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GAME-BASED LEARNING IN HIGHER EDUCATION USING ANALOGUE GAMES

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Abstract

Analogue games have been increasingly studied through the lens of media and cultural studies namely considering their technology, textuality, and audiences, to understand their ability to convey meanings, messages, and their ancient presence in popular culture. Nevertheless, their specific potential in the fields of learning and education has been relegated to the background, given the salience of digital games in the scientific landscape. This paper provides a Systematic Literature Review (SLR) and mapping of game-based learning (GBL) applied in Higher Education (HE). Specific areas that require further work to improve the effectiveness of GBL have been highlighted. To this aim and in the context of this research, interviews were conducted with HE tutors and game designers across Europe to determine if the issues raised in the literature review are replicated in the opinions of those teaching. The resulting analysis showed a strong similarity between written and spoken opinions regarding GBL. Although all interviewees felt there were clear benefits to exploiting GBL, there were several barriers to their use. Those that were most mentioned were the large amount of time needed to create GBL experiences, and the lack of support, or understanding of the benefits of GBL, both from students and the institutions at which they teach. The research the was carried out for this paper shows that there is a clear need for a simple, easy to use, framework for the creation of GBL experiences. Such a framework would reduce the time needed by educators to create such games and would aim to increase games' exploitation in educational contexts.

Keywords: Analogue Games; Learning; Game-Based Learning; Education; Serious Gaming.

Introduction

Games have been effective in helping people to interact with one another and learning more about the culture they inhabit (Piaget, 1962). The importance of games and their centrality to culture is pointed out by Huizinga (1944) who suggested using them as a medium to organise our lived experience and as an escape from their pragmatic focus (Ruckenstein, 1992). The "playful" nature of games results in escapism because it often hides the seriousness of their outcomes (Bateson, 2014; Henricks, 2006). For instance, games can be implemented in war where they are viewed as a deadly sort of game, with elaborate rules, strategies, and codes of sportsmanship. Furthermore, the widespread use of games has gained traction as a rapidly evolving teaching and learning tool in the educational sector as well. This rapid growth in the use of games as an educational tool has led to the creation of an immense number of diverse games, aiding teaching and learning in a multitude of disciplines from economics to art, and numerous encyclopaedic websites of previously developed games have been created. Despite this rapid growth, it is debatable whether this is due to increased effective learning from games, or simply the increased engagement and enjoyment observed in comparison to traditional pedagogical methods. To that end, the current paper explores the practices of analogue GBL across European Higher Education Institutions (HEIs) and the challenges and opportunities associated with Game-Based Learning (GBL) from the perspective of educators and game designers.

Gamification – including simple game mechanics, such as points for correct answers (Hidi & Renninger, 2006; Kim, Song, Lockee, & Burton, 2018; Rotgans & Schmidt, 2011) – is often used as a teaching aid to increase student engagement and enjoyment. However, simply adding a game mechanic into classic, lecture-based teaching does not necessarily assist in cognitive retention in classrooms, or develop 21st-century skills. As a matter of fact, more academics are seeing the benefits of GBL (Qian & Clark, 2016), in which games are specifically designed to enhance learning and the development of a certain skillset. It may also involve adapting a game that is already designed for use in the classroom, such as using open world-based board games to teach the interaction between geopolitical groups, or the use of LEGO® blocks to help improve comprehension of city planning. A good GBL intervention will ensure that the central mechanic of a game is linked to the expected learning outcomes of the module (Arnab et al., 2014).

Why Games?

Despite the ubiquitous use of games throughout cultures, there is still debate over the classification of games (Salen & Zimmerman, 2003; Juul, 2003). The multidimensional definition of games suggested by Juul (2003) is the most beneficial for our research purposes – that is, considering games as learning tools. This definition comprises the following six dimensions.

First, a game is a formal rules-based system.

- Second, variable and quantifiable outcomes though the rules of the game fit the skills of the players.
- Third, valorisation of the outcome in a way that allocates higher values to some components, which creates useful, meaningful conflict (between players or between players and the system) with explicit goals.
- Fourth, player effort - games contain a conflict which ultimately can influence the game state and outcome due to the energy the player invests.
- Fifth is the attachment of the player to the outcome. The psychological attachment of the player to the outcome depends on their attitude towards the game which is part of the "game contract" agreed upon by all players.
- Sixth, negotiable consequences. A game is characterized by *optionally* assigned real-life consequences negotiated on a play-by-play, location-by-location, and person-to-person basis.

Overall, games for educational purposes teach students *through* games rather than learning *whilst* playing a game (about things outside the game orthogonally to the game). Dimensions one to five exclude activities that are merely interactive or merely playful, and the educational outcomes consist solely of learning about the game. Dimension sixth implies a degree of separation from real life and lets the game have meaningful learning as opposed to the transposition of a non-game activity to game-like learning as orthogonal to the game.

Why Analogue Games?

Analogue games refer to a specific type of non-digital playable media, which can be used as an umbrella term for a broad range of games, considering the materials or components used – board games, dice games, card games, building block games, or any other. In any case, the literature in the field of game studies has been using the term board games as its umbrella term, so it will also be adopted analogously in this section.

Considering the activity of playing a board game, it is possible to argue that change is at the absolute core of the experience. Every individual player's move modifies the board situation, impacting the game system. This description is also quite accurate in relation to the interdependent processes of human learning and development. In a very broader manner, the first process describes the direct and indirect acquisition of knowledge and skills, while the second one is related to the biopsychosocial process of change that humans suffer during the years and might be impacted by the first one (Gobet et al., 2004). Considering the focus on HE of the present study, emphasis will be made significantly on the learning process using GBL.

At present, there have been significant advances in the field that demonstrate the potential of games in supporting teaching and learning processes. This is supported by several studies such as Abdul Jabbar and Felicia (2015), Arnab et al. (2014), and Qian and Clark (2016). However, it is important to consider the dominance of digital games, as highlighted by Naik (2014), which may neglect the importance of board games and other analogue games, as previously discussed. In addition to the lack of systematic evidence on their potential to foster learning interventions, data also shows how analogue games can solve some issues that tend to emerge in digital GBL projects, such as the lack of hardware or funding (Sousa et al., 2022a). This explains the option for this medium in a project that is centred around issues of inclusivity.

The option for analogue games in the specific scope of this study can also be justified by the systematic interest in researching media as a vehicle to promote more accessible learning experiences. Unlike the toxicity that has come to characterize the industry and the communities associated with digital games (Busch et al., 2016), board games communities have been generally characterized by their "overall friendliness and welcoming nature" (Booth, 2021, p. 189). This seems related to a certain notion of board games as a niche hobby, which seems to promote open communication between players and the industry itself. As shown by Booth (2021), board gaming communities have organized themselves to respond to the different challenges associated with diversity and inclusivity issues, with a general sense that systemic changes are required to welcome a broader range of players, their narratives and experiences. Furthermore, according to the author, the community's concerns can be grouped into five different categories: (a) player and game communities; (b) in-game representations; (c) types of games, (d) demographics of board game designers at the industrial level; (e) and within the larger culture itself.

Although there are some positive indicators, it is known that games and the practices surrounding them emerge in a certain socio-historical context, so ensuring their accessibility, diversity, and inclusion of players implies, above all, systemic changes, which go beyond the goodwill of their community. This implies prioritizing accessibility from the beginning of the

development process, using it as a creative trigger, instead of a processual barrier. It also depends on the acknowledgement of different disability and education paradigms, by applying them to the specific context of analogue games, through notions such as intersectional accessibility and inclusive design (Sousa et al., 2022b).

Why in Higher Education (HE)?

In the field of HE, gamified and game-based learning and teaching systems have shown their effectiveness in the promotion of student engagement, motivation, and performance (Subhash & Cudney, 2018). Nevertheless, this evidence has been systematized tendentially through a narrower vision, that emphasises the potential role of analogue games in the enhancement of skills and attributes needed in the study of mathematics and other STEM-driven subjects (Smith & Golding, 2018).

Considering this premise, and the potential explored above to foster inclusion and diversity through analogue games, the present study emerges in the context of an EU-funded project.

Figure 1.
Educational game design workshop with building blocks
(Source: Authors' elaboration, 2022).

This action-research initiative is aimed to develop an analogue game-based teaching strategy that intends to change traditional pedagogical practices. Based on the experience of four European universities renowned for applying innovative teaching approaches, it intends to develop a methodology that promotes students' equal participation in the class, and in the educational process in general, by helping all of them (including, among others, those with learning disabilities, non-native language speakers, individuals with introverted personalities) gaining a better understanding of abstract concepts and acquiring crucial skills.

The purpose of this study is to evaluate the current advancements in GBL practices in HEIs, as well as the obstacles faced by stakeholders in creating and maintaining educational games. Considering this context, it aims to provide proposals to answer the main research question " What are the challenges and opportunities associated with analogue game-based learning?". In more detail, it aims to explore a number of specific questions in this field of research, which include:

1) What skills will be developed through game-based learning for students?
2) What skills will be developed through game-based learning for educators?
3) What are the challenges associated with game-based learning?
4) What is the significance of game-based learning over other types of classrooms?
5) What measures of inclusivity are being practiced within GBL classes?
6) What were the costs of developing/playing the game (financial/time-based/human-based costs)?
7) What alterations your game might need in the face of the new pandemic and general interest in online teaching?

Systematic Literature Review (SLR)

Table 1. Criteria of the SLR

Database	Search mode (Boolean/Phrase)	Limits (criteria)	Found
EBSCO (Business Source Complete)	game-based learning OR "game-based teaching" OR "serious gam*" OR "game-based teaching and assessment" OR "board gam*" OR "conceptual gam*" OR "educational gam*" AND "higher education" NOT SU gamification NOT SU digital games NOT SU video games NOT SU medical	Full text Scholarly (Peer Reviewed) Journals Published date: 2010-2020 Document type: article, case study Language: English Publication type: academic journal/case study	92
EBSCO (Academic Search Complete)	game-based learning OR "game-based teaching" OR "serious gam*" OR "game-based teaching and assessment" OR "board gam*" OR "conceptual gam*" OR "educational gam*" AND "higher education" NOT SU gamification NOT SU digital games NOT SU video games NOT SU medical	Full text Scholarly (Peer Reviewed) Journals Published date: 2010-2020 Document type: article, case study Language: English	406
Science direct	game-based learning OR "game-based teaching" OR "serious games" OR "game-based teaching and assessment" OR "board game" OR "conceptual game" OR "educational game" AND "higher education" Title, abstract or author-specified keywords: NOT (gamification AND digital game AND video games AND medical) Note: Limited to 8 Boolean operators	Year:2010-2020 Article type: research article Subject areas (Filter): Arts and humanities; business, management, and accounting	375
SCOPUS	ALL ("game-based learning" OR "game-based teaching" OR "serious gam*" OR "game-based teaching and assessment" OR "board gam*" OR "conceptual gam*" OR "educational gam*") AND "higher education" AND PUBYEAR > 2010 AND SUBJAREA(BUSI) OR SUBJAREA(ARTS) OR SUBJAREA(ECON) AND DOCTYPE (ar) AND NOT gamification AND NOT digital AND NOT online AND NOT video		122
PubMed	ALL ("game-based learning" OR "game-based teaching" OR "serious gam*" OR "game-based teaching and assessment" OR "board gam*" OR "conceptual gam*" OR "educational gam*") AND "higher education" AND PUBYEAR > 2010 AND SUBJAREA(BUSI) OR SUBJAREA(ARTS) OR SUBJAREA(ECON) AND DOCTYPE (ar) AND NOT gamification AND NOT digital AND NOT online AND NOT video		3

SLR Methodology

A Systematic Literature Review (SLR) of 96 papers was conducted, through forward and backward search using specific keywords as shown in Table 1.

SLR Results

Overall the articles broadly reinforced the pedagogical value of analogue GBL (Gibson & Douglas, 2013; Gil-Domenéch & Berbegal-Mirabent, 2017) in students' engagement and satisfaction (Lyford, Chen, Rhar, & Kovach, 2018; Montenegro & Greenhill, 2015; Zeller 2018), especially in subjects that students consider boring (Juliano, 2019), abstract, or too complex (Johnson, 2019). Moreover, analogue GBL is also discussed by the authors as a strategy that fits both the needs and the abilities of the students (Zeller, 2018), while allowing connections between different areas of learning (Lyford, Chen, Rhar, & Kovach, 2018) to promote a wide range of skills and competences. These fields include the following: acute care skills (Gibson & Douglas, 2013); personal hygiene practices (Bassey et al., 2020); religion (Zeller, 2018); probabilities and statistics (Johnson, 2019; Lyford, Chen, Rhar, & Kovach, 2018); business management skills (Sugahara & Lau, 2018); mathematic skills (Gil-Domenéch & Berbegal-Mirabent, 2017; Ku et al., 2014); geography (Sardone & Devlin-Scherer, 2016); law (Juliano, 2019); history (Larkin, 2017); human rights (Montenegro & Greenhill, 2015); engineering (Li, Huang, Jiang, & Chang, 2016); and global economy (Takahashi & Saito, 2011). Moreover, analogue games and approaches were also discussed as engaging, considering the usage of tangible materials, such as LEGO® blocks (Li, Huang, Jiang, & Chang, 2016), that enhance concept visualization.

The review allowed the formulation of several suggestions. Firstly, analogue GBL is a potential answer to promote learners' involvement, comprehension, cooperation, and motivation as crucial areas for the current teaching practices (Gil-Domenéch & Berbegal-Mirabent, 2017). Aligned with this, board games particularly are seen as a feasible approach to deal with current issues with traditional/instructional pedagogical methods (Sardone & Devlin-Scherer, 2016). Secondly, games seem to teach through an experiential framework, by establishing constant parallels between the game dynamics and the formal contents to be taught. For example, the relationship between Civil Procedure and inner game rules (Juliano, 2019) is explored by experiencing the game. This allows knowledge to be built on a practical basis which is considered fundamental for learning. Sugahara & Lau (2018) even formalized the centrality of experiential learning paradigms, by testing the fitting of the Matsuo's Framework of Experiential Learning (Matsuo, 2015) to GBL as an optimal structure for the successful intervention. The model is based on five main factors: critical reflection; seek challenging task; enjoyment of work; developmental network; and learning goal orientation. Besides this, GBL was also hypothesized as a relevant strategy to enhance students' confidence towards the subjects they typically struggle with (Ku et al., 2014).

The main conclusion that emerges from analyzing the papers is the great heterogeneity between studies, not only in their fields, but also in the adopted methodologies and, mainly, the data reported by authors. Another issue is lack of uniformity in the adopted concept of game, with studies using different tools labeled as games, but with very different characteristics. Besides the results discussed above, papers also reported several outcomes that are not directly connected with measurable learning improvements. This included the promotion of hands-on experience (Lyford, Chen, Rhar, & Kovach, 2018), which can also be connected with experiential learning, the potential of analogical games to raise awareness to socially relevant themes and induce attitudes changing (Bassey et al, 2020; Montenegro & Greenhill, 2015), the promotion of problem-solving skills as transversal in the field of GBL (Li, Huang, Jiang, & Chang, 2016), and the promotion of interaction between peers through GBL (Takahashi & Saito, 2011), as a strategy to enhance participatory and collaborative knowledge building.

However, even considering the many advantages of the games, they are only used by a minority of educators. The main

reasons are the overall restructuring of the class to play the game and significant preparation time and supply of (educational) game material (cards and others). Moreover, it is difficult to integrate a game into the curriculum in groups of less than 300 people. The papers indicate the effectiveness of games in small groups which can be managed by the facilitators, however, it can be done in several small groups at the same time with many tutors. The studies that applied analogue GBL to Higher Education (HE) show that there is a lack of clear descriptions of the participants in these studies. Broadly, the authors do not discuss the limitations of the studies in detail. Nevertheless, this is also due to the low frequency of collection and analysis of quantitative data on the effectiveness of the GBL approaches. In this sample, only five studies reported quantitative data (Bassey et al., 2020; Li, Huang, Jiang, & Chang, 2016; Montenegro & Greenhill, 2015; Sugahara & Lau, 2018; Takahashi & Saito, 2011). From these five, only two studies involved Randomized Controlled Trials (RCT) (Bassey et al., 2020; Li, Huang, Jiang, & Chang, 2016), and none of them were developed in the field of HE. Even if the authors detail the overall approach, including the game, the number of sessions, among other aspects, the lack of quantitative data and, mainly, uniforms ways of reporting effectiveness can negatively affect the impact of the studies in policy-making, since their external validity and replicability is frequently seen as challenging (Bamberger, 2019).

Summarizing, there is ample research on game mechanics, game designs, and characteristics of the games. However, limited research is done on the post-game assessment through quantitative analysis, mapping of the learning outcome, and inclusivity measures within the game. Also, most of the articles are focused on the learning process of the students, and little is documented on the educators' learning process within analogue GBL. Also, the time commitment associated with developing games leads to limited practice of that within classrooms.

To that end, in addition to answer to the initially defined research aim, the following conclusion emerged from this part of the study:

a) There is a lack of a robust assessment framework for GBL.
b) There is a limited number of inclusivity measures for GBL.
c) There are limited criteria for the educator learning process within GBL.

Interviews

Design of the Interviews

Interviews were conducted by the authors of this paper in four European countries; three interviews were conducted in each country; 12 one-hour-long interviews were conducted in total. The general composition of the interviewees and their background is presented in Table 2.

Table 2.
Demographic information about interviewees

Questions	Options	Answers
What is your Role?	Teacher	10
	GBL expert	4
	Game creator	4
Age group of the interviewee	20-30	1
	30-40	3
	40-50	4
	Above 50	4
Gender	Male	7
	Female	5
	Other	0
	Decline to answer	0
Years in practicing game-based learning	Average, year	9.3
Type of the game you are using/creating	Board Game	9
	Puzzle	6
	Card Game	4
	Role Play	10
	Other	2

** Participants could give multiple responses to questions 1 & 5*

The final design of the semi-structured interviews containing eight closed and 13 open-ended questions is listed below. Audio recordings of the online interviews were made and later transcribed.

A set of interview questions is designed to explore the challenges and opportunities associated with GBL. This overall research question is addressed through the following interview questions:

1) What skills will be created through game-based learning for students?
2) What skills will be created through game-based learning for educators?
3) What are the challenges associated with game-based learning?
4) What is the significance of game-based learning over other types of classrooms?

Also, to explore the propositions A-C, the following questions are formulated:

5) What assessment techniques are used post-session game-based?
6) What measures of inclusivity are being practiced within GBL classes?
7) What were the costs of developing/playing the game (financial/time costs-based/human-based costs)?
8) What alterations your game might need in the face of the new pandemic and general interest in online teaching?

Interview responses

Responses to each of the open questions are mentioned in turn.

1. What skills will be developed through game-based learning for students?

Responses to this question primarily focused on soft skills. The teachers-interviewees mentioned the use of games to aid in teaching social skills, such as collaboration and communication. The use of GBL to aid creativity was also mentioned. Generally, soft skills were a common theme together with other abilities, such as problem-solving and decision making.

Two interviewees argued that game-based learning can be adapted to the requirements of any specific classroom. However, few specific examples of skills or learning outcomes (beyond social skills and creativity) were given.

Another commonality was the opinion that GBL would allow for a deeper and more theoretical understanding of the subject matter. Many considered it a good addition, but not a replacement, for traditional pedagogical methods.

In sum, social skills and soft skills were primarily discussed as learning outcomes. Many interviewees also mentioned, in different ways, that there was a sense of adaptability to GBL methods.

2. What skills will be developed through game-based learning for educators?

The most widely discussed topic here, was the increased creativity and imagination in pedagogy gained by educators who decide to use a game-based approach in their classroom. Some interviewees stated that such educators are more flexible, recognize the positive role of games, become more familiarized with game concepts and vocabulary, create closer relationships with students and are better able to observe how students interact in a more relaxed setting and can assess their behaviour.

The idea of game-based approaches making teachers *active trainers* was also mentioned, in which teachers understand the real learning needs of their students by leaving them free to learn through playing. They also understand students' real skills and the personalized development of students' skills, the connection of the theoretical principles with the practical

applications which leads to differentiated learning. On a similar theme, it was suggested that using this novel pedagogical approach allows for lifelong learning in educators. Taken together, the interview participants considered using game-based approaches improved the teaching skills of educators.

Along with improving the teaching skills of educators, the interviewees mentioned benefits to organisational and management skills. Organising and implementing a game-based intervention requires a fair amount of planning and leadership from educators. Otherwise, the learning aspect of a game can be lost.

3. What are the challenges associated with game-based learning?

The biggest challenge teachers-interviewees faced in creating educational games was a lack of time. Educators often do not have enough time to create useful games for their classrooms. Similarly, creating games that can be easily adapted for the specific need of each classroom was also a common challenge. A game may take a year to create due to the various other tasks required of HE educators. Moreover, the lack of ability to adapt a game to different size classrooms, or different topics, can put off educators from using GBL.

Ensuring that students are learning *through* gameplay, rather than simply being additive to their learning, was another common concern. Impactful GBL methods involve learning via the core mechanic of a game. This can be seen when games such as Diplomacy are used to teach risk management in Business classes. Interviewees mentioned difficulty in ensuring that students are learning *through* gameplay. Whilst others discussed balancing the learning with gameplay - that students are learning *via* playing the game, not just playing a game in a classroom.

Interviewees also discussed a lack of institutional support, or a way to assess the effectiveness of GBL methods.

4. What is the significance of game-based learning over other types of classrooms?

GBL techniques were viewed as more fun and engaging than other pedagogical methods, according to the received comment: *"people learn without realizing it, by playing and having fun"*. Numerous interviewees suggested the reason for this increased enjoyment, as well as an advantage of GBL, was due to the visceral, real-world, learning experience that GBL provides. It provides a realistic scenario to students to understand the stakes, though nothing is at stake, students can assess the realistic aspects created by games and simulations.

Some interviewees echoed this, arguing that the methods can provide more *active learning experiences* compared to traditional pedagogical approaches.

Finally, as was mentioned in response to Q1, it was highlighted that GBL can teach soft skills that are difficult to teach using more classical methods.

5. What assessment techniques are used post-session game-based?

Broadly, there was little attempt at assessing learning, with only interviewee indicating the use of formal assessment methods. Some interviewees did attempt to assess the effectiveness of their GBL method, though primarily this was done with self-report from students, and often related more to engagement than learning. It was also argued that assessment is hard due to the small timeframe in which a GBL intervention takes place, generally only lasting the length of a typical lecture (1<2 hours).

6. What measures of inclusivity are being practiced within GBL classes?

Each interviewee had a different way to answer this question. Some did not see inclusivity as a problem or had not needed

to consider it before. Others had to deal with very specific problems faced by students, and yet others described cultural and language differences as the biggest issue. As it was mentioned "one size does not fit all". As such, each participant had to consider inclusivity from a different angle, depending on their specific classroom.

For example, some interviewees discussed using symbols, rather than letters, to be more inclusive of students with dyslexia. This differs from the approach taken by others, whose main issue was related to cultural differences. They advocated that educators must be flexible and creative in order to solve these issues. One would imagine reducing the reliance on words by using symbols could be a pragmatic example of this and may also help with the issue they mention.

The overall picture from interviewees shows how every classroom is different, and each will face its inclusivity issues. GBL itself is a good inclusivity measure, reducing the barriers between people and allowing increased collaboration.

7. What were the costs of developing/playing the game (financial/time-based/human-based costs)?

The most common theme from answers to this question was that costs can vary greatly depending on the game being played. To give an example of the difference, a LEGO®-based game required 60 hours to create an overall financial cost of roughly €5000. In contrast, the creation of numerous mini-games took four to six months with an overall cost of €40,000, in which 35 mini-games were developed.

The financial and human costs vary during the different stages of game creation. The costs are high during the initial stages of practice because a lot of preparation is required but they keep on decreasing once the tutors are confident enough. The development cost of the game depends upon the intended objectives, learning outcomes, and the type of games developed.

As has been highlighted in answers to previous questions, the biggest reported cost is the time taken to create games for educational purposes.

8. What alterations your game might need in the face of the new pandemic and general interest in online teaching?

Most interviewees cited adapting their games for online learning by using webcams and teleconference platforms. Other specific virtual platforms such as virtual escape rooms, Miro, and online collaborative tools (Discord, Roll20, Watch2gether, Boardgamearena, Tabletopia) were also mentioned.

Despite attempts by many to adapt, many of the interviewees stated that contact learning was much preferred. Although games can be played virtually, via webcam, or using a virtual platform, getting the same level of excitement and engagement was considered difficult.

Discussion and Conclusion

The current paper aimed to answer one overarching question: *"What are the challenges and opportunities associated with analogue game-based learning?"*. To that end, the presented SLR gave rise to a set of four sub-questions as well as three propositions to be addressed through a set of interviews with educators and game designers in four European countries. The thematic analysis of the interviews yields some useful insights.

The advantages of analogue GBL benefit both educators and students. The interviewees confirmed that analogue GBL promotes a variety of soft skills that otherwise are hard to induce using traditional methods of teaching. These skills could include collaboration and communication, creativity, problem-solving, and decision-making. It also gives the flexibility to be adapted to the requirements of any specific classroom. The specific dynamics of the classroom also help to bring the educator and the students closer and facilitate observing

the interaction, leading to a better assessment of behaviour and personalising skill development. In the case of educators, analogue games allow lifelong learning as well as improved teaching skills, and organisational and management skills. On top of that, analogue GBL provides a fun and engaging environment as well as a visceral and real-world learning experience.

In analogue GBL, two major challenges are encountered. The first challenge is the limited time available to create educational games, and the second challenge is the need to customize them according to the unique requirements of each classroom. These requirements may include factors such as the number of students, their academic abilities, and the subject being taught. The design of an average game may take from 60 hours to one year and the financial cost can be quite high. However, financial, and human costs vary during the different stages of game creation which might decrease as the game designer becomes more experienced. In developing an educational game, time is the main cost component and constraint for educators, however, it depends mostly upon the intended learning objectives, outcomes, and the type of games. The process of learning also implies ensuring that students are learning *through* gameplay, where the learning involves the core game mechanic whilst balancing the learning with gameplay.

The lack of quantitative assessment, pointed out in the SLR, was confirmed by interview respondents who indicated limited use of formative assessment techniques. Instead, due to the lack of time during teaching sessions, assessment mainly involved observation or student-reported engagement measures.

Considering inclusivity, some interviewees suggested that GBL itself is a good inclusivity measure, reducing the barriers between people and allowing increased collaboration. Alternatives such as reducing the reliance on words by using symbols were suggested by participants as inclusivity and accessibility measures for students with learning disabilities. Others also argued that creative thinking is needed when considering cultural barriers to understanding and inclusion in GBL. Spoken simply, educators must be flexible and creative to ensure the inclusivity of all in their classrooms. Overall, there is a large gap in research and existing literature regarding how to ensure the accessibility of GBL to all students.

Recently most participants adapted using webcams, online platforms, and online collaborative tools and physical distancing measures due to the outbreak of the pandemic. Whilst everyone agreed that such measures were needed, all also agreed that contact learning ensured much higher engagement from students.

As a result, based on the gaps highlighted above, a framework that addresses the assessment and inclusivity measures within GBL is missing. In addition, a design framework that saves time and costs for new designers with less experience could also be useful. The development and application of such a framework may also benefit the target audience by offering training sessions to educators upon delivery. This would ensure that educators are familiar with the application of GBL practices and reduce the perceived perceptual barriers. The institutional support and training shall ensure the widespread application of GBL across HEIs and lead to increased collaboration among professionals and academics.

Limitations and Future Directions

It is important to note some limitations of the current paper. Firstly, the review method used was narrative and practitioner-driven, rather than a quantitative systematic literature review. While this approach highlights practical aspects of applying analogue GBL interventions, it may limit the generalizability of the findings. Future studies could consider using systematic approaches to summarize the scientific evidence in this field. However, the gaps identified in this study were supported by interviews with educators and game designers

across Europe, which enhances the validity of the findings in different contexts. This triangulation of data sources increases the potential of the study to be applicable to diverse settings. Future research could build on these findings by using a more rigorous review method and exploring the effectiveness of analogue GBL interventions in different educational contexts.

Second, it is important to reflect on the use of a relatively small sample size and mostly qualitative methods. While the use of qualitative methods allows for a deeper exploration of participants' experiences and perspectives, the small sample size may limit the generalizability of the findings. Additionally, the reliance on qualitative data may limit the ability to make quantitative comparisons and draw statistically significant conclusions. Future studies could consider using larger sample sizes and incorporating quantitative methods, such as surveys or standardized assessments, to strengthen the reliability and validity of the findings.

Future directions would include the completion of the steps described above, but also methodological contributions to some of the gaps identified, including systematic evidence on the potential of analogue games to support learning processes in the context of HE, through more framework-driven interventions.

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