Clear goals and a matching approach: Due to its broadness, the concept of game-based pedagogy might initially seem overwhelming to someone who is new to the topic. For teachers, one way of approaching the idea of game-based pedagogy is to think about some key scenarios in the classroom where games might bring added value. For example, if some pupils are struggling with learning basic skills (or if some fast learners are getting frustrated not having enough to do), a good *subject-specific educational* game could both get the former group to practice more and give the latter group some extra challenge. There is evidence to support the usefulness of educational games especially in terms of literacy and mathematics (see e.g., Kebritchi et al., 2010; Richardson & Lyytinen, 2014; Shin et al., 2012). In another scenario, if some students are showing lack of effort and motivation, not using their full potential in a traditional

classroom setting, they might get excited by a task that is set in the world of their favourite video game, helping the characters solve a mystery they have encountered. If the teacher wants to help his or her pupils learn self-reflection and teamwork, a *joint project involving game building or other creative, gamified activities* could help them combine their individual skills and strengths with those of others in a meaningful way.

Thinking outside the educational games box: Many people (teachers and pupils alike) still equate game-based pedagogy with educational games. This was reflected in our data as well: educational games were the most common approach in this group of teachers. There are more studies and practical examples available of the use of educational games than of any other type of game-based pedagogy, and because they have specific didactic goals (see De Freitas, 2006; Van Eck, 2006), they are easy to take into use even with little or no prior game-related experience. However, focusing only on educational games limits the potential, application contexts, and perceived value of game-based pedagogy. As the findings suggest, in order to use the full potential of game-based pedagogy, it is worth looking beyond "the educational games box" and try new ways of bringing games into the learning process: applying entertainment games for educational purposes, gamifying classroom activities in different ways, and having students make their own games. The adoption of game-based activities does not have to be a huge leap into the unknown; various game-like elements already exist in school education (tasks, rewards, points, stories, etc.) and these can be made even more appealing and engaging for the pupils (see e.g., Kapp, 2012). Game-based pedagogy also offers an excellent platform for applying blended learning (cf., e.g., Garrison & Kanuka, 2004; Käse, 2010; Vesisenaho et al., 2010), connecting the possibilities of technological environments and face-to-face situations both simultaneously and non-simultaneously. This will bring a new "layer" to learning situations and allow creating flexible ways to support learning, varying from simple drill-and-practice activities to collaborative, authentic learning practices.

The potential for assessment: Assessment might not the first thing teachers think about when considering the use of games. In fact, as seen above, the versatile potential of game-based pedagogy for assessment has sometimes taken teachers by surprise: they have noticed how game-based activities have allowed them to observe and evaluate the whole learning process in a different way than traditional activities have, and how these activities have given some students an opportunity

to demonstrate their hidden skills. This suggests that game-based activities can have plenty of potential in the learning and assessment of cross-curricular 21st-century skills (Binkley et al., 2012; Partnership for 21st Century Learning, 2015) or key competences (European Parliament and the Council of the European Union, 2006) that are becoming increasingly important on all educational levels. However, games can be used as tools for assessment in more traditional ways as well. For example, tests can be implemented with a game-based online quiz tool instead of pencil and paper, or the data collected by educational games can be used as one element in evaluation (see e.g., Shute, 2011).

Giving responsibility to pupils: Helping pupils learn to take responsibility has emerged as one of the key purposes for applying game-based pedagogy and especially for implementing broader game-based projects. There is a connection to many of the elements included in the frameworks for 21st-century skills and key competences: sense of initiative, self-direction, collaboration, decision-making, problem solving, creativity, productivity, and accountability (Binkley et al., 2012; European Parliament and…, 2006; Partnership for 21st Century Learning, 2015). Moreover, as we have pointed out above, game-based projects can give pupils a chance to identify their own strengths as learners, to use them to complement those of others, and to learn from their peers during the process. In other words, they can address the important competence of "learning to learn" (Binkley et al., 2012; European Parliament and…, 2006). From the teacher perspective, this requires a certain mindset when it comes to the role of the teacher: trusting the pupils with more responsibility while observing the activities very closely in order to know when a group or an individual pupil needs support and guidance. The same principles apply to all group-based work but the particular characteristic of game-based activities is their potential for uncovering some unexpected skills and roles among the pupils, which can be rewarding both for the pupil and the teacher.

Collaborative and supportive school culture: Above, we presented Dondi and Moretti's (2007) characterisation of the three different types of teachers. Presently, the most active group of teachers are already very experienced, innovative, efficient, and "fluent" users of game-based approaches, knowing how to best adapt and apply them in different contexts – and also when not to do it. In accordance with Shear et al. (2011), we believe that a supportive and collaborative school culture – involving teachers, students, and school leaders

alike – is in a key role in spreading the approach beyond the earliest adopters. In the study of Hamari and Nousiainen (2015), teachers' perceived educational ICT self-efficacy was a predictor for the actual use of game-based learning but not for its perceived value: in other words, although teachers who are not confident in their technological skills are often hesitant to start using games, they might still be open to their potential. For these teachers especially, encouragement from the social environment is important, and they might significantly benefit from concrete examples of successful practices and from one-on-one peer collaboration. Opportunities for such collaboration, for its part, are greatly facilitated by school leaders' support both on attitudinal (displaying interest and encouragement) and practical level (e.g., enabling new contacts with teachers from other schools) (cf. Shear et al, 2011).

7. Limitations and future research

As we have pointed out, these results are based on the initial analysis of one part of our data, and we will continue examining the whole data for a more fine-grained analysis of the ways of implementing game-based pedagogy. It should also be noted that the findings of this paper are not directly generalizable to all teachers: the focus is on the views of teachers who are more active than average in using game-based pedagogy (for a more general view on the adoption of game-based learning among Finnish teachers, see Hamari & Nousiainen, 2015). Moreover, in this paper we have only focused on the teachers' point of view. In the future, we will also present findings based on the analysis of the pupils' survey, focusing especially on motivational factors.

This paper is based on data collected during the first part (2013-2014) of the *Game-based Pedagogy* and *Portfolio-based Learning project.* Whereas the goal of the first two years was to encourage individual teachers to try using game-based pedagogy in different ways, the latter half of the project aims to go beyond single experiments, making game-based pedagogy an established approach in the schools participating in the project. Therefore, our future data collection will focus especially on the factors that contribute to making these practices sustainable in the longer term. Furthermore, the initial findings have highlighted the need to examine some types of game-based pedagogy more closely: for example, there is already plenty of research on the effects of educational games, while gamification on a broader scale (i.e., efforts to gamify most classroom activity) is still a rather new area to be studied. To address this gap, we will also conduct case studies focusing on a specific type

of game-based pedagogy, aiming at triangulation of different perspectives including teacher and student experiences, documentation, and classroom observation.

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