Teachers’ experiences of using game-based learning methods in project management higher education

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ABSTRACT

The benefits and challenges of using game-based learning (GBL) methods in project management higher education have not been widely investigated. This study employs qualitative methods and builds on in-depth interview data from 22 experienced university teachers with a project management teaching background. It shows that teachers perceive beneficial consequences for students from gaming, such as increased interest and knowledge acquisition with a memorable learning experience. Teachers’ inspirations and motivations are boosted by a novel method to motivate and engage students. The perceived challenges of GBL for students manifest as increased cognitive load and stress. This paper contributes to a deeper understanding of the impact of GBL methods while identifying challenges and disadvantages, which are not as widely discussed as benefits. This research identifies experiences from project management teachers’ perspectives, covering both learners’ and instructors’ viewpoints. The findings may help teachers to decide whether GBL could be used in their courses.

1. Introduction

The degree of “projectification” in Western economies in all economic sectors indicates that approximately one-third of all economic activities are project-based (Schoper et al., 2018). It is evident that a highly skilled workforce is needed to deal with project management challenges for the success of project-based organizations. Future project managers also need to be ready to adapt to, face and take control of project leadership responsibilities. Therefore, higher education institutions need to provide educational programs that train and equip new professionals with relevant discipline-based and generic skills.

Modern project management requires skills for dealing with complexity and uncertainty together with constantly changing organizations and technologies. Ramazani and Jerges (2015) point out three vital competence areas for project managers in addition to developing just technical skills: critical thinking, interpersonal skills, and leadership and engagement with real-life projects. Human aspects of project work require particular attention from education design to enable fostering sensemaking abilities or project managers (van der Hoorn and Killen, 2021). Researchers have proposed that education should prepare project managers with a more practical approach to project complexity and skills development instead of theory (Geist et al., 2007; Winter et al., 2006). Using game concepts like GBL and simulations as teaching methods in project management education provides students with an opportunity to apply and practice their knowledge in simulative setups.

There are several papers and research results on using serious games, educational games and game-based learning in various fields as learning solutions or methods, but teaching project management skills and phenomena with games has not been widely studied. The potential benefits of GBL are well understood, but less research exists on examining the challenges, disadvantages and barriers of applying it. This paper is written to analyze and understand the perceived benefits and drawbacks of using GBL methods in teaching and learning project management. Incorporating educational games in course designs is not an easy task. This article introduces typical challenges that teachers have faced.

Given the fact that there is room to elaborate on and contribute to research on utilizing GBL methods in the project management education context, we formulated the following research questions:

• What are the benefits and challenges for students of applying GBL methods in project management education?
• What are the benefits and challenges for teachers of applying GBL methods in project management education?

The research data were collected during semi-structured interviews with 22 experienced project management higher education teachers in...
Europe, Asia, North America and Australia. This article illuminates perceptions, opinions and experiences of GBL methods among both students and teachers.

2. Game-based learning experiences

Gamification as an educational method means incorporating game elements, such as points, badges, levels, roles and leaderboards, into teaching to engage students with content, motivate action and influence behavior to promote learning (Kapp et al., 2014; Landers, 2014; Plass et al., 2015). GBL differs from gamification because it includes an actual game that creates the learning experience and teaches knowledge and skills (Shaffer et al., 2005; Wiggins, 2016). Throughout this paper, the term “game” is used to refer to either an analogue game or a digital game that can be played on a computer or mobile device platform in educational situations. Games designed for learning purposes are called serious games, educational games or simulation games in the literature, but we do not make a distinction between them in this study.

The following sections discuss findings of GBL experiences from extant research. Since there is a limited number of studies with a project management focus, the benefits and challenges of GBL are discussed on a generic level.

2.1. Benefits and challenges for students

Cognitive learning theories suggest that play-like activities foster deep learning because learners want to spend effort and time with assignments that they feel are interesting and motivating (Piaget and Piaget, 2007). Student engagement is commonly believed to affect learning and motivation. Engagement is defined as the “heightened, simultaneous experience of concentration, interest, and enjoyment in the task at hand” (Sernoff, 2013). Games are claimed to facilitate learning engagement on the cognitive, affective and sociocultural levels, unlike other media providing a playful learning experience (Plass et al., 2015).

In existing systematic literature review papers, the benefits of gaming in the education context are relatively aligned, and similar findings are reported. Collaborative play, competition and role-play have been identified in several studies as gameplay elements that engage students cognitively and emotionally. The most significant benefits in the higher education context are improved student attitudes, engage students cognitively and emotionally. The most significant findings are reported. Collaborative play, competition and role-play gaming in the education context are relatively aligned, and similar learning engagement on the cognitive, affective and sociocultural levels, emotional behavior has been repeatedly observed (Barbosa and de Avila Rodrigues, 2020; Chang et al., 2020; Hamzeh et al., 2017; Jääskä et al., 2021; Röpelt et al., 2019). Mobile game-based learning solutions have the same effect (Troussas et al., 2020). Promising areas for applying educational games include science and mathematics (Kehrtehi et al., 2019; Mayer, 2019).

There are also known interrelated disadvantages of game-based learning for both learners and instructors. Challenges for teachers usually cause negative consequences for students. For students, game-based learning may be time-consuming, and game session durations can be difficult to predict (Boghian et al., 2019). In addition, competition, visibility and comparison of game results can be uncomfortable for some students. Students may regard gamified classes as demanding and may prefer more traditional learning methods (Dominguez et al., 2013; Sceanovic et al., 2015). For learners, incomplete technical implementation of GBL practices or disconnection from learning objectives might cause feelings of frustration. However, in addition to generating positive affective states like delight and excitement, reasonable amounts of confusion and frustration in GBL sessions may promote learning. Positive stress may increase motivation and willingness to succeed (Shute et al., 2015).

2.2. Benefits and challenges for teachers

The benefits for students mentioned in section 2.1 can also be considered directly as benefits for teachers. Engaging students with an interest in learning with a method that teaches the necessary skills is the foundation for successful education. The possibility of connecting the game context to learning topics in a safe environment to practice skills and visualize processes may contribute to learning (Huizenga et al., 2017). Furthermore, games’ ability to simulate real-life settings and act as a “sandbox” for practicing needed skills may foster learning. A freedom to fail without fear of severe consequences can be provided in a GBL environment (Sousa and Rocha, 2019).

From the teacher’s perspective, the main drivers, together with typical barriers for applying game concepts into the curricula, have been studied by de Freitas (2018) and Sanchez-Mena and Marti-Parreno (2017). They have identified drivers such as teachers’ assumptions of positive effects on students’ interest and motivation with the entertaining nature of gamification and its contribution to interactive learning by trial and error. Identified challenges or even barriers are the lack of resources to prepare GBL classes, students’ potential resistance towards the method and a lack of knowledge regarding the suitability of the method to teach the subject.

Successful design and implementation of GBL practices requires that they are well integrated into the subject matter taught. Teachers need GBL-specific skills, such as technological competence and gaming literacy, in addition to subject matter expertise and pedagogical skills. Teachers may consider deploying and using games labor-intensive and therefore burdening on top of other tasks (Marklund and Taylor, 2016). In addition to pedagogical suitability and learning game mechanics, the technical reliability of games has been considered a challenge (Clarke, 2009; Marklund and Taylor, 2016). Suitable software and hardware (technological infrastructure) needs to be invested in, maintained and
Molin (2017) lists barriers to integrating and adopting GBL, such as teachers’ lack of time to prepare gameplay sessions, missing or insufficient technical competence and difficulties in choosing and integrating suitable games for teaching. Facilitating student dialogue when applying GBL practices, insecurity about how to integrate GBL into the curricula, classes on tight schedules and the novelty of teaching project management may prevent teachers from using the method. Fear of failure in front of students may undermine the teacher’s role as a knowledge authority in the classroom (Chee et al., 2014; Jong, 2016). In addition, the measurement of perceived learning and assessment can be difficult in a GBL setup (Boghian et al., 2019; Jong, 2016). Insufficient time was mentioned most often as a factor hindering the utilization of GBL practices in teaching. Despite the barriers and challenges with GBL as a method, it can also be seen as an opportunity to engage and empower teachers, giving them a feeling of ownership of teaching and providing new learning experiences for them as well (Molin, 2017). Sufficient training and resources for teachers to apply GBL successfully, both pedagogically and practically, are needed (Sánchez-Mena et al., 2019).

### 3. Research method

#### 3.1. Research strategy

We used an inductive qualitative research method in this study. We conducted several semi-structured qualitative interviews to gain an in-depth understanding of teachers’ perceptions of applying game concepts in the project management education context. We were looking for rich answers for our semi-structured interview questions and the possibility to ask new questions depending on interviewees’ replies and willingness to reveal their own thoughts (Bryman and Bell, 2011).

The research process of this study follows a qualitative data analysis method adopted from Miles et al. (2014). Fig. 1 illustrates the data collection and analysis process phases with their interconnections and iterative nature. In the data collection phase, we recorded and transcribed the interviews to create a basis for systematic data analysis. We performed data condensation and coding in order to organize, sort and focus on the most relevant data and to sharpen the research focus. As a result of the data condensation process, we created graphs of first-order categories and second-order themes to draw conclusions (Miles et al., 2014).

#### 3.2. Data collection

We interviewed 22 experienced project management teachers individually in semi-structured interview sessions online. Teachers were from universities in Australia, Austria, Canada, China, Denmark, Finland, Iceland, Norway, Sweden, the UK and the USA (Appendix A). Convenience sampling was used since the teachers were selected from the existing colleague network of the authors. All selected teachers had extensive experience with teaching project management. The interview questions were not sent to teachers in advance, so while they knew the interview subject, they were neither asked nor particularly prepared for answering the questions. In advance, we knew that at least five of the teachers had earlier experience with using computer games in a project management teaching. We were not aware of the educational game-related experience of the other teachers, and it did not, therefore, directly affect the selection process. Five more teachers were invited to the discussion as the interviews proceeded and the professors recommended contacting their colleagues with experience or interest in GBL methods for further insights.

Interview discussions focused on the benefits and challenges teachers anticipated or had faced while applying GBL methods. The interviews were conducted by the authors between December 2020 and March 2021. The interviews took place in online meetings using MS Teams or Zoom, and they lasted between 25 and 57 min. The interview sessions were recorded, transcribed and crosschecked with meeting notes. The interviews were conducted in English with all the teachers who were not supported to apply GBL practices successfully (Molin, 2017; Vu and Feinstein, 2017).

### Table 1

<table>
<thead>
<tr>
<th>Benefits of applying GBL</th>
<th>For student</th>
<th>For teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interesting and motivating assignments foster deep learning (Piaget and Piaget, 2007)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Increased student engagement facilitates learning (de Freitas, 2018; Fluss et al., 2015; Subhan and Cadney, 2016)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Understanding and applying theoretical concepts in a safe environment (Huizenga et al., 2017; Sousa and Rocha, 2019; Vlachopoulos and Makri, 2017)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Positive impact on activating and motivating students (Barbosa and de Avila Rodrigues, 2020; Hamzeh et al., 2017; Huizenga et al., 2017; Law, 2019; Vu and Feinstein, 2017; Wang and Lieberoth, 2016)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Challenges created by games promote learning (Hamari et al., 2016)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Leadership skills development with GBL (Barr, 2017; Sousa and Rocha, 2019)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Learning in a positively competitive and rewarding environment with reasonable amount of stress (Anastasiadis et al., 2018; Shute et al., 2015)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Development of generic skills, such as decision making, critical thinking, problem-solving, collaboration and communication (Anastasiadis et al., 2018; Barr, 2017; Qian and Clark, 2016; Rummes and Emsley, 2019; Vlachopoulos and Makri, 2017)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Improved learning results in science and engineering education (Barbosa and de Avila Rodrigues, 2020; Chang et al., 2020; Hamzeh et al., 2017; Jääskä et al., 2023; Kebrich et al., 2010; Mayer, 2019; Roepel et al., 2019; Troussas et al., 2020)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>New, empowering and engaging learning experience for teachers (Molin, 2017)</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Challenges of applying GBL

<table>
<thead>
<tr>
<th>Challenges of applying GBL</th>
<th>For student</th>
<th>For teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpredictable duration of applying and participating in GBL (Boghian et al., 2019)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Incomplete technical implementation causing feelings of frustration (Shute et al., 2015)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Technical reliability of computer games (Clarke, 2009; Manklund and Taylor, 2014)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Connection of assessment and grading to GBL results (Boghian et al., 2019; Jong, 2016)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>GBL content and implementation disconnected from learning objectives (Shute et al., 2015)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Students feel uncomfortable with competition and results comparison (Domínguez et al., 2013; Scepanovic et al., 2015)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Finding, investing, supporting and maintaining technical infrastructure to apply GBL (Molin, 2017; Vu and Feinstein, 2017)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Lack of time and resources to prepare for GBL (de Freitas, 2018; Molin, 2017; Sánchez-Mena et al., 2019)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Lack of pedagogical and/or technical skills (Manklund and Taylor, 2016; Sánchez-Mena et al., 2019)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Fear of failure as knowledge authority (Chee et al., 2014; Jong, 2016)</td>
<td>x</td>
<td>x</td>
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speaking the native language of the authors. These six interviews were translated into English for this article by the authors.

3.3. Data condensation

The first round of organizing the empirical data on teachers’ experiences was conducted according to the interview theme structure. We asked specific questions regarding the perceived benefits and challenges of GBL methods in project management education from students’, teachers’ and institutes’ viewpoints. Interview data were coded using NVivo. In this process, benefits and challenges for students and teachers were all organized separately into first-order categories and second-order themes (researcher-induced second-order themes) to identify patterns and create an easy-to-read outline for this article.

3.4. Data display

As a result of iterations in data condensation and analysis, we defined first-order categories as observations and second-order themes as benefits or challenges. The research data displayed in a format of graphs together with explanatory texts are documented in detail in section 4.

3.5. Conclusions: drawing and verification

The last element of the qualitative analysis focused on considering what the analyzed data mean. Conclusions were drawn, refined and elaborated to answer the research questions of this study. Verification was performed by revisiting the data multiple times to ensure the validity and credibility of the conclusions. Conclusions drawn from data analysis and existing research knowledge are reported in sections 5 and 6.

4. Results

4.1. Benefits for students

Teachers were quite unanimous about the positive effects of activating students with games and game-like activities. Teachers’ observations are identified in Fig. 2 as first-order categories. During the second-round coding, the authors searched for similarities between these observations and synthesized them as second-order themes. Table 2 contains quotes of the mentioned students’ benefits.

4.1.1. Students’ interest in learning content increases

Most of the teachers mentioned that most students get inspired when teaching methods are enriched by adding gamified elements like scores and competition into teaching. Students like to have fun and get excited, which happens when educational or simulative games are incorporated into classes. According to teachers, adding GBL adds variation to more conventional teaching methods. Instead of reading books or watching videos, a valid educational game motivates students, resulting in an enthusiastic manner of learning. Teachers also reported that the novelty of GBL methods is recognized as inspiring and engaging by the majority of students. Immersion and participation in games boosts the active learning process. Competition, visible scoreboards and ranking might be highly favorable and stimulating for students, but naturally, there are also learners not so keen on competing or comparing results publicly. Therefore, teachers highlighted that thorough consideration and
Table 2
Illustrative interview quotes substantiating the identified benefits for students.

<table>
<thead>
<tr>
<th>Quotes representing benefits for students</th>
<th>Second order theme</th>
<th>Informant</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘If it’s well done then it’s fun, and if you learn something in a fun environment it might stick better in your brain.’...</td>
<td>Students’ interest in learning content increases</td>
<td>14</td>
</tr>
<tr>
<td>‘I think the most important is to have an engaged class, because nothing is better than an engaged class, and nothing is more boring than to go in a class and people are not engaged.’</td>
<td>Students’ interest in learning content increases</td>
<td>15</td>
</tr>
<tr>
<td>‘Experiencing in a safe place, giving them a common experience from which to learn.’...</td>
<td>Students learn the subject by doing trial and error in risk-free environment</td>
<td>8</td>
</tr>
<tr>
<td>‘I found that quite interesting and that was part of the feedback from students that they learned from each other, from each other’s organizations as they discussed the problem.’...</td>
<td>Students learn together and learn generic skills</td>
<td>7</td>
</tr>
<tr>
<td>‘... the students tell us about is that they remember it six months later, and they can still feel it, on their body, that they’ve made the wrong decisions then...’</td>
<td>Students get a memorable learning experience</td>
<td>18</td>
</tr>
</tbody>
</table>

sensitivity towards students’ preferences is required when adding game elements or applying GBL methods while teaching.

Many interviewees brought up that the student generation born after 1999 is familiar with digital equipment and software systems. They usually have played entertaining games already and are therefore an amenable audience for more serious games. The young generation wants to develop their own stories and play. One teacher had observed that when comparing teaching with GBL methods between undergraduates and postgraduates with work experience, the benefits were stronger for postgraduates. This possibly happens because the logical connection between real-life phenomena and the simulative environment embedded in educational games may improve adult learners’ ability to reflect on learning and share experiences with peers.

In summary, the teachers believed that GBL methods increase students’ motivation and engagement. According to our data, this leads to a better interaction with learning content, potentially resulting in better learning outcomes. GBL methods are believed to positively affect students’ motivation to participate in classes and their retention in course programs.

4.1.2. Students learn the subject by doing, trial and error in a risk-free environment

According to teachers, students can apply and test in GBL environments what they have learned during lectures or from study materials. They can take the theory into real-life situations simulated with a game. Abstract subjects can be modeled in a more understandable and concrete way with educational games. Some interviewees emphasized that game experiences should be as realistic as possible, simulating real-life phenomena, which gives a good picture of what is expected from students in working life as project managers. The game environment may teach students to understand how to manage connections between people and activities, integration and uncertainty. These are all relevant skills that project managers need to master.

Many teachers felt that the use of educational games is especially good in the project management teaching context, because it provides learners with a safe setting where learners can practice their management skills without fear of severe failure or consequences. This is not the case in business life when managing projects or project business companies. Therefore, educational game settings can be thought of as a test environment or “laboratory” to learn management skills in practice.

One informant gave an example of taking learning to a deeper and more practical level with a game. For instance, students may need to develop and write a risk management plan as part of the game exercise, which is then used during the game for risk identification and mitigation planning purposes. Instead of being taught the theoretical viewpoint only, students can apply and gain knowledge by designing and utilizing the actual risk management plan—similarly to real projects.

The teachers interviewed reported that especially students who prefer learning from doing and learning by experimenting seem to benefit from simulations or games. Experimental learning opportunities with a game make them active learners. The learning process becomes bidirectional when students can participate in a gamified setup. Teachers assumed that an interactive, simulated environment, where consequences of decisions can be immediately seen, facilitates learning.

4.1.3. Students learn together and learn generic skills

Learning together was mentioned as a benefit by many teachers during the interviews. Students learn from each other and together during classes with GBL and debriefing sessions taking place soon afterwards. In GBL settings, students learn together when they share their thoughts, discuss with each other and come up with decisions jointly.

One interviewee suggested that a game gives students a common group experience from which to learn effectively. Based on student feedback from GBL situations, learners were able to learn from each other, from each other’s organizations, as they had discussions to solve problems during game groupwork. Even if the students had common experiences when participating in GBL classes, they did not all experience or interpret them the same way. This creates an opportunity to practice dealing with miscommunication and misunderstanding, which also usually occur in business projects with multiple activities and a fast pace.

Many teachers mentioned that GBL may promote learning of generic skills like problem solving, decision making and collaboration. Games are often applied in teamwork setup, which gives students an opportunity or forces them to learn from peers. Students’ communication, cooperation, problem solving and decision making skills are challenged with game activities having schedule or quality pressure. Conflicts during teamwork may arise due to different personalities and they need to be solved constructively as in real life teams.

Some interviewees discussed the effect of GBL methods on project management competence development. Learning generic management skills often happens naturally during GBL, since students are expected to make decisions and solve problems the nature of which is often unexpected, as in real-life projects. Students need to react, generate responses and learn how to structure complex activities into manageable work packages. Therefore, gameplay might help to increase tolerance of insecurity and unforeseen problems. Teachers reported that often, when students are thrown into challenging situations, they begin to understand the importance of coordination, organizing and planning, which are the skills needed not only in project management but in other management disciplines as well.

Debriefing after GBL classes was attributed great significance by most of the teachers. Teachers reported that reflection on learning is essential because the game is a learning method or a model of reality, and the connection to learning objectives needs to be created during and after the game session. One informant said that students may face the “Ahaa-moment” when they are able to identify the contextual relevance and relation of the game experience to their working life occurrences. Debriefing sessions after the game are also a forum to incorporate teachers’ professional viewpoints into discussion. Reflection and debriefing helps avoid the implication that the game was played only for fun and did not have any deeper meaning for learning.

4.1.4. Students get a memorable learning experience

Most of the teachers reported that students often have their emotions involved during gameplay. As a beneficial consequence, people typically remember the occasions well and for a long time—even several years
4.2. Challenges for students

The challenges of using GBL methods concern negative emotions caused by learning arrangements or environments. The observations and challenges are introduced in Fig. 3. Table 3 consists of selected illustrative quotes from the interview recordings, which support and maintain the validity of the data coding.

4.2.1. Students’ cognitive load and stress are increased

Students’ learning styles and preferences vary. According to teachers, some learners prefer more conventional teaching methods, such as lectures, written assignments and exams. They want to sit back and relax while the teacher performs the teaching work as one-way communication. Teachers mentioned that, according to their observations, only a minority of the students opposed teaching methods that require active participation or teamwork. One teacher mentioned a case example where part of the students perceived the use of an educational game in a class as a “shock” when they found out that they needed to play in order to achieve grading and credits from the course module. The students had expected to have a more traditional learning experience instead.

One informant argued that even if the memory of the subject experienced and reflected upon during the game is weak, it is better than if it was taught using whiteboard or slides only, because it sticks in one’s mind. According to teachers, learning happens together with positive game experiences when pleasant memories can be connected to the learning objectives. While playing, students are connected with their feelings, such as excitement and eagerness to win. Emotions support the learning process because they promote remembering a unique learning experience.

Some of the interviewees expressed their concern regarding the competition and comparison often connected with games. Playing together or playing per se can be stressful for learners who are reluctant to engage in group work or competition. Scoring and competition under pressure among students with different technical or behavioral skills may cause additional stress and cognitive load for students. Failure or underachievement is uncomfortable for any of us. Group dynamics might be compromised if all students will not or cannot participate in teamwork equally. Using GBL methods can therefore be a divisive pedagogical approach among students, where they are unintentionally categorized as “strong” and “weak” students depending on their level of activity, competitiveness or skills required to play a game.

Another concern that teachers mentioned was the difficulty of educational games. The game mechanics or the instructions might be complex and demanding for students. According to teachers, educational games or simulations should not be too hard or unintuitive to adapt easily. The narrative and introduction of the game should be easy to understand, competitiveness or skills required to play a game.

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students in addition to subject area learning. All this consumes energy and requires time and effort from students.

4.2.2. Students get frustrated with the teaching method

Teachers mentioned that the use of GBL causes feelings of frustration for students if they do not get sufficient or clear instructions on how to participate or how to play the game. This is often caused if the instructor is not familiar with the game logic or mechanics or if the game does not fit into the teaching process properly. This may lead to negative student experiences and may compromise their motivation toward the teaching method. Teachers emphasized that instructors need to be well prepared for GBL sessions to convince students.

The majority of the interviewees felt that technology problems with educational computer games may ruin classes and create a frustrating experience for both learners and instructors. Errors or crashes in the game, a lack of equipment such as computers or mobile devices together with incompatibility issues with various device configurations may even prevent teaching. Robust and error-free educational games together with well-planned sessions were seen as preconditions for a successful class.

Student evaluation and grading based on game scores and performance was discussed in many of the interviews. One of the concerns the teachers named was how to make sure that the game gives correct and fair results. There must not be any errors in the game or other factors that might distract from the student evaluation. Incorrect game configurations or the possibility of misinterpreting the results could lead to incorrect or unfair grading of students. Connecting the game results with students’ grading should therefore be thoroughly considered.

Since GBL methods can be seen as a divisive pedagogical element, they should therefore be implemented carefully while encompassing both stronger and weaker students. Teachers suggested that, especially in debriefing sessions after GBL sessions, sensitivity and kindness should be highly valued in feedback for all students. Debriefing sessions should concentrate more on describing what happened and what could be learned instead of comparing students or teams based on scores.

4.2.3. Students experience games as irrelevant or disconnected from learning objectives

Despite the fact that educational games are often immersive and entertaining, playing a serious game should not simply be fun. Teachers said that there might be a danger that the playing happens just by pressing the buttons of the game without focus or concentration. Rushing into playing prior to learning the game mechanics or internalizing the instructions may lead to a negative learning experience and poor achievements. Informants suggested that teachers should motivate students to take the games seriously and convince them with believable contextualization, good narrative and a thorough introduction of the case.

An educational game or simulation is always a simplified model of reality consisting of a limited number of different scenarios. There is a possibility that students will find the game setup too artificial or unrealistic and therefore lose their interest. Therefore, reflection and debriefing are crucial parts of the learning process to connect the game experiences into learning objectives in a meaningful way.

When educational games are used to support learning, students are required to learn the game rules and mechanics. This is actually irrelevant to the learning objectives of the course. Interviewees remarked that learning how to play a game takes learners’ time and needs to be done in addition to learning the course subjects. That is why time planning in course design needs to be productive and reasonable to avoid excessively overburdening students.

4.3. Benefits for teachers

The benefits for students of GBL methods can be considered indirect benefits for teachers. Therefore, students’ benefits in Fig. 1 are presented as first-order categories in addition to other aspects the teachers brought up during the interviews. Findings categorized according to Fig. 4 and Table 4 provide our reasoning in the form of interview quotes for organizing the topics.

4.3.1. Teachers get inspired and motivated

According to teachers, they can both enable and undergo a memorable learning experience when GBL is used as an activating teaching method. Both physical and computer games are regarded as inspiring and engaging during classes. Teachers said that they remember well the learning sessions both in the student and teacher roles because emotions and excitement were involved. An unforgettable learning experience combined with a successful learning achievement is therefore beneficial for both learners and instructors.

Teachers indicated that when students ask questions eagerly and get active and engaged, this increases teachers’ own motivations and well-being at work. In addition, GBL may create a learning opportunity for teachers as well. Teachers conveyed that they can learn from students while sharing and reflecting on their insights into learning and game experiences during or after game sessions. Happy and satisfied students will increase the pleasure of teachers. As one interviewee said, the best feedback received from students is, “I really enjoyed the game.”

4.3.2. Teachers can motivate and engage students with variable and versatile teaching methods

As discussed earlier in Section 4.1, it is easy to draw students’ interest with a novel teaching method. Teachers can enrich and renew teaching by incorporating GBL methods into classes. The use of educational games does not yet happen too often in teaching, so the inspiring and activating method is usually well received. Teachers said that the method was powerful or appealing enough to bring the students into class when participation was not required.

From the teachers’ perspective, the use of GBL methods brings variability and diversity into teaching. Curiosity and experimental characteristics of using games in teaching are considered fascinating for both students and teachers. Educational games can be used to teach complicated subjects with repetition, trial and error, which may help students to jump over a threshold of learning complex concepts.

The interviewed teachers mentioned that they also use non-computer games to simulate project management phenomena or sub-processes. Exercises such as building a bridge from Legos or throwing a die to mimic uncertainty are also found appealing and activating additions to other teaching methods. However, teachers need to consider the use of GBL methods and ensure their feasibility. The timing of using games needs to be planned well. Teachers should be able to convince the students that the GBL method is expedient. One informant related an example of the gaming exercise happening too early in the course, which seemed awkward and ended up creating negative feedback. Mutual trust needs to be obtained so that students trust the teacher and the method and the teacher feels confident and competent enough to apply GBL methods.

4.3.3. Teachers have a method to teach and grade discipline-based skills

Most teachers mentioned the potential of GBL methods to provide students with a learning environment where they can learn and practice project management skills by doing. Students can test “in practice” what they have learned from theory lessons without worrying too much about the consequences of making wrong decisions. Teachers regarded GBL and its ability to simulate project management phenomena as an opportunity to teach various essential topics for future project managers.

Teaching project management skills with an educational game helps make abstract topics more concrete. When project circumstances are simulated in a game, it creates a common experience of a project for the students regardless of their vocational background. According to teachers, positive feedback is received especially from post-graduate students, who already have work experience. These learners are
assumed to benefit from GBL, because they can easily associate the simulation or narrative of the game with real-life situations and thereby even obtain process models, instructions or tools to be applied in their own work.

Teachers highlighted the role of debriefing sessions as a valuable part of GBL solutions. Sharing experiences and thoughts about what was done well or not so well or what could have been done differently in debriefing sessions synthesizes the game incidents into meaningful learning. Debriefing also increases the teacher’s understanding of the subject and improves her/his skills to teach better in the future. As one interviewee put it, the goal of the course might be that students are confident to say, for example, that “I am now able to structure and manage small projects.”

GBL methods can be used both in short learning sessions and throughout the whole course module. GBL can structure the whole course module so that the game framework offers the topics, order and pace, integrating the learning goals together. One teacher suggested that project management teachers without practical project management experience might even utilize game simulations to fill their potential competence gaps.

Educational game results or teamwork observations can be used for student feedback, evaluation and grading. Some digital educational games store records of player activities during the game or give score points after the game, which could be used for grading the student. Some interviewees said that they use subjective observations during teamwork in gamified situations as grounds for student performance evaluation. As teachers expressed, fairness and fidelity must be ensured while grading based on educational game scores or statistics.

4.3.4. Teachers have a method to influence generic skills development

Teachers mentioned GBL as a method that improves generic skills relevant for project managers. Playing an educational game illustrates the complexity of real-life situations. To proceed in game setup, you need to choose between different options, make decisions and react to unexpected situations—just as in life.

One of the interviewees with a background in using GBL methods mentioned that gaming may break the barrier between student and teacher. When teachers actively participate and throw themselves into playful activities, teacher-student communication gets better and may also educate the teacher. Therefore, working and learning together in a game-like learning framework will influence the development of generic skills for both learners and instructors.

4.4. Challenges for teachers

Challenges of using GBL methods are presented in Fig. 5 and complemented with the interview quotations in Table 5. A lack of time to find and use games, controlling achieved learning and pedagogical or technical issues are the typical problems instructors may face.

4.4.1. Teachers need to do extra work to obtain, learn and teach the educational game

Finding a suitable educational game may not be easy. Teachers reported that they often hear about games by accident or from a colleague who has already used it. A Google search gives a list of educational games, but real experience with using the game or simulation is valued. In addition to other teaching and research duties, teachers will not have time to actively search for suitable games. Teachers said they believe
there is currently a lack of proper educational games in the market. The use of an educational game must be purposeful from the learning objectives point of view. The game should be seamlessly integrated into the curriculum, which requires careful designing of the course module. Incorporating the game session into class requires connecting the learning objectives to the game activities already in the planning phase. Sometimes the game needs to be modified for cultural or contextual reasons. Writing a new narrative for game or game configuration modification might be necessary. Teachers said that they may not have enough time or resources to fit games into their teaching. Teachers brought up the fact that it takes time to learn the game rules and mechanics well. Learning a game is a precondition for teaching it, and that time might be taken away from something more essential. Debriefing sessions, discussion and reflection on learning requires time; therefore, finding a balance in the course structure and schedule for gameplay and debriefing is essential.

4.4.2. Teachers have trouble controlling or measuring learning fairly
The results or scores from an educational game are sometimes used for grading students. One of the problems with this is that teachers cannot always monitor the events of a game session to see what really happens during the class and how the students operate in groupwork. Sometimes the game results cannot be taken out of the game, or they are unexpectedly lost. There is a possibility that the game result is expressed by a score that does not correlate with the learning objectives of the course at all. A bad decision or choice made at the beginning of the game session may ruin the whole game session, and the numeric result can be poor even if the course of events in the game was successful from the learning perspective. With computer games, technical problems or errors in software can distort the game results. One informant pointed out that some educational games also enable cheating on the results because with commonly used educational games, tips for success and achieving high scores are available on the internet. Publishing student leaderboards or scores from gameplay may virtually divide students into categories. One teacher brought up a concern that game results might label students as winners and losers. At its worst, the learners end up in groups of “good” and “not good.” This should not happen in any case. Bad feelings for students can be easily generated if the teacher is too harsh when giving feedback based on
events or observations during the game. Therefore, sensitivity and focusing on discussing what happened during the game instead of scores is more constructive. Teachers pointed out that student evaluation and grading must always be done fairly, regardless of students’ varying competences and behavioral preferences.

4.4.3. Teachers face pedagogical problems when using educational games

Applying GBL methods in a meaningful way requires thorough design and planning of the course. Teachers said that convincing students of the method and its benefits is crucial. Students need to see and understand the connection and relevance of the game to the learning outcomes. This oblige motivation and good facilitation skills from the teachers. Students should not feel that gamified teaching is irrelevant or disconnected from the learning objectives.

One teacher emphasized the salience of timing when using GBL during the course. Mutual trust between instructors and learners needs to be gained prior to the successful use of any new or experimental teaching method. Otherwise, there is a risk that the learning situation may appear awkward and generate negative feedback later on. Experience and discretion help teachers evaluate the feasibility of GBL methods in the educational context. Teachers said that the usefulness and student satisfaction with GBL should be known in advance, but their reactions and experiences cannot always be anticipated. Pedagogically careful implementation is also needed in order to take into account different learning types.

4.4.4. Teachers face technical problems when using educational games

Most of the teachers mentioned potential technical problems as a concern when using GBL methods. Learning the game mechanics and logic is required from the teacher for the successful use of the method. Teachers should have sufficient technical and ICT skills. Technical problems arising during game sessions in class lead to negative game experiences and frustration for both teachers and students.

Half-finished computer games with bugs and crashes are considered poor. Unexpected error situations can still happen even with robust and trustworthy educational game environments. This is a type of technical risk that cannot be totally mitigated or avoided. As interviewees expressed, using computerized educational games set higher competence requirements for teachers than traditional methods because of the technology involved. Technical challenges or issues during GBL class will make students nervous and, most certainly, also teachers. Technical problems, especially with computer games, due to a lack of technical skills, missing support, incomplete instructions, device incompatibility or just bad luck causing a game crash, may disturb the class.

5. Discussion

Much research exists regarding the positive effects of applying gamified concepts in education and in higher education. However, the focus of prior research has mainly been on the potential benefits of gamification and game-based learning, while significantly less has been written about the challenges and barriers of applying GBL methods. In addition to elaborating the impacts of GBL in the context of project management higher education, one of the contributions of this study is that a novel understanding of the potential negative consequences of applying GBL is developed. The benefits of game-based learning methods include the activation and motivation of students as well as challenging them to learn by practice, which our results also highlighted (Barbosa and de Avila Rodrigues, 2020; Hamzeh et al., 2016; Hamzeh et al., 2017; Huizenga et al., 2017; Vu and Feinstein, 2017). Leadership and managerial skills, such as motivation, facilitation, coaching, mindset-changing, decision-making, problem-solving and communication skills, are necessary for project managers, and our findings lend support to prior research arguing that they can be developed with GBL (Barr, 2017; Rumeser and Emsley, 2019; Sousa and Rocha, 2019). GBL’s effects on knowledge acquisition and the understanding of learned subjects have also shown positive signals (Barbosa and de Ávila Rodrigues, 2020; Hamzeh et al., 2017; Jaaska et al., 2021; Kebritchi et al., 2010; Troussas et al., 2020), but more evidence is needed.

Respondents to this research mentioned many similar benefits of GBL as an educational method that has been reported in existing research. Our empirical findings show that teachers have experienced increased motivation, enthusiasm and activation effects of gamified learning activities in their project management courses. Providing students with a memorable learning experience by touching their emotions either positively or negatively was considered a means that may foster learning. Teachers also highlighted that competition, challenges and failures in games together with debriefing and feedback might teach lessons that stick in the mind for a long time. Informants of this study brought up that GBL is particularly suitable for teaching project management phenomena and processes in a practical way because it allows students to freely try, repeat and fail, which prepares them to act feasibly in similar occurrences in working life.

According to our results, challenges and disadvantages for students appear as increased cognitive load and stress. Project management teachers experienced that some students feel rivalry, potential comparison of results between peers and teamwork stressful. Gaming is just not appealing to everyone, even without competition. Technical problems with the game, unclear instructions or complicated game rules can also frustrate project management students. The opposite extreme of disliking gaming is to focus on just playing and having fun and forgetting the purpose of GBL. Challenges of complexity, competition and feelings of frustration discovered in this study are in line with prior findings (Boghian et al., 2019; Scepanovic et al., 2015; Shute et al., 2015).

Benefits for teachers are connected with the benefits for students. Project management teachers highlighted the novelty and activating nature of GBL to engage students. The interviewed teachers said that it is a rewarding and inspiring experience to see motivated and enthusiastic project management students. GBL can enrich the toolkit of instructors to teach discipline-based skills, such as problem-solving, decision-making and collaboration skills. Learning experiences with a realistic touch in simulate environments are regarded as better than lectures or written assignments in project management higher education. These observations of teachers’ benefits from GBL lend support to prior research results of Barr (2017) and Sousa and Rocha (2019), who have written about GBL’s ability to simulate and practice real-life phenomena when developing leadership skills.

The relevant concern of teachers is how to integrate GBL into taught subject matter or curricula (Chee et al., 2014; de Freitas, 2018; Jong, 2016; Sánchez-Mena and Martí-Parreño, 2017). Deploying and using the method requires enough time and effort from teachers (Molin, 2017) and investments from the educational institute or organization into technological infrastructure and support structures to guarantee the successful use of GBL (Clarke, 2009; Marklund and Taylor, 2016). The respondents in the present study mentioned labor intensiveness as one of the biggest obstacles to using GBL. Teachers often need to do extra work to purchase, plan and learn how to use games in their courses. Worth consideration and thorough planning is also how to connect the use of GBL methods to project management grading seamlessly and fairly. Pedagogical problems identified in earlier studies also emerged in the discussions with project management teachers. Teachers need to ensure that using GBL is justified and connected with the project management learning objects, and they need to convince students of the relevance of the method. The fear and technical incompetence or serious problems during gameplay may hinder the use of digital GBL methods among project management educators.

Our findings suggest that more focus on the competence-building of university teachers with regard to the possibilities offered by GBL is needed. Currently, teachers are assumed to make decisions about using GBL methods autonomously without supporting structures, practices or instructions from the educational institute. Professional training in implementing digital GBL could enable and promote the use of the
method, especially when digitalized learning environments are increasingly put into use in the future. Finally, the results of this study can be used as a checklist or instruction when evaluating the benefits and challenges of designing project management courses, including GBL.

6. Conclusions and limitations

The role of game-based learning as an educational method is to support other methods rather than to replace them. According to our findings, GBL has the potential to facilitate class instruction and complement more conventional methods in project management education because it can provide students with a simulative environment in which management skills can be exercised risk-free. GBL can produce positive effects on student engagement, manifesting as increased interest, motivation and learning from peers. However, incorporating GBL into curricula requires resources and preparation from instructors to avoid technical and pedagogical risks that may arise later.

This study has limitations. The limitations of qualitative interviews include a limited number of respondents and a homogenous study sample. The interviews were semi-structured, but the researcher ensured that in addition to planned themes, spontaneous discussion could also take place. Reviewers asked additional questions on an as-needed basis, and the respondents were encouraged to freely share their insights on education gamification as a phenomenon reflecting not only the current situation but also the future.

The impact of GBL practices on students’ performance and achieving learning goals was not examined by the teachers like measurable constructs such as assessments, exam scores or grades, but this would be a fruitful avenue for further research. There are a limited number of studies on performance impact, and more rigorous studies to find research-based evidence are needed. The impact of the method on perceived learning would be an interesting and valuable topic for future research. Systematic analysis of the influence on academic performance would provide teachers and administrators with facts for decision-making while choosing their teaching methods.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Interviewees

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<tr>
<th>University</th>
<th>Country</th>
<th>Job position</th>
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</thead>
<tbody>
<tr>
<td>RMIT University</td>
<td>Australia</td>
<td>Senior lecturer</td>
</tr>
<tr>
<td>University of Technology Sydney (UTS)</td>
<td>Australia</td>
<td>Academic member</td>
</tr>
<tr>
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<td>Austria</td>
<td>Professor</td>
</tr>
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<td>Webster Vienna Private University</td>
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<td>Professor</td>
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<td>Professor</td>
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<td>Lecturer</td>
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<td>Iceland</td>
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<td>Ireland</td>
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<td>Senior lecturer</td>
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<td>University of Leeds</td>
<td>UK</td>
<td>Professor</td>
</tr>
<tr>
<td>Stevens Institute of Technology</td>
<td>USA</td>
<td>Associate professor</td>
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References


