Discovering Educational Game Design Through 'Conversation Starters': Teachers' and Game Designers' Perspectives

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Abstract: Educational game (EG) design process has its complexities which are recognised differently at player-end. The need to understand teachers' perspectives and views about identifying what makes games educational (whether they use or prefer EGs or digital games), the problems and barriers encountered in their practice while using EGs, any design challenges that hinder their use and the 'pains and gains' of using EGs in their classroom is crucial. In parallel, these inquiries should also be investigated from game designers' perspectives to visualize both stakeholders' needs. Therefore, this paper presents the data of six teachers' and six game designers' views during the co-discovering design thinking workshop method on the above inquiries, based in the Australian context. This paper presents the first co-discovering technique called the 'conversation starters', where both stakeholders discussed their current practices relevant to EGs along with the probes listed above. The data is thematically categorized, coded, and analysed using NVivo. The results are presented through the constructivism paradigm, which is grounded by theory of experience (Dewey, 1938) and the participatory design method. The intentions are to provide insights for game designers in designing EGs, this can enable teachers and game designers designing EGs towards understanding some issues and expectations from teachers to help their designing process of EGs.

Keywords: Educational game designing, Conversations, Empathy, Design challenges, Barriers and problem in design, Games in classroom, Use of games, Educational game design

1. Introduction and Relevant Literature

Playing games for learning is known as an entertainment, but it also facilitates teaching depending on the situation (Gee, 2003, Gee, 2007). Games are identified as highly motivating and engaging tools for 21st-century skills and the tech-savvy generation. The mastery of new challenges, the methodology of trial and error, the repetition of a task to better understand concepts – all demonstrate positive learning through games (Barab et al., 2012, Squire and Barab, 2004, Young et al., 2012). However, the binding elements of game design in educational learning results support positive and negative results (Young et al., 2012). The GUMC model, which allows teachers to use games in classrooms to explore in a useful way, covers detailed barriers faced by teachers in classrooms (Stieler-Hunt and Jones, 2015a, Stieler-Hunt and Jones, 2015b). Perhaps it indicates the emphasis on allowing game designers and teachers to design games together, which may cover some obstacles such as insufficient time in school (Kirriemuir and McFarlane, 2003), or how games are aligned with their learning/thinking in parallel with the course (Stieler-Hunt and Jones, 2015a). Other researchers showed how the gap between teachers' learning and the use of games in their classroom produces innovatively different learning experiences, and therefore pedagogical approaches need to be addressed alongside students' learning experiences.

Recent studies have highlighted the importance of students' perceptions and teachers in classrooms. The studies include perspectives on the learning environment, engagement strategies, teacher motivation strategies or even the comparison of students' and teachers' perceptions in the classroom context. The differences in the views of students and teachers about a learning environment are vast. This requires the researchers to pay detailed attention to critical analyses and position teachers and students as important actors in a learning environment(Könings et al., 2014). A study investigated how primary school children react to the inclusion and exclusion of their peers during game play in NSW (Australia) through observation and interaction interviews (Varea and Ndhlovu, 2017). The results indicate that the use of exclusions allows students to maintain their friendship (social aspects) and that the strategies adopted by adults to promote inclusion among children vary depending on the choice of play.

Acknowledging the way Gee (2004) has observed games as a situational context or learning environment, it is unclear how the proposed principles can be standardised in a gaming practice or at game design level (Linderoth, 2012). It is crucial to emphasize the importance of the learning experience the player has, while addressing the variety of their experiences. Understanding players' motivational and engagement levels along with the acquisition of the subject matter while playing has been challenging to assess. Adams & Clark (2014) argue that as players act in educational physics games, they also need to conduct a self-explanation task through a pedagogical agent. However, this has yet to demonstrate any significant effect on learning outcomes (Adams and Clark, 2014).

Globally, many EGs have been created or produced, but only a limited number of them have emerged within the gaming industry (Hamdaoui et al., 2019). Numerous reasons could justify this (Gunter et al., 2008, Kim et al., 2017):

- EGs do not provide an optimal balance between educational content and gameplay,
- The combined value of gameplay and learning content is mismatched (focus on quality of design - the looks – rather than the learning),
- Lack of involvement of teachers and educators in the process of designing,
- Overly prioritizing the seriousness (learning content) and reducing the fun element, which leads to demotivated players.

For instance, Magnussen et al. (2003) applied PD as an approach to design, develop, and evaluate the game development process, where the participants were children (age 11-12) as designers of the game concept, and the teachers presented the game concept. Moreover, they reported opposing interests as a result: while children are crucial in designing and developing games for education purposes and the PD approach enabled teachers to gain a deeper understanding of their students' perceptions, teachers were not supportive of the idea because they believed that children could not fully understand the educational goal(Magnussen et al., 2003). Similarly, Könings, K. D. et. al (2011) examined whether the PD approach could potentially reduce misunderstanding and incongruences between student perception and teacher instructions (Könings et al., 2011), and suggested positive outcomes for education, as teacher-student disagreements and perceived discrepancies were collaboratively acknowledged. Moreover, another study reported the need to bridge serious games and PD to explore the possibilities of existing players' knowledge and use co-designing methods to achieve serious game goals (Khaled and Vasalou, 2014). Khaled and Vasalou (2014) involved three children (age 10) for the workshop sessions and reported a mixture of outcomes: creative ideation processes, freedom of choice to build upon, being unaware of conflicts between one another, sharing and learning to maximize the chances of design choices of the game, and the quote "Teachers are strict, and the game will not be fun" (Khaled & Vasalou, 2014, p.6). Könings et al., (2007) work further extended to combining the perspectives of designers, teachers, and students by proposing a Combination-Of-Perspectives (COOP) model (Könings et al., 2005), that acknowledges the importance of the different stakeholders involved: instructional designers (instructional materials and educational approaches for learning environment), teachers (building/creating appealing learning environment), and students (their perception and influence of the learning environment and quality of learning outcomes).

With the gaps and issues addressed above, this paper intends to provide a broad idea of what teachers and game designers have in common or differences in opinions about the EG design, the designing processes, and playing EGs before using in the classroom. Teachers are the initial players of EGs before the game is introduced within the classroom. Hence, their involvement in discussion may help identify the gaps between both teaching and game-designing industry is at large.

2. Theoretical, Conceptual, and Methodological Approach

The conceptual and theoretical framework adopted in this paper relates to Dewey's theory of experience (1938): growth of experience, purpose, and continuity. As these concepts were relevant to the epistemology and ontology of the research, constructivism belief is situated as the paradigm to allow the construction of new knowledge which welcomes the subjectivity of individual experiences (Dewey, 1938). The growth of experience represents how individuals grow in their career, experience the everyday activities to gain knowledge, learn to achieve their goals, sustain their understanding of the phenomenon, and continue to grow in their experience. The aspects of 'growth' are driven by one's desire to formulate a 'purpose' that reverts to the growth of experience with the intelligence of one's mind. In this context, the adults whose learning methods combine work and studying, or theoretical and practical exposures are highly familiar and productive in their expertise. *The purpose* is simple when a desirable quality *"…which identifies freedom with power to frame purposes and to execute or carry into effect purposes so framed. Such freedom is, in turn, identical with self-control; for the formation of purposes and the organization of means them are the work of intelligence"* (Dewey 1938, p.67). Dewey's description of an actual purpose is that it begins with an impulse. It is always equipped with *"end-view" – which is involving "the foresight of the consequences that may result from acting upon that impulse"* (p.67). Teachers create their meaning and reflect through their actions constantly as the games are played or play tested while game designers have similar ideals. Hence, deriving an enriched experience shows an individualized aspect of learning by playing games, learning by doing, and adapting the experience throughout the process.

The principle of *Continuity* is each experience taken from the past affects the future experience of the individual. In contrast, interaction is referred to the situational and teacher's influence on student's experience. He believes that the elements of interaction and situation in which they occur are *"inseparable from each other"* (1983, p. 41). Despite the importance of experience, some challenges may encounter, such as *"that all experiences are genuinely or equally educative"* (1938, p.13). Hence, the teachers must first comprehend the nature of human experience, stating that the effect judges the experience's value that this experience has on the individual's present and future, an individual's ability to contribute to society. This is placed directly to the idea of how teachers interact in their classrooms with every individual's needs, to be able to support their cultural and social differences, and to allow them to learn equally and freely. Similarly, game designers empathise and understand the experiences of players, designers, and also game designing processes to help design educational game design experiences. It is, therefore, crucial to position the commutative experiences of teachers and game designers to understand their perspectives, which may be enjoyable, may not contribute to personal growth or experience with no coherence to a situation that does not necessarily result in a cumulative learning foundation for future learning.

3. Data Collection, Analysis, and Interpretation Approach

As the participatory design research enables the co-discovery and co-construction of knowledge between experts, this paper reports the variations of ideas thoughts and reasons that allows various participants' experience to unfold (Muller et al., 1993). As this paper reports part of a project, the data collection presented is categorized under T (Tiny, 2-4 participants per session) group, as the best possible category during COVID-19. CODWs were conducted via Zoom video-conferencing software. The Co-design workshops (3 different groups) were audio-visual data recorded, transcribed, and time stamped. An initial hand-coding approach was adopted prior to an in-depth thematic analysis using NVivo 10 Software. The data was collected as 'audio-visual' (audio and video recording) materials to provide data fidelity through to the transcription phase of data analysis. The participatory observation requires the researcher to engage in the participants' activities and record systematic observations (Leavy, 2022). The details are shown below:

- The data is an audio discussion and video recorded (screen recording) and hand-written (memo and note-taking). It is transcribed later based on each group of co-design workshops.
- Tangible sheets (from MURAL[1])
- The researcher's observations and video recording (screen-recording) of the co-constructing of the activities.

This research adopted a six step thematic analysis approach (Braun and Clarke, 2006, Braun and Clarke, 2012). This analysis aims to allow teachers' perspectives, inspirational and motivational drivers, their experience (its growth & continuity), and the way they evaluation the games/EGs before they are used in the classroom to emerge (framing the purpose of using games as a learning tool). The themes are discussed through interpretivism approach where hermeneutic analysis is adopted to allow the subjectivity of both stakeholders' experience to flow through the experience, education, the perspectives of using games in the classroom, and how they select the games - correlating and critically discussed through researchers' epistemology and ontology position as well as concepts of the theory of experience.

Overall, there were six primary school teachers, and six game designers who participated in the co-designing method. All participants were based in Australia, specifically, in Melbourne Victoria. In the results section, the participants are addressed as teachers [T_1, T_2 etc] and game designers [GD_1, GD_2 etc]. See Figure 1 to visualize the process of positioning both stakeholders in the empathy and conversational position.

[1]MURAL is "a space for your team to collaborate visually and problem-solve faster with an easy-to-use digital canvas. No ordinary online whiteboard, MURAL has powerful facilitation features, guided methods, and the deep expertise organizations need to transform teamwork." (Direct link: https://www.mural.co/)

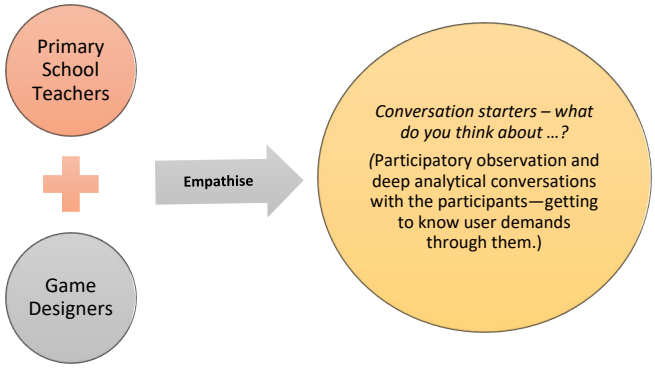

Figure 1: Illustrates the conversation started activity and how empathy is positioned to enable co-discovery aspect

4. Results and Discussion

Conversation Starters is an activity that is known as a warm-up discussion were free flowing of sharing perspectives and ideas quickly. This activity is 10 minutes in duration, and it is focused on specific questions such as "*What you think about…?*" to begin ideation on EGs, and focus on what participants exemplify, identify, or criticize about EGs that they have used or designed. This activity is designed to help participants focus on their tacit knowledge and opinions without hesitation. The objective of this activity is to encourage creativity and outside-the-box thinking from the participants. Please note that due to limitation, this paper present most crucial ideas and quotes.

4.1 Prompt Questions 1: Identify What Makes Games 'Educational'?

Both GDs and teachers drew upon their expert opinions on EG design. The question was, "*Identify what makes a game 'educational'?"* empowered both teachers and GDs felt at ease to freely generate ideas and drop them quickly through the conversation. All six participants' responses were thematically analysed, which revealed themes including problems/barriers, design challenges (for GDs and teachers), using different games that were not entirely designed for 'classroom context,' and teaching challenges (that teachers encountered) associated with the use of the game in the classroom.

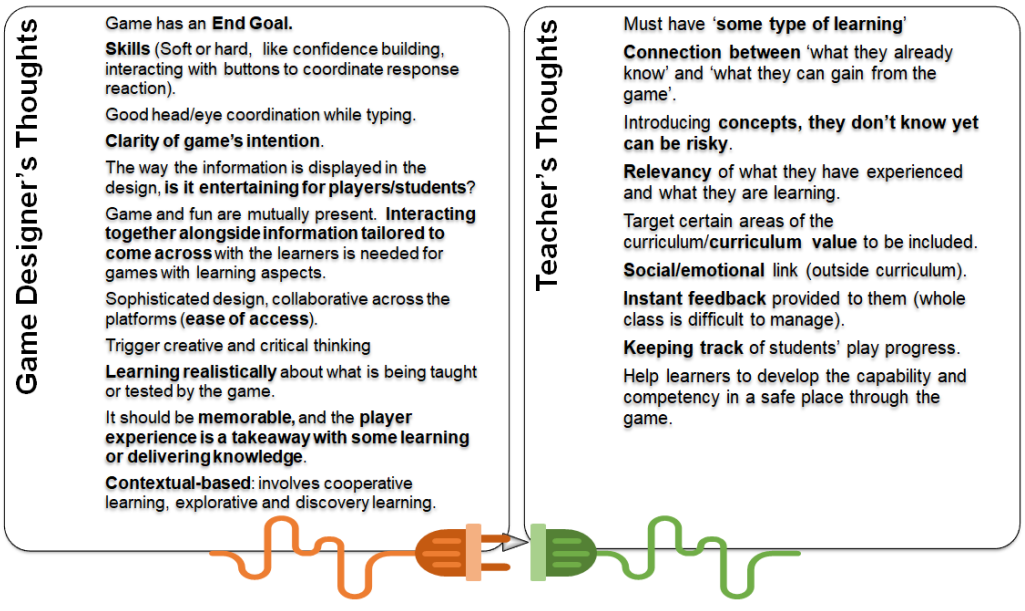

Figure 2: Currates and presents categories and qoutes from all participants: *what makes EGs?*

Figure 2 shows the data transcribed from both participant groups on *what makes games Educational?* I observed a diverse range of similarities and distinctive thoughts shared. To summarize the results, GDs described that an EG need a clear goal and set of intentions to help guide the learners/players as they play. They emphasized that EGs enable learners' soft and hard skills through gameplay and asserted that designing such gameplay requires them to understand their players' curiosity, surprising elements, clarity in communicating the game goals (game

aesthetics and realistic design) and interactivity of game designing to deliver expectations. In addition, participants asserted the need to design EGs that can be accessible on multiple platforms, to enable ease of use (for both teachers and students) and encourage collaboration to ensure that students play experience are memorable and meaningful. Interaction provides various ways of communicating and triggering a player's reaction as they interact with the game design (Schell, 2008). Hence, the interaction between the game's goals, the functionality of the game, and how these connect are highly essential, as GD participants suggested: [GD_2] "*… together alongside the information tailored to come across with the learners is needed for games with learning aspects*". Although GDs did not explain what they mean by learning aspects, [GD_3]:

> "It is mainly the learning content, the information that we game designers are trying to convey through the game design... it is not essays for players to read because that is not fun, but it is something that is crucial for EGs and students to grasp the goals and achieve rewards."

Based on Figure 2, teachers emphasized the need to have consistency between the topic taught in the classroom and the topic/game content explored within the EGs. They associated this with the challenge that if students can't relate their prior knowledge with what the gameplay contains, the students will fail in achieving the goal. Teachers also asserted that it impacts the students' play experience, interaction, and memorable experiences of gameplay. Similar with GDs, teachers believe that it is crucial to maintain consistency between content shared and learned by the students. They believed that introducing a game with no relevant concept *prior* to play experience may be risky and lead to confusion or demotivation for players. Teachers asserted the need for EGs to enable learners with developing their capabilities, competencies, and skills through gameplay, which is like GDs' observations on context-based game design. For teachers, learners can take actions within the game environment and not physically harm another peer, while game designers explained that the game design should cater to the needs of expectations from a classroom teacher to allow such context to be formed.

Particularly, all teachers emphasized that EGs should focus on curriculum values and learning skills within the game itself to help learners relate to the curriculum, topic, or subject. Teachers emphasized that they playtest all EGs before introducing in the classroom. In addition, teachers advocated that EG design should have a social and emotional link that immerses learners to gain emotional experiences such as excitement, failing, winning, or winning competitively; all contribute towards engaging and learning through experiencing. 'Good games' were the term used by the teachers indicated that games with clear learning goals, assessment or checklist and an interactive design. Teachers repeatedly emphasized that mostly, good games, which they consider fun and engaging for their students, rarely have progress or goal achieving bars. This hinders teachers' practice as they cannot track the progress of their students individually. I observed that teachers highly recommended the need to have tracking or progress bars in the game design to enable their practice into collecting each students' play-progress as "*monitoring 25-30 students is not easy during game playing*" [T_2]. Lastly, they added that instant feedback within the game is crucial, but if the feedback does not scaffold or guide the players on what they have done correctly or wrongly, it is meaningless.

Figure 3 (below) presents the data from both participant groups with respect to problems/ barriers/ challenges encountered during their identification of EGs design processes. Teachers acknowledged their concerns are more relevant to the way game levels are designed, and it's an issue when game levels do not match students' intellectual growth levels, or the interactivity is not suitable for learners. Relatively, teachers asserted that EGs should have functions that could cater to versatile learning abilities such as reading aloud, sounds and inclusive designs – to support teachers in ensuring that EGs can assist their learners' capabilities. Moreover, teachers advocated that most EGs assume that learners have prior knowledge and do not scaffold instructions or guidelines. This issue hinders the learning process of learners and teachers require more time to scaffold the instructions within the game. Consequently, teachers considered these questions (see quotes) and thought there was a possibility for such links:

> *"linking between what their [players] current experiences are with the abilities to progress at their levels of intellectual development [T_2]"*

> *"does it need to set levels that we as teachers must adhere to?[T_1]"*

These concerns are thought-provoking, and all three teachers conveyed common barriers and challenges that they encounter with EGs in the classroom. Teachers' continuous interaction with games reconstructs their experience and enables a better understanding on the way they learn about their learners' reactions while gameplaying. Intriguingly, some points from GDs surprisingly pondered similar concerns.

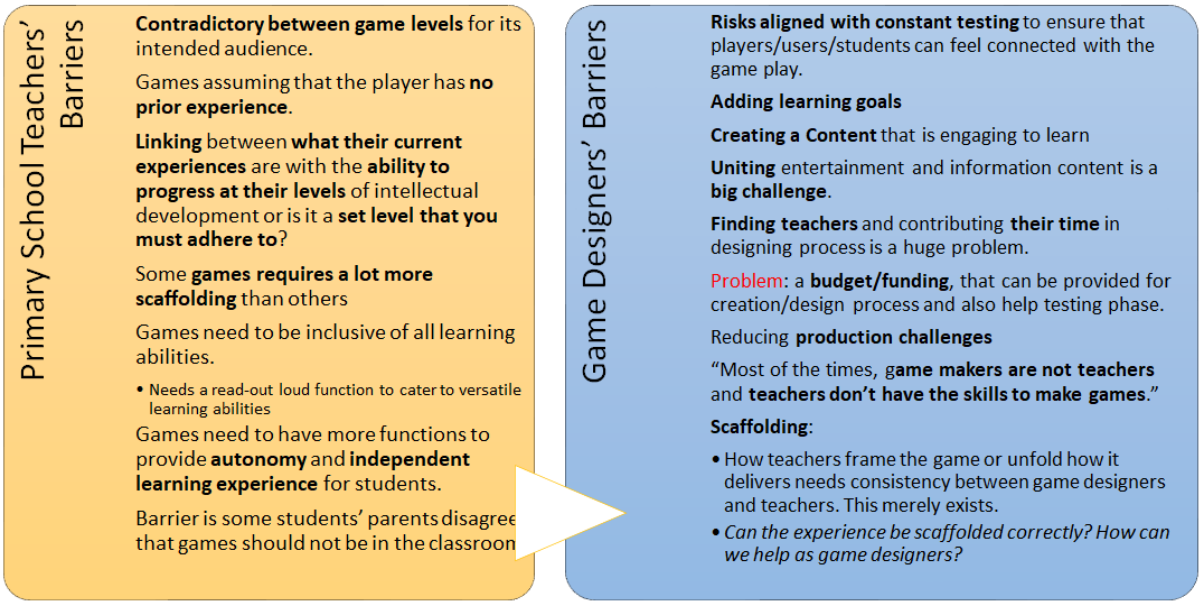

Figure 3: Summarizes and presents quotes/categories from all participants: Problems/Barriers

GDs participants shared stimulating questions including:

> *"Can the experience be scaffolded? How can we help as game designers? [GD_1]"*

> *"How teachers frame the game or unfold how it delivers needs consistency between game designers and teachers as this [rarely?] exists! [GD_3]"*

These questions are relevant to what teachers emphasized as the scaffolding needs of the games. GDs addressed the crucial concern that:

> *"most of the time, game makers are not teachers, and teachers do not have the skills to make games [GD_2]."*

This causes difficulties with the way the game is designed to be used as opposed to the way the game may be used. Despite these barriers being emphasized, GDs discussed three other crucial points.

- Firstly, adding learning goals without teachers is challenging and gathering insights from teachers in designing process relies upon funding, time limitation and teachers' availabilities.
- Secondly finding teachers to participate in the design process is a challenge, for instance: "*creating learning content that is engaging to learn is confronting to my knowledge of designing games [GD_5]*".
- Thirdly is an identified gaming industry challenge: that the reduction of production costs, the lack of resources and experts in the field, and lack of playtesting for design leads to constant risks in achieving the game goals and meeting the players' expectations. The way GDs framed their *purpose* is based on their desires to design an EG that reaches and satisfies a large population of gamers (Dewey, 1938). However, with these challenges and barriers, their best option resides in researching and evaluating their play experiences (past, present, and iterative playtesting) of playing good or bad EGs/games; and ensuring that failing mechanics or a flawed player's experience in a game is not repeated (reflective and experiential learning).

Figure 4 presents the emerging ideas discussed by teachers and GDs in terms of the game design challenges. Both participant groups encountered design challenges in their practice, and this theme potentially explains the essentialness of collaborative intervention between multiple stakeholders. As mentioned earlier, teachers' concerns with the lack of scaffolding within the game designs that requires extra time prior and during the lesson was prominently highlighted by all teachers. Teachers rely on their play experience and empathise with their learners' play experience and tend to believe that trial-and-error playing of various games can enable a better understanding of their learners' expectations. In addition to that, teachers asserted the need to clearly present learning goals, rewards and reduce text-based content within the design to avoid demotivation by learners.

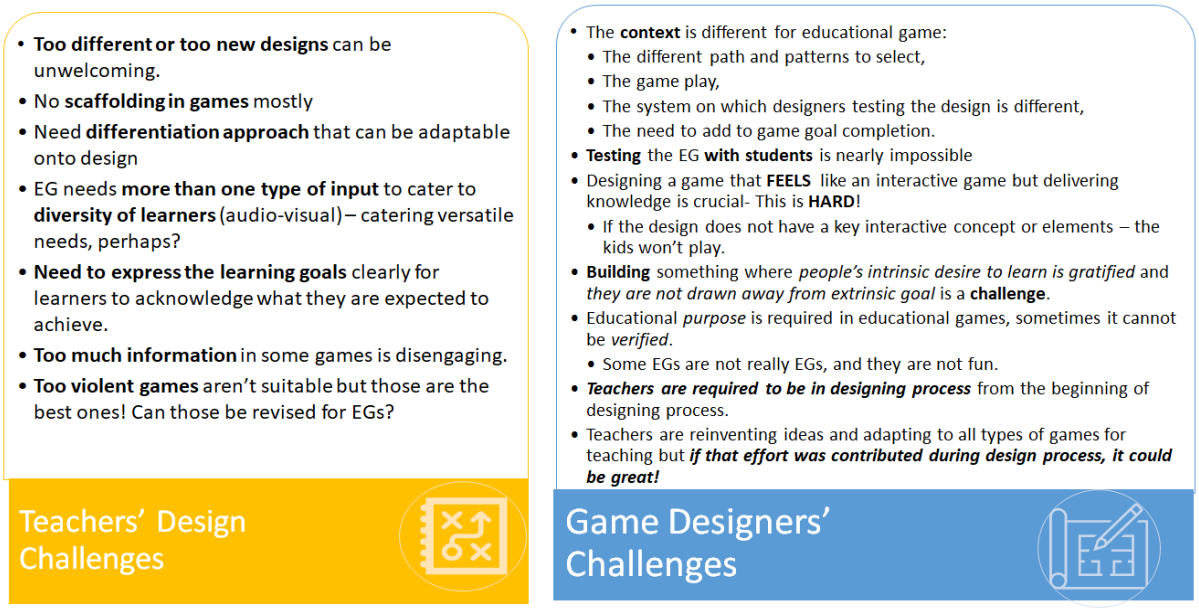

Figure 4: Design Challenges encountered by participants groups

Teachers further advocated the need to enable various learning abilities and develop more inclusive design options. Lastly, teachers advocated the need for adaptable designs to promote differentiation approaches and possibly aid teachers' needs to some extent. The reason for differentiation approaches or strategies potentially indicates the need for diverse, versatile interactive methods within the game design to accommodate instructions that are effective for high-ability students as well as students with mild to severe learning abilities (Weselby, 2022). Conceivably, the content and the learning environment of EGs can be designed in a way that caters to differentiated instructions or provides a variety of ways in which one task or learning outcome can be achieved or learned through the game design.

Design challenges encountered by GDs (Figure 4) complemented teachers' challenges. To begin, GDs addressed their awareness of reinvention and adapting ideas by teachers as they use games in the classroom and advocated the need for collaboration, for instance:

> *[GD_3]: "Teachers are reinventing ideas and adapting to all types of games for teaching, but if that effort was contributed during the designing process of EGs, it could be great!"*

> *[GD_1]: "Teachers use all games, not just educational games! Even Civilization is not really for educational purposes, but now it has reformed because of teachers being involved in later versions of the game sequel! With teachers, we can work wonders!"*

GDs asserted the need of teachers' requirements in the designing process to enable verification of game design (GD_2). Interestingly, GDs emphasized that assessing, testing, or verifying EGs is difficult, time-consuming, and limited in their project timelines. GDs acknowledged that mostly, the reason for EGs failing is because of a lack of teachers' insights into the design process. Lastly, in comparison with teachers' emphasis on differentiation inclusion within game design, GDs asserted this as a design challenge (GD_1).

> [GD_2]: "*teachers are required to be in a designing process from the beginning...because educational purpose is required in EGs, and sometimes it cannot be verified*".

> *[GD_1]: "Teachers use all games, not just educational games! Even Civilization is not really for educational purposes, but now it has reformed because of teachers being involved in later versions of the game sequel! With teachers, we can work wonders!"*

> *[GD_3]:"designing a game that feels like an interactive game but delivers knowledge is crucial but enormously hard!"*

This view reconnects with the environment (*situation*) in which learners play, and how the learning content is designed within the game. These findings suggest that, in general, game designers balance the process of designing games and EGs to some extent; but the factors stated above influence the requirements of each design distinctively. This resonated with the [GD_3] suggestions, below:

> *"Contextualizing how EGs are designed differently from other action-based games. The difference includes aspects like type of paths, patterns of selection, gameplay, system in which we design and test differently from which the players may play on, adding goal completion, or even the way instructions are designed… it is iterative and sophisticated!"*

Some additional points were noteworthy: (1) good games are costly, and schools disagree in implementing such games, (2) teachers' need to consider their students learning abilities as a priority to achieve engagement and understanding versatile levels of learning acquisition with every student. Here, the teacher mentioned their fear that the "*game failed to deliver what she thought was intended when she play-tested it*" [T_1] and versatile learning abilities is highly prioritized. Lastly, teachers wondered whether the game designers/publishers could narrow the age gap for EGs to achieve more focused and reliable expectations within the game levels progression. As teachers suggested:

> *[T_3]: I need to know my students' learning proficiency, and cater to larger learning abilities...*

> *[T_2]: It is always hard to predict their reaction and to watch them adapt to a new game is both great and frightening.*

Lastly, game designers added that it is important for EG to be context-based where "cooperative learning, explorative and discovery learning" can be enabled.

4.2 Prompt Question 2: What Are the Pains and Gains Of …

This question was prompted to participants to learn and understand what experiences the teachers and game designers have had with designing, using games, and collaborating to design EGs. Pains and gains are also sometimes used as 'hopes and fears,' which is described as one of the tools to accomplish such learnings from stakeholders in DT (Crawford, 2018, August 2). The purpose of this question is to give stakeholders the chance to identify and discuss their *pains and gains*. As a facilitator, it is crucial to create an emotionally safe environment for everyone while working to level the expectations and complete the activity. Figures 5 highlight the emerging views with quotes during data analysis.

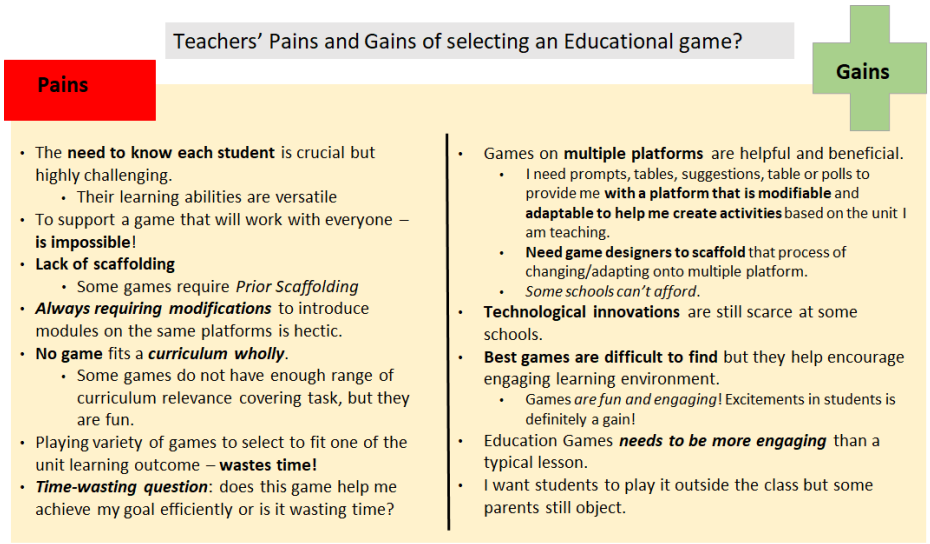

Figure 5: Teachers' quotes on pains and gains of selecting EGs

Figure 5 shows the common views discussed by teachers when the question was prompted: ***What are the pains and gains of selecting an educational game?*** Focusing on seeking their past confrontations of selecting EGs for their classrooms. These responses reveal that the wide range of ICT tools (hardware and software or even internet connection stability) that are available to schools within Australia may not always be sufficient. Teachers have mentioned that as they train other teachers, some tend to resist the change due to old learning strategies. Admittedly, teachers believed that 21st-century skills "*require a change in teaching strategies, but not all teachers find it beneficial* [T_4]".

- **Pains**: the emphasis on the following: knowing students' needs and learning abilities, lack of scaffolding within the game which requires prior knowledge and more time during classroom, games

require modification to accompany curriculum as no game fits curriculum wholly, selecting relevant games wastes time and this adds onto how game can help achieve learning goals efficiently to the students.

- **Gains**: teachers highlighted that: games should be on multiple platforms with modification and adaptability functionalities to add creativity tasks relevant to the curriculum, games need in-built function to scaffold the tasks, scarcity of technological innovations in school hinder tech-savvy students' expectations, and unable to find good games that are engaging and motivating.

Teachers indicated that adaptable games work effectively, save time and easy-to-use games/EGs provide an easy transition between learning activities.. Despite this, currently teachers contend with ICT scarcity in some schools, emphasising that the "*best games are difficult to find [T_5]"* Perhaps this reveals that the game designing industry and education sector are yet to converge to meet the necessities of their stakeholders and users of the system.

GDs' views and quotes shared (Figure 6) when asked: ***What are the pains and gains of designing an educational game?*** GDs revealed some views similar to those of the teachers and some reflective experience in terms of using and designing EGs. They highlighted that their 'fear' about designing EGs is that its neither fun nor educational "*If I'm not able to marry, like make the thing that I'm trying to educate on fun thing maybe it's difficult to construe it into an enjoyable topic?"* [GD_5]

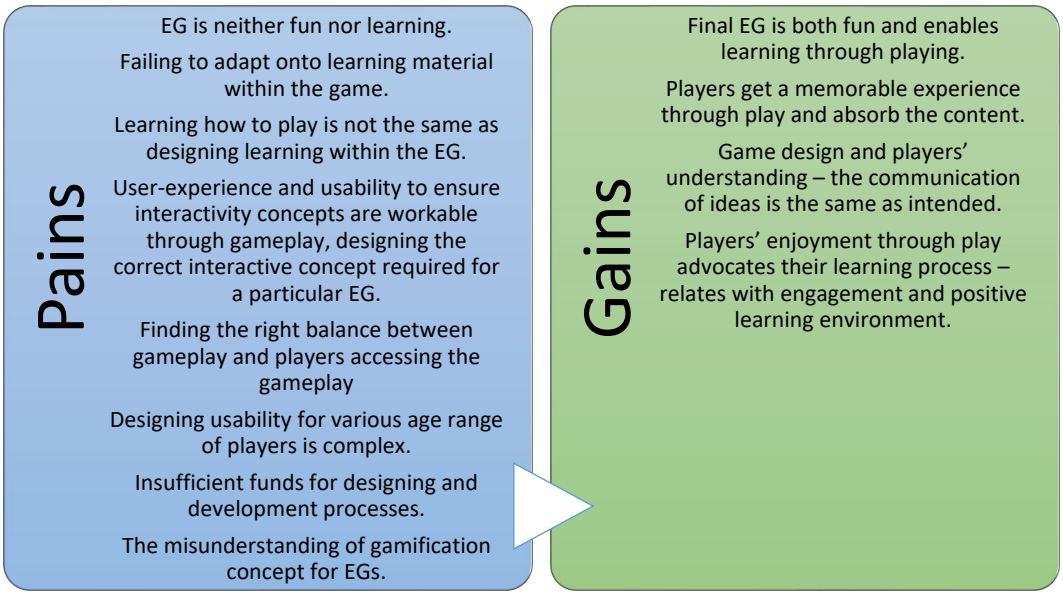

Figure 6: Presents quotes and summarised points from Game designers' participants

With that, some thought-provoking questions were prompted by them about how the balance between learning the topic through play can be achieved, as quote "*can the desired outcome matches the curriculum? [GD_5]*" or "*the learning outcome of the topic? [GD_6]*". This suggests that they would consider such thoughts when a teacher is not present in the designing or requirement gathering process. I argue that every topic has a possibility of being 'fun', although achieving this has been reported as being problematic (Tang and Hanneghan, 2014, Adams, 2010, An and Cao, 2017, Wei and Li, 2010). However, the reasoning was not clarified by the game designers. It can be assumed that due to the lack of collaborative designing with teachers implies that combining a subject-topic with fun element in an EG design is difficult to achieve. GDs added that player's psychology and target players' age can be researched and helps to some extent (see quotes below). Recognizing that this is a crucial requirement needed by game designers, it can be argued that there is a lack of empirical research studies (descriptive and experimental methods) noted previously (Keogh, 2021, Boud et al., 2013, Keogh and Banks, 2018), and it impacts game designers' practice of designing EGs for classroom players to learn their gameplay reactions or interactions with UX and the usability (Nagalingam and Ibrahim, 2015, Hagen, 2011).

[GD_2]: "the design theories related player's psychological/cognitive development allows me to research on the age group selection for design"

[GD_1]:"the design for each age range can make or break the game."

To summarise the *conversation starters* activity results, both game designers and teachers have sparked the responses based on their experiences towards using and designing EGs, and the suggestions, opinions, and views have demonstrated their expertise to generate creative and outside-the-box thinking where the designing and using of EGs is concerned.

5. Concluding Remarks

The *conversation starter* activity raised crucial points that were relevant to the needs and expectations of game designers and primary school teachers. This contextualizes the importance of why their experiences accumulated over time in their practice represent a strong interconnection with the way they *interact* with their audience (students as players and gamers/players). Additionally, it sheds light on what game designers identify as educational, what their challenges and barriers they encounter in designing processes, what are the design challenges, and how their practice as game designers has accumulated reflective knowledge and *growth* in the experience of designing games over time. Lastly, they also added the '*pains and gains*' of designing an EG and contextualized their points based on the demographic and context provided by the facilitator(myself) as primary school children (ages 6-11) and classroom. The summarized and prominent results are presented in the following paragraphs on EGs, and design challenges encountered by both groups of participants.

I observed that teachers' thoughts on *pain and gains (activity)* of selecting an EG appeared to converge on a surface level with the game designers' in designing an EG. Teachers and game designers projected similarities, as shown in the Figure 7 below. Although the similarities may seem like differences, but the teacher's comment on "good games are costly…" is relevant to game designers' comment about "Designing usability is a lengthy process…" which also leads to costly playtesting. Thus, the EGs tend to fall-into 'bad design' categories.

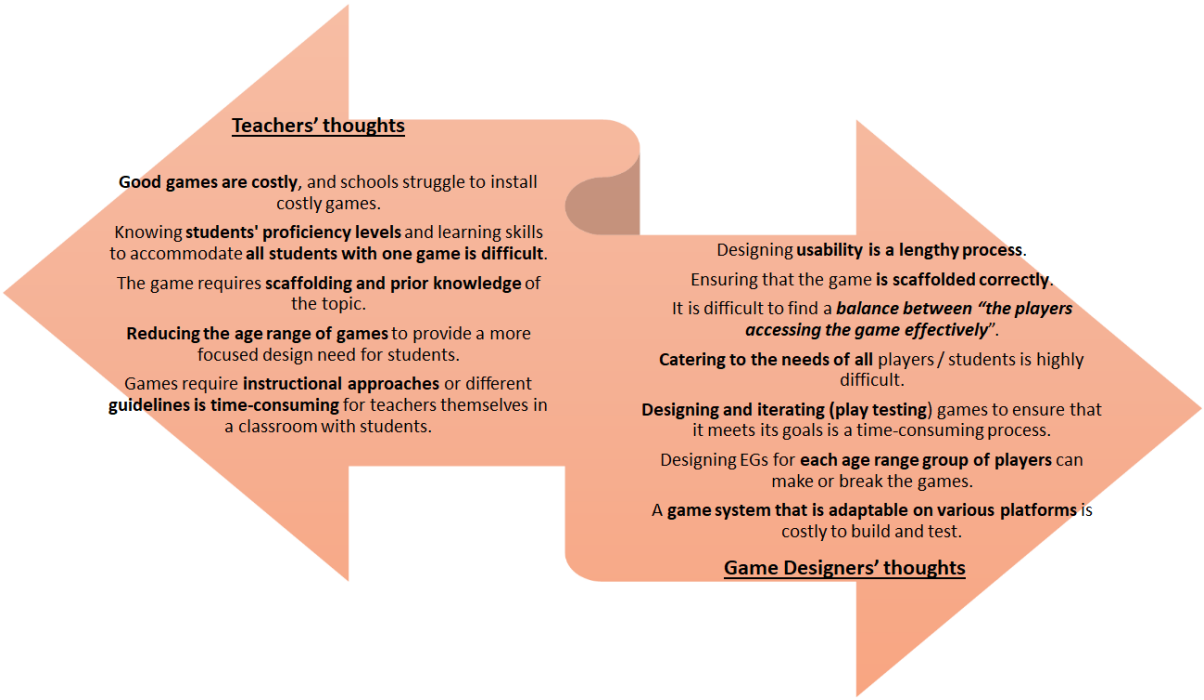

Figure 7: Parallels between both teachers' and game designers' responses about EGs

For further research, I would like the researchers in gaming, educational games design to consider the position of game designers and teachers in the designing process to help communicate, understand, and provide a platform for them where they can collaboratively discuss ideas. The Parallels and the methodology used in this case to help engage participants in designing thinking and creative techniques to ignite the questions that are normally unexpected. Sharing experiences from their practices suggested that there are reasons why teachers find good games costly because game designers go through a lengthy testing process, where EGs generally don't get through a testing process because of lack of funding. I would recommend re-designing questionnaire relevant to the prompts shared in this paper and perhaps apply in testing a game concept or prototype of the games between relevant stakeholders.

References

Adams, D. M. & Clark, D. B. 2014. Integrating self-explanation functionality into a complex game environment: Keeping gaming in motion. *Computers & Education,* 73**,** 149-159.

Adams, E. 2010. *Fundamentals of game design*, 2010 by Pearson Education, Inc.

An, Y.-J. & Cao, L. 2017. The effects of game design experience on teachers' attitudes and perceptions regarding the use of digital games in the classroom. *TechTrends,* 61**,** 162-170.

Barab, S., Pettyjohn, P., Gresalfi, M., Volk, C. & Solomou, M. 2012. Game-based curriculum and transformational play: Designing to meaningfully positioning person, content, and context. *Computers & Education,* 58**,** 518-533.

Boud, D., Keogh, R. & Walker, D. 2013. *Reflection: Turning experience into learning*, Routledge.

Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology,* 3**,** 77-101.

Braun, V. & Clarke, V. 2012. Thematic analysis.

Crawford, K. 2018, August 2. *Design Thinking Toolkit, Activity 13 – Hopes & Fears* [Online]. Atomic Object. Available: https://spin.atomicobject.com/2018/08/02/design-thinking-hopes-fears/ [Accessed 3rd February 2020 2020].

Dewey, J. 1938. *Experience and education: Kappa Delta Pi,* Rochefeller Center, New York, NY 10020, Touchstone NY.

Gee, J. P. 2003. What video games have to teach us about learning and literacy. *Computers in Entertainment (CIE),* 1**,** 20-20.

Gee, J. P. 2007. *Good video games+ good learning: Collected essays on video games, learning, and literacy*, Peter Lang.

Gunter, G. A., Kenny, R. F. & Vick, E. H. 2008. Taking educational games seriously: using the RETAIN model to design endogenous fantasy into standalone educational games. *Educational technology research and Development,* 56**,** 511-537.

Hagen, U. 2011. Designing for player experience: How professional game developers communicate design visions. *Journal of Gaming & Virtual Worlds,* 3**,** 259-275.

Hamdaoui, N., Idrissi, M. K. & Bennani, S. 2019. Educational Games Design: How to Create Adaptive, Engaging, and Fun Learning Experiences. *Handbook of Research on Immersive Digital Games in Educational Environments.* IGI Global.

Keogh, B. 2021. The cultural field of video game production in Australia. *Games and Culture,* 16**,** 116-135.

Keogh, B. & Banks, J. 2018. *Beyond startups: supporting Australian videogame culture* [Online]. Overland:Plemic/The Arts. Available: https://overland.org.au/2018/02/beyond-startups-supporting-australian-videogame-culture/ [Accessed 26 September 2021].

Khaled, R. & Vasalou, A. 2014. Bridging serious games and participatory design. *International Journal of Child-Computer Interaction,* 2**,** 93-100.

Kim, S., Chang, M., Deater-Deckard, K., Evans, M. A., Norton, A. & Samur, Y. 2017. Educational games and students' game engagement in elementary school classrooms. *Journal of Computers in Education,* 4**,** 395-418.

Kirriemuir, J. & Mcfarlane, A. Use of Computer and Video Games in the Classroom. DiGRA Conference, 2003. 1-12.

Könings, K. D., Brand-Gruwel, S. & Van Merriënboer, J. J. 2011. Participatory instructional redesign by students and teachers in secondary education: effects on perceptions of instruction. *Instructional Science,* 39**,** 737-762.

Könings, K. D., Brand-Gruwel, S. & Van Merriënboer, J. J. 2005. Towards more powerful learning environments through combining the perspectives of designers, teachers, and students. *British Journal of Educational Psychology,* 75**,** 645-660.

Könings, K. D., Seidel, T., Brand-Gruwel, S. & Van Merriënboer, J. J. 2014. Differences between students' and teachers' perceptions of education: Profiles to describe congruence and friction. *Instructional science,* 42**,** 11-30.

Leavy, P. 2022. *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches*, Guilford Publications.

Linderoth, J. 2012. Why gamers don't learn more: An ecological approach to games as learning environments. *Journal of Gaming & Virtual Worlds,* 4**,** 45-62.

Magnussen, R., Buch, T. & Misfeldt, M. Participatory design and opposing interests in development of educational computer games. Level Up: Digital Games Research Conference Proceedings, 2003.

Muller, M. J., Wildman, D. M. & White, E. A. 1993. Taxonomy of PD practices: A brief practitioner's guide. *Commun. ACM,* 36**,** 26-28.

Nagalingam, V. & Ibrahim, R. 2015. User experience of educational games: a review of the elements. *Procedia Computer Science,* 72**,** 423-433.

Squire, K. & Barab, S. 2004. Replaying history: Engaging urban underserved students in learning world history through computer simulation games.

Stieler-Hunt, C. & Jones, C. M. 2015a. Educators who believe: understanding the enthusiasm of teachers who use digital games in the classroom. *Research in Learning Technology,* 23.

Stieler-Hunt, C. & Jones, C. M. A model for exploring the usefulness of games for classrooms. Proceedings of DiGRA 2015 International Conference, 2015b. Digital Games Research Association, 1-16.

Tang, S. & Hanneghan, M. 2014. Designing educational games: a pedagogical approach. *Gamification for human factors integration: Social, education, and psychological issues.* IGI Global.

Varea, V. & Ndhlovu, S. 2017. Primary school games and play as inclusive/exclusive situations. *Ágora para la Educación Física y el Deporte,* 19**,** 158-176.

Wei, T. & Li, Y. 2010. Design of educational game: a literature review. *Transactions on edutainment IV***,** 266-276.

Weselby, C. 2022. *What is Differentiated Instruction? Examples of How to Differentiate Instruction in the Classroom* [Online]. Resilient Educator. Available: https://resilienteducator.com/classroom-resources/examples-of-differentiated-instruction/ [Accessed 1st January 2021].

Young, M. F., Slota, S., Cutter, A. B., Jalette, G., Mullin, G., Lai, B., Simeoni, Z., Tran, M. & Yukhymenko, M. 2012. Our princess is in another castle: A review of trends in serious gaming for education. *Review of educational research,* 82**,** 61-89.