How are DGBL techniques being used as educational tools in primary school classrooms to support learning and what impact do they have on students' classroom experiences?

Miss Eve Young

Student Registration Number: 100395365

Submitted in part requirement for the Doctorate in Educational Psychology (EdPsyD)

University of East Anglia (UEA)

The School of Education and Lifelong Learning

30th November 2025

Word Count: 39,936 (including figure and table descriptions and participant quotes; excluding table content, references and appendices)

Access Condition and Agreement

Abstract

In 2023, the UK government produced a framework to encourage further exploration on video games and related technology. Within Chapter One (Section 1.2) of this framework, the research potential for video games and education is explored through potential research questions. One research question asks: 'how are games used for teaching and learning, and what is their value in supporting learning?'. The current project aims to explore this question through a qualitative perspective on how DGBL is being used within classrooms, and what experiences, positive or negative, students are having whilst engaging with this novel pedagogical tool.

This qualitative study conducted 3 focus groups of 3-6 school staff (n=13), and 2 focus groups of 5 students (n=10) to gather both group's views. One student focus group was with a group of children who attended a Learning and Cognition Specialist Resource Base (SRB). The other student group was held with children attending a mainstream primary school. After transcription, the data was analysed using Thematic Analysis, following Braun & Clark's (2006) six-stage process to identify themes and commonalities within the data. The results are discussed and the potential merits and pitfalls of utilising DGBL within classrooms will be explored, with recommendations made on how to shape future iterations of DGBL tools.

Acknowledgements

I would like to express my heartfelt thanks to everyone who has supported me throughout my (especially long) thesis journey.

My deepest gratitude goes to my research supervisor Chris Clarke, for your guidance and continued encouragement, which helped guide me through this challenging process and provided me with exactly the right amount of support.

To my biggest supporters: my wonderful partner Jake and my beautiful stepson Felix, and little Bump — thank you for surrounding me with love, patience, and purpose. Special thanks to Bump, you have given me the motivation I needed to get through the final stages of this thesis, and I am so grateful for the gift of you at the end of my doctoral training.

To my family, thank you for your unwavering belief in me and for keeping me grounded through every high and low.

To the special people in my cohort, who have become lifelong best friends, thank you for your kindness, laughter, and constant (nagging) encouragement. Sharing this journey with you has been one of its' greatest joys.

Finally, my sincere thanks and gratitude go to all the participants who generously gave their time and insight. This research would not have been possible without you.

Contents

Glossary of Terms and Abbreviations

Term or Abbreviation	Full term
Player	Any person who is participating in video games or DGBL, for any period of time.
DGBL	Digital Games Based Learning
GBL	Games Based Learning
PC	Personal Computer
VG	Video Game
SG	Serious Game
NPC	Non-Player Character
DfE	Department for Education
CYP	Child or Young Person
SEND	Special Educational Needs and Disability
EP	Educational Psychologist
SRB	Specialist Resource Base
TTA	Traditional Teaching Approaches
RelTA	Relational Teaching Approaches
RTA	Reflective Thematic Analysis
TA	Teaching Assistant

List of Tables and Figures

CHAPTER ONE: Literature Review

Section One- Introduction

Chapter overview

This literature review aims to critically explore the role of digital game-based learning (DGBL) in primary education. The review will adopt a thematic literature review method and use Bronfenbrenner's Ecological Systems Theory (1968) as a guiding framework and structure which will start by considering factors relevant to how games and learning might impact the exosystem (government policy and national curriculum), the microsystem (the curriculum and classroom practices) and finally the child themselves.

The review will begin by clarifying ambiguous definitions surrounding gamification, Serious Games (SGs), and DGBL which will inform this study's definitions that will be adopted throughout the empirical paper. The literature review will then examine existing government policy and legislation relating to technology and games. Focus will then shift to analysis of the national curriculum and classroom practices throughout UK primary schools. While digital technology as a broad concept has transformed education, digital games occupy a unique position due to how they integrate interactivity, feedback loops and motivational mechanisms into digital learning tasks. There has already been an exploration into how general technology impacts education and the outcomes of Children and Young People (CYP); the advantages and pitfalls of screen time, the potential of "smart classrooms" and Artificial Intelligence (AI) to personalise learning will be discussed, with special attention to how these might impact student's learning outcomes and experiences. However, specific focus will settle on DGBL and its' role on student outcomes, particularly in motivation, engagement, and knowledge acquisition across core subjects are discussed.

The review also identifies substantial barriers to implementation of DGBL. Teachers' confidence, pedagogical beliefs, and lack of training are all explored, and issues of accessibility, inclusivity, and equity are discussed. The literature review aims to provide a critical lens regarding the

quality of the existing literature and whether the nuances and complexities of DGBL tools have been captured accurately and reliably.

The chapter concludes by identifying potential research gaps in UK-based, primary school-based research. The landscape of the literature is discussed, and different quantitative and qualitative approaches are analysed, and methodological gaps are identified. Qualitative approaches capturing student and teacher voices, alongside evaluations of widely used DGBL tools are considered.

Introduction

The Information Age is a period of recent history described as a shift from a traditional, manual industry to an economy and culture which favoured technologies which allowed for easier dissemination and communication of knowledge and information (Castells, 1996). For example, technologies such as Personal Computers (PCs) (which were the early hosts of the internet) and mobile phones became accessible to the majority of society and increased global connectivity which transformed how people work, communicate, and access knowledge and information (Pullig, 2023).

It is suggested that a contemporary stage of the Information Age, the Digital Age, began in the late 20th century when digital communication began to dominate all aspects of human life, going beyond basic information sharing (Floridi, 2014). The Digital Age places an importance on how we now heavily include technology in our everyday lives. McGonigal (2011) suggests that by 21, young people will have spent an estimated 27,000 hours using technology (UK Parliament, 2024). An estimated 10,000 of those hours are playing digital games (Skripkauskaite, Fazel, & OxWell Study Team, 2022)— roughly equivalent to the time they spend in education.

The impact of the Digital Age was brought to my attention when I was babysitting my cousin, who was 3 years old. I asked her if she wanted to read a book before bed and asked her to pick one out. She returned with an iPad, expertly unlocked it, clicked and swiped until she had a virtual “book” open, and this interaction made me question how the modern child experiences growing up with life

which has become so entangled with technology. I started to develop questions about the application of technology in general, the impact of increased "screen time", how the convenience of technology revolutionises access (for example, enabling entire libraries to be accessed through a single app) and the increased connectivity and social access technology provides. As I developed my career in education, I wondered whether technology could be harnessed to digitalise aspects of education such as homework, classwork or even the classroom itself. I had questions specifically about the application of digital games within the classroom, and whether they could be used as a novel tool for teaching. Furthermore, do students see the application of technology as useful, engaging or perhaps tokenistic, as a quick replica of the video game industry?

Use of Social Media

Questions have already been raised around the use of social media and its effect on CYPs mental health and development, with one study concluding that social media use on teenage mental health cannot be fully realised without considering other influential protective and risk factors of adolescent development (Panayiotou et al., 2023). Social media employs gamification methods (such as creating competition through number of "likes", similar to how video games might use "points", "achievements" or levelling systems). Both rely on instant feedback loops which feed into users' sense of achievement. This further justifies a need for exploration into the complex discussion surrounding technology, the internet and digital games and their possible effects on CYP.

Screen time within the home

Children in modern society have unparalleled access to technological devices compared to their parents and previous generations, and there have been numerous studies researching the impact electronic displays have on developing minds. The majority of research has yielded findings which indicate negative outcomes associated with excessive exposure to screens at home (Domingues-Montanari, 2016). McArthur, Tough & Madigan (2021) found that in early childhood, there was an association between a child's exposure to screens and poorer developmental outcomes related to language, behaviour and delayed achievements for developmental milestones. The House

of Commons collated research relating to video games, screen time and young people, and found that children aged 8-11 who used screens for more than two hours a day had reduced functions in working memory, processing speed, attention, linguistic skills and executive function compared with those who did not (Joneidy & Ayadurai, 2023). This is likely in response to rising public concerns regarding screen time and child development. The government has a duty to create evidence-based policy and ensure appropriate safety measures are in place for the wellbeing of CYP. Therefore, as concerns and screen time usage rise, there is a growing need for clear guidance on screen exposure. A year later, the House published a report on the impacts of electronic displays and provided guidance for parents and professionals on the amount of time CYP should spend on electronic devices (Education Committee, 2024). This could be a precursor of stricter government guidance; some countries have already enforced penalties and fines against parents who allow their children to use electronic devices excessively (BBC, 2023). In Australia, guidance denotes specific time limits for age groups. In summary, CYP under 2 should have no screen time; CYP between 2 and 5 should have no more than 1 hour per day and CYP between 5 and 17 should have no more than 2 hours per day (ACT Government, 2025). While international guidelines highlight growing concern about excessive screen use, they should be interpreted cautiously. There is a need for further evidence to be collated regarding screen time effects and whether the quality of digital engagement impacts such effects. Research suggests that the impact of screen time depends not only on duration but also on content, context, and parental involvement, with interactive or educational media often showing positive effects (Przybylski & Weinstein, 2017; Nikken & Schols, 2015; Stiglic & Viner, 2019). Strict enforcement measures, such as fines, may also be less effective than supportive approaches which promote objectives such as media literacy (Lauricella, Wartella & Rideout, 2015).

Internet Access

CYP's internet access has been a topic of debate within the literature, particularly after the COVID19 crisis, which saw an unprecedented increase in internet access and digital technology use. One global systematic review boasting over 29,000 participants found a 52% increase in screen time

during the pandemic compared to before (Madigan et al., 2022). However, it must be noted that this review used estimated statistics and participant's self-rated data, meaning its validity might be affected. The literature is associated with a mixture of findings which include developmental opportunities and wellbeing risks. For example, research indicates that internet access can enhance creativity, social connection and informal learning opportunities (Ito et al., 2010). However, unsupervised internet access has been linked to exposure to cyberbullying, inappropriate and harmful content, and safeguarding risks (Kowalski et al., 2014). Finally, excessive access and use of the internet have been linked to poorer sleep, reduced physical activity and increased social anxiety (Twenge & Campbell, 2018; Boer et al., 2020). These findings highlight that the digital environment can significantly influence CYP's outcomes and wellbeing, and therefore we must consider how we might encourage balanced use to support healthy online habits.

Within the classroom, students have felt they had increased resources within the classroom when they had access to the internet (Yang, Pan, Zhou & Huang, 2018). Therefore, this raises an important discussion regarding the equal access to information and the internet for all children. The internet is a vast and infinite source of knowledge and information, and this breeds ample opportunity for false or misinformation to be spread (Safieddine, Dordevic & Pourghomi, 2017). Therefore, educators must consider how they will teach students to identify false information and understand how to use responsible online sources (Polizzi & Taylor, 2019). When used responsibly, having access to the internet has been suggested to contribute to students' critical thinking, independent learning and motivation (Papanis, Giavrimis & Papani, 2010).

Section Two- Definitions

As novel concepts, Digital Games Based Learning (DGBL), Games Based Learning (GBL), gamification and video games have somewhat mixed and melded into synonymous terms and there has been much debate in the literature over their overlapping definitions (Becker, 2021; Schrader, 2023). This definitional complexity further justifies narrowing the review's focus to DGBL specifically;

other broader technologies have generally well-agreed definitions within the literature. This section will discuss the various definitions across the literature, arriving at the recognised definitions this paper will use and refer to.

Zagal, Debus & Cardona-Rivera (2019) suggest that the characteristics of games are embedded in the mostly instructional design which encourages intrinsic motivation. They go on to suggest that games are oriented towards one of three goals: winning, finishing or prolonging the game. For a game to be successful, players must have choices and strategies for success, providing players with opportunities for immediate feedback, sometimes termed “instant gratification” on their success (Gee, 2003). Games also allow permission for players to “fail”, commonly when their in-game characters “die” or the game cannot progress, which usually enables them to start again with increased skill, knowledge and motivation (Bushner, 2015). Rowe (1992) described the concept of a game to be a sequence or a goal designed to have no significant value; the completion or pursuit of which is to capture the player’s or spectator’s attention and engagement for their entertainment.

In contrast, gamification is described by Gregory et al. (2015) as use of game design (i.e., the mechanics and dynamics) in non-game contexts, such as the classroom. Non-game contexts are described as settings or contexts which are not designed primarily for entertainment or competition (Deterding, Dixon, Khaled & Nacke, 2011). For example, game environments might include a basketball court or a theatre. Non-game environments might be educational or workplace settings or public settings such as supermarkets or a dentist. Examples of gamification within education include applying concepts like levels, points and competition to the class, these could be achieved – for example – through “reward jars” where classes receive a “point” (sometimes represented as an object like a marble) into a “bank” (represented as a jar) as a reward for achievement. However, gamification is more than simply changing the labels of “rewards” to “points”. Christopoulos & Mystakidis (2023) explore the concept of gamification in depth and describe it as having multiple

dimensions such as character/player types, aesthetics, game mechanics and learning mechanics – all which influence the success of implementing gamification.

The creation or use of games for educational or learning purposes is sometimes referred to as a ‘serious game’ (SG), ‘game for learning’ or 'game-based learning' (GBL). It is important to note that there are subtle differences between these terms. SGs are games designed and intended for purposes other than entertainment. These alternative goals include training a skill, supporting a behaviour change, therapeutic purposes or to create a social impact (Zyda, 2005). They therefore might have an educational or informative aspect incorporated into the game. For example, a game which has been created specifically to inform and educate people about the dangers of drink driving would be considered an SG. A game for learning is a game designed with specific learning goals incorporated. For example, a game whose goal is for children to learn about the animal kingdom or learn how to touch type would be considered a game for learning. This differs slightly to an SG as it focuses on the *learning* aspect rather than creating a game whose purpose is to *present* educational content. Finally, GBL focus on the process of learning itself and aims to enhance this process through gamification approaches.

Becker (2021) provides a useful table (Figure 1, see below) which describes the terms. This set of definitions successfully identifies the small nuances between the different “strains” of teaching and learning approaches using games. However, there is still some ambiguity within the terms, especially to those who are unacquainted with the nuances of the different approaches and definitions. For example, the term ‘Serious Game’ has been misinterpreted as being synonymous with “real games” therefore leading to misconceptions that their purpose is for entertainment, rather than for education (Breuer & Bente, 2010).

Both SGs and GBL have been used in schools historically. Lopez et al. (2023) found that SGs have been used in the last decade and have provided positive outcomes for student’s cognition and learning achievements. They noted that SGs helped with active learning by encouraging students to

engage in content in an exploratory way rather than passively receiving information. However, it was also noted that including competition within SGs sometimes increased anxiety levels in students. Additionally, one meta-analysis examined the use of GBL in primary schools and found that it has gained popularity in recent years and is used broadly across different areas of learning, for example, to promote social communication, motivation and engagement (Alotaibi, 2024).

Becker (2021) also separates SGs and games for learning, which can feel convoluted as both aim to provide educational goals or academic achievements by design. I would therefore group these two terms together into "SGs" to create a concise and clear term.

Distinctions between Types of Teaching & Learning using Games

© K.Becker 2021	Game	Serious Game	Game for Learning (G4L)	Game-Based Learning (GBL)	Game-Based Pedagogy (GBP)	Gamification
Basic Definition	This term includes **BOTH** Serious Games AND Games for Learning	A game ***designed*** for purposes other than or in addition to pure entertainment.	A game ***designed*** specifically with some learning goals in mind.	The process and practice of ***learning*** using games. [From the ***learner's*** point of view]	The process and practice of ***teaching*** using games. [From the ***teacher's*** point of view]	The use of game elements in a non-game context.
Purpose	Can be for any purpose.	Change in behaviour, attitude, health, understanding, knowledge.	Normally connected with some educational goals.	**Not a game** - this is an approach to learning.	**Not a game** - this is an approach to teaching.	Often used to drive motivation, but can also be used to make something more playful and game like.
Primary Driver (why used)	Can be either play or rewards (or both).	To get the message of the game.	To learn something.	To improve learning. To increase learning effectiveness. **Note GBP & GPL are related, but not the same.*	To improve teaching practice & effectiveness. **Note GBP & GPL are related. They are like two sides of a single coin.*	Depending on how it's implemented, it can tap into extrinsic or intrinsic rewards (or both)

Figure 1: Definitions Table, taken from Becker, K. (2021). What's the difference between gamification, serious games, educational games, and game-based learning? Academia Letters, Article 209.

"Terms" describes the words or phrases used to label the most widely used approaches to teaching using games. For the purpose of this paper, I strived for clear and concise terms which are recognisable to those not familiar in the field. Key terms for this paper and their definitions adopted for this paper are outlined as such:

- "Gamification" is defined within this paper as the use of game elements within a non-game context. Gamification is an added layer to a concept, rather than a stand-alone product. Gamification can be applied to different contexts such as education, gaming or business. A supermarket providing shoppers with "reward points" for spending money with them would

be an example of gamification as the non-game context (the supermarket) is using game elements which has added to the value of buying their products. Gamification qualities can be present in SGs and GBL simply due to the necessity of including game aspects within whole games. However, gamification will still remain its own concept within this paper, defined as adding a game-mechanic to non-game contexts.

- "Serious Games" and "games for learning" will be defined as games explicitly designed for educational purposes and with learning goals in mind. Therefore, these games only exist within the educational setting for which it was created, however can provide entertainment for students as a by-product. This paper will use the term Serious Games (SGs) to encompass "games for learning" to ensure conciseness and due to their similarity in nature and objectives. An example of an SG is "Foldit" (University of Washington, 2025) which is a puzzle game used to educate medical students on how to fold 3D protein structures in the most efficient ways. There are specific learning goals relating to knowledge acquisition of protein structures; however, some players might also find this game entertaining due to its' puzzle-like nature.
- "Game-Based Learning" (GBL) will be defined as the use of games to facilitate the learning experience. These games are implemented to aid the learner's experience, rather than the act of teaching. For example, staff might use The Trading Game (Oxfam, 2018) which is a small group class activity which uses game elements to facilitate learning about global citizenship and economics.

There is a key distinction between SGs and GBL. SGs are primarily designed to teach or inform on specific knowledge, with less emphasis on the learner's experience. Conversely, GBL aims to facilitate learning by creating an engaging and motivating learning environment through the use of gameplay and game mechanics. Learning and knowledge acquisition occur as a natural outcome.

As we have progressed into the Digital Age, so too have the game-based tools we use to educate. Referred to as Digital Games Based Learning (DGBL), this term tends to encompass SGs and GBL which have a digital aspect (Anastasiadis, Lampropoulos, & Siakas, 2018). However, this term can be somewhat confusing, as it encompasses two terms which were previously distinct from one another. For example, Times Table Rockstars (Maths Circle Ltd., 2025) is considered a digital SG (DSG) and Minecraft (Mojang Studios, 2011) is an example of GBL. Both have been referred to as DGBL applications and share commonalities: an educational component, game-based learning features and a digital platform. This paper will adopt a broad definition of DGBL that includes all game-based activities with both educational and digital components. Under this definition, GBL and SGs are treated as synonyms. The paper recognises that the distinctions and nuances between DGBL and DSG remain and that some research contexts may require separate terms. However, the present study focuses on educational, game-based tools delivered in digital formats. For this reason, DGBL and DSG are merged into a single term for conciseness and to support a clear understanding among participants and readers of what DGBL refers to and how it will be explored within the aims of this research.

"Video Games" (VGs) are also a term related to DGBL, referring to a broad range of games played on electronic devices (Granic, Lobel & Engels, 2014). Again, here Minecraft (Mojang Studios, 2011) can be considered a VG, a game played for entertainment with coincidental gamification qualities but has some aspects which can be adapted for learning outcomes. Therefore, Minecraft (Mojang Studios, 2011) is both a VG and an example of DGBL. There are however, VGs which have little to no aspects that can be turned into learning outcomes. For example, First-Person Shooters (FPSs) are VGs which do not align with any of the curriculum values and do not provide educational feedback loops; therefore, making them pure VGs for entertainment purposes only.

However, for the purpose of this paper, DGBL shall be used as an umbrella term to describe any digital game – serious or not – used for the purpose of education and learning. Please see Figure

2 for a visualisation of examples within the terminology overlap. The definition will be adapted from Clark et al. (2016) and is as follows:

- DGBL involves using digital games (which inadvertently use gamification qualities) for learning activities through electronic mediums (such as video games or apps, delivered via PCs, laptops or iPads or otherwise) that aim to improve students' learning outcomes by balancing educational content and gameplay.

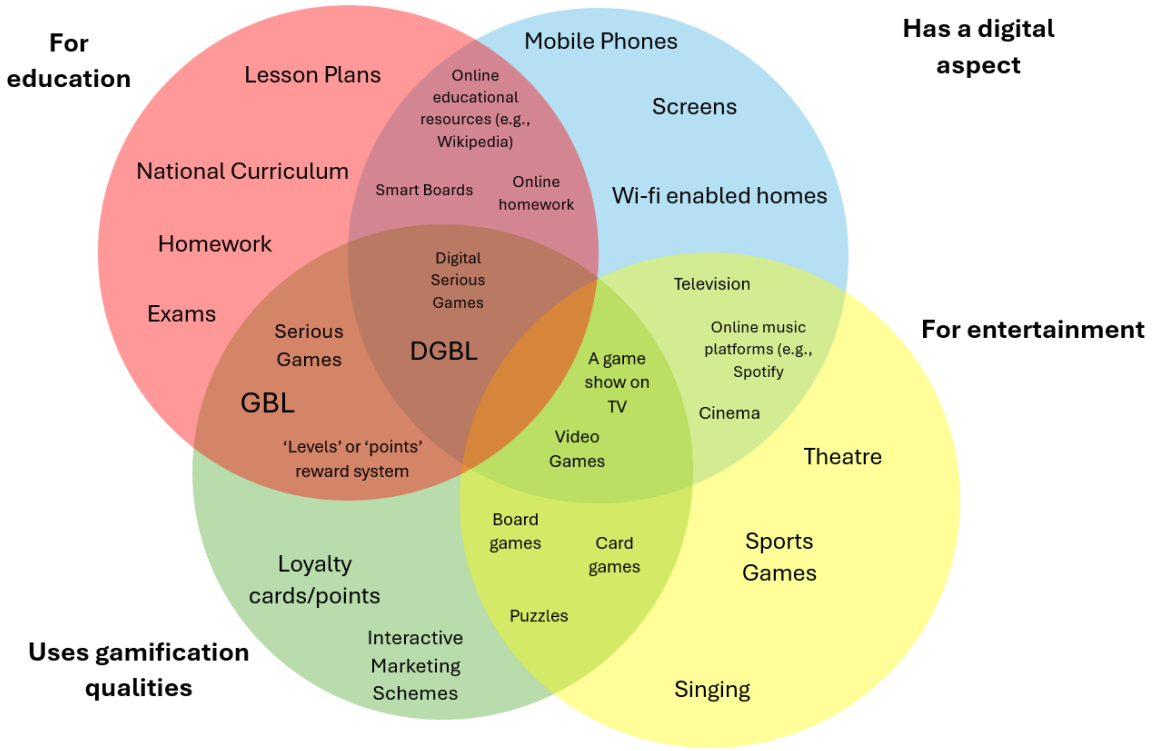


Figure 2: A visualisation of examples within the terminology overlap.

There are other important related terms outside of the realm of education and games which will be referred to in this paper. For example:

- iPads are digital technology devices which can be used for both educational and recreational purposes (Scibora, Mead, & Larson, 2018). Therefore, an iPad might be referred to as a form of DGBL as it is the conduit for which DGBL is being delivered (via apps and/or the internet).

- The internet is described as a vast network which connects internet-enabled technological devices around the world, enabling individuals to communicate, share information and connect virtually (Encyclopaedia Britannica, 2025).
- “Screens” refers to the electronic display on a technological device (Blankenbach, 2016). These devices omit continuous levels of light when on, which has sparked ongoing and inconclusive debate around the potential health impacts of light before sleeping (Hartstein et al., 2024) The time spent in front of screens is referred to as “screen time”.

To conclude, there are undeniable difficulties in defining these overlapping terms. This can be problematic when exploring the reliability and validity of DGBL research. For example, when researchers use overlapping or inconsistent definitions for key terms it becomes difficult to compare results and identify patterns. Vlachopoulos & Makri (2017) highlight that conceptual confusion in terminologies undermines the methodological rigor of empirical research. Furthermore, outcomes may be mis-attributed, for example, a study might claim to test “DGBL” effectiveness but use games with no educational aspects or intent (Wouters et al., 2013).

One literature review explored the methodologies being used in DGBL studies and found different definitions of key terms and different interpretations of what activities encompass DGBL which impacted on comparisons being made due to the inconsistency of terminologies and definitions (All, Castellar & Van Looy, 2014). It is therefore important to establish definitive and clear definitions for key terms. Appendix One provides a further table of key terms and their definitions.

Introductory Sections Conclusion

The previous sections aimed to orient readers to the continually evolving landscape of technology in education. It highlighted the growing integration of technology into not only our lives but our primary school classrooms. This section also aimed to address and clarify the numerous definitions and terms attributed to DGBL, SGs and gamification. It provided a clear set of terms and definitions this study will adopt. The following sections will examine DGBL in more detail, starting

with exploring the wider social and political landscape and ending with examining what impacts DGBL has to the individual learner.

Section Three- The Literature Review

Scope of the Review

This literature review aims to provide a clear picture of the themes within current research in relation to the implementation and use of digital technologies and DGBL in primary schools, and based on these insights, identify where there are knowledge-gaps to provide a clear rationale for the current research study. Although digital technologies in general influence the educational landscape, DGBL warrants its' own focused investigation as it constitutes as its' own distinct pedagogical tool which utilises mechanisms which differ from other technologies such as screens. Therefore, I adopted a bottom-up approach which follows Bronfenbrenner's Ecological Systems Theory (EST) (1979) as a guiding framework. The review aims to start at the macrosystem as described in EST by examining the wider social and political landscape and explore how policy and government agenda might filter down through successive systemic layers. EST describes the "filtering down" and connections between system layers the mesosystem. I will then investigate in detail the exosystem and microsystem around the child, exploring curriculum design, classroom practices and teacher perceptions. Ultimately, individual outcomes related to student attainment and wellbeing will be explored, which is the inner core of EST. By adopting this perspective, the review hopes to highlight the interconnectedness of these layers, illustrating how technology in education is not merely a pedagogical choice but one deeply embedded within broader structural, social and political contexts.

A systematic review was considered but not adopted as there is limited research available on the niche topic of DGBL which the review narrows its' focus to. Therefore, there was a need to consider and include different types of literature (e.g., not yet published literature, literature from international sources etc.) which may have been excluded if using a systematic literature review. Furthermore, a thematic review allows for rich discussion of themes that are relevant to the topic

(Snyder, 2019) which I feel is necessary considering the complex and overlapping nature of the research which has been carried out so far.

Search Strategy

Extensive internet searches of the literature were made between June 2024 and September 2025, via the university library website and Google Scholar search engines. I found that the UEA library sometimes did not show up key relevant papers when the key search terms were used, however these did show up on Google Scholar. Therefore, papers from both platforms were included. Specific databases were also used: Science Direct, EBSCO (PsycINFO) and Scopus using key inclusion terms (please see below).

Inclusion and Exclusion Criteria

A set of inclusion and exclusion criteria were created to generate a standard of literature used to make clear the focus of the literature search, and to ensure the topic was fully searched.

I only selected papers which could be accessed fully either publicly or through my UEA access. I did not set an inclusion criterion related to the dates of publications, however due to the nature of the research, all papers were within the last 50 years. I did not set any inclusion criteria relating to methodology; sample size or location the paper was published. This was deemed necessary as the literature pool is still growing, particularly for UK research.

I found that the following inclusive search terms yielded relevant and specific results for an initial search:

Terms (grouped synonymously)	Rationale for inclusion
'Education' or 'school' or 'teaching'	To provide focus on educational contexts, particularly schools.
'Gamification' or 'game-based learning' or 'digital game-based learning' or 'gamify'	To provide focus on gamification and DGBL rather than games in general.

'Primary school' or 'elementary school' or 'primary education' or 'elementary education'	To provide focus on primary school research in line with the research question.
'Students' or 'pupils' or 'children within the classroom'	To provide focus on student perspectives and outcomes.
'Teachers' or 'School staff'	To provide focus on teacher and staff perspectives and outcomes.

Table 1: List of terms and their rationale for inclusion

It is also important to note that within the inclusion terms, the terms were required to be in the abstract of the paper. This was due to the initial searches yielding too broad a range of papers, where the focus was not on games and education.

I found that using solely inclusive search terms yielded many medical-focused papers around gaming and addictions. The abstracts of papers were reviewed and discounted if they related to the following terms:

Terms (grouped synonymously)	**Rationale for exclusion**
'Video games' or 'computer games' or 'gaming'	There is a definitional difference between this group of terms and the construct of games for educational purposes that I was seeking.
'Medicine' or 'medical'	There were lots of clinical and medically based papers which were returned by initial searches, and these were deemed irrelevant to my focus.
'Diagnosis' or 'diagnoses'	
'Addiction'	There were lots of papers which explored video game addiction which was outside of my focus, therefore the term was excluded.

Table 2: List of terms and their rationale for exclusion

Additionally, I included a "snowball method" (Jalali and Wohlin, 2012) meaning I read the papers yielded from the initial search and noted any papers which were repeatedly cited in these papers. These new papers were then included in the literature pool. The reference lists of papers

were also analysed, and reoccurring papers across the reference lists were also sought after and included. This reduced the likelihood of me shaping and influencing the paper selection and supported me to be objective when organising the literature review thematically (McDonagh et al., 2013). I felt the "snowball method" was necessary to include due to the niche nature of the literature pool, and the diverse nature of the literature which was not easily captured by the initial search. As Kitchenham et al. (2009) note, this approach is especially valuable in fields with an evolving body of research, as it helps track how key themes and methodologies have developed over time.

Criteria and process for organising, retaining, merging and discarding themes/subthemes

A theme was retained where it demonstrated recurrence throughout the literature, for example where it appeared consistently across multiple high-quality studies and/or sources rather than in an isolated study. Furthermore, where the theme added depth, theoretical insight or analytical clarity it was retained. Finally, themes were retained when they could be clearly located within the ecological systems of Bronfenbrenner's Ecological Systems Theory (EST). Where there were two themes which had closely overlapping or related constructs (for example, engagement and motivation) I chose to group or merge these themes. I also grouped themes related to where they were situated within EST. I chose not to include or to discard themes which were interesting but not directly related to the research question and main focus of DGBL.

To organise themes and aid in theme development within the literature review, I used EST as a guiding framework. Using EST prompted me to consider how different layers of research influenced one another. For example, I knew that research and legislation set out by the UK Government would influence the design of the curriculum, subsequently influencing the experiences of students. This therefore led to the organisation of the literature initially at the exosystem level (e.g., wider technological developments, policy, and institutional systems influencing DGBL implementation), followed by the microsystem (e.g., classroom practices,

teacher–pupil interactions), and finally research centred on the child or young person (CYP) and their direct experiences of DGBL. Please see Figure 3 for a visualisation of this framework.

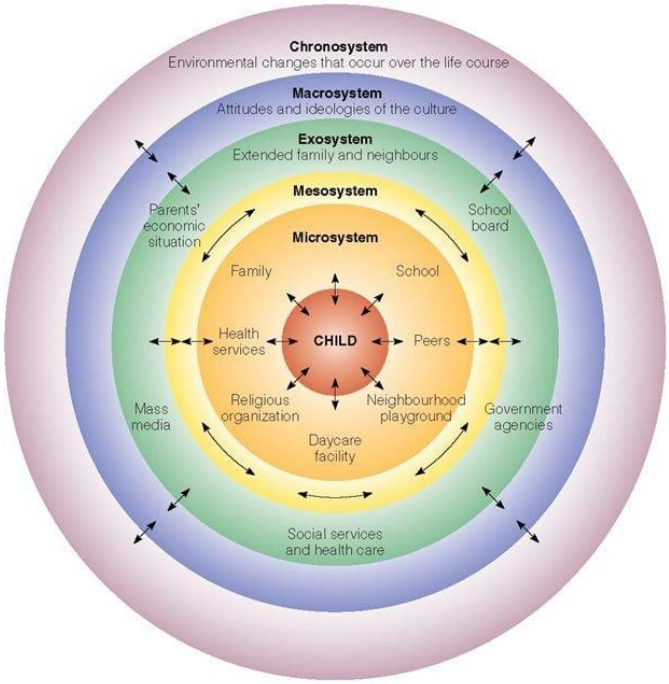


Figure 3: A visualisation of Bronfenbrenner's (1979) Ecological Systems Theory, (Guy-Evans, 2025,).

In methodological terms, theme development involved deductive reasoning as I used EST as a framework to analyse and organise the literature themes into pre-existing categories and exploring the theories themes are related to. There was also an element of abductive reasoning through the literature review process as emerging insights from the literature prompted me to move between exploring theory and themes within the literature and refining how ecological systems informed the organisation of these findings.

Section Four- Technology, The Government and Policy

Ofsted's cultural shift towards technology

As technology and video games grow in popularity and usage they are becoming significant areas of interest for mainstream organisations such as international private companies, government-funded organisations and governments themselves. A UK-based example of an educational

organisation is the Office for Standards in Education, Children's Services and Skills (Ofsted), a government body who inspect and regulate educational institutions and services (UK Government, 2025a). In 2012, Ofsted announced its intention to become a "digital service by default," signalling an organisational shift towards embracing digital technologies (UK Government, 2025a). This is noteworthy as it highlights Ofsted's recognition of technology as being a useful tool for their service in an administrative capacity. By adopting a digital format for their own internal operations, Ofsted sent a clear message that technology is becoming an accepted element essential to the progression of modern education. This is further supported by Ofsted's recent October 2025 guidance which states that it will support and encourage the use of Artificial Intelligence (AI) within school settings (Ofsted, 2025). Following this guidance, Ofsted will now consider the impact of technology in their inspection criteria, demonstrating a clear priority to include and evaluate how technology is being used within the classroom and what impact this is having on students' experiences.

The UK's 2019 Education Technology Strategy

The Department for Education (DfE) created a national strategy to recognise the potential for technology in education (DfE, 2019). Their aim was to support the education sector to embed technology into its' practices, and increase efficiency, decrease workload, and ultimately provide improvements in educational outcomes. They focused on providing digital infrastructure in schools, promoting digital safety and skills, and improving their own digital services. This paper was one of the first whose main focus was education and technology, and it set the foundational goals for future technology development within education. It also laid the groundwork for the UK's increasing engagement with educational technology.

The UK Government's 2022 White Paper

The UK Government released a White Paper called "Opportunity for all: Strong schools with great teachers for your child" in 2022 recognising that technology in education was a potential tool for supporting efficient delivery of teaching and inclusive practices to improve student outcomes (DfE, 2022a). They set out 3 core ambitions:

- For all schools to have established infrastructure to enable digital technology access for pupils
- To create environments where schools can use technology to support the use of evidence-based practices
- To distribute £150 million in funding to support schools in priority areas upgrade their connectivity to meet standards.

To meet the final goal, they included guidance on how schools can meet standards of connectivity. This manual covers broadband, digital devices and connectivity (Uk Government, 2025b).

This paper was a continuation of the goals set out in the DfE (2019) Education Technology Strategy. Both papers focus on technology as a tool to support education, mainly aiming to increase access to resources such as the internet and digital devices.

The UK's 2023 Framework

In 2023, the UK government issued guidance announcing the creation of a video game research framework aimed at exploring video games and related technology (Department for Digital, Culture, Media & Sport, 2024). The purpose of this guidance is to grow an evidence base to determine whether video games have positive, negative, or neutral effects on aspects of users' lives. It is hoped that these future findings will inform key stakeholders, including players, academics, policymakers, and game developers on how the features of video games work, and the influence they have on outcomes such as engagement, motivation, socialisation and cognitive development.

Although the primary focus of the framework is on video games, it leaves room for broader exploration into related contexts, such as DGBL and gamification. The framework is structured into three core chapters (see Appendix Two for full detail), and within Chapter One (Section 1.2), the research potential for video games and education is explored through potential research questions (See Appendix Three).

This framework serves as guidance and foundation for research exploring educational gaming and has the potential to inform both theoretical frameworks and practical applications, driving advancements in pedagogical methods, curriculum design, and educational policy. It also highlights a shift in the UK's priorities from increasing access and securing technological infrastructure, to focusing more specifically on games and their potential as educational tools.

Technology in Schools Survey

In 2022, IFF (Industrial Facts and Forecasting) research was commissioned to conduct a Technology in Schools Survey to explore best practices for implementing technology that supports reduced workload, increased student outcomes and cost efficiency (DfE, 2023b). Their findings were published in 2023 and revealed that although many schools reported good connectivity to the internet, rural schools faced some challenges. The survey found that 4 of 5 school leaders felt that 75% or more of their staff were confident using education technology (DfE, 2023b). This contrasts with previous literature; for example, a study by EdTech, commissioned by the DfE (DfE, 2021a), surveyed teachers about their confidence in using technology, and 45% responded that confidence and skill was a barrier to technology implementation. However, these two findings cannot be directly compared due to the different methodologies used; however, this does suggest that school leaders perhaps perceive staff to be more confident than staff perceive themselves to be. The DfE (2021b) conducted research during the pandemic into teacher's confidence using education technology to deliver remote teaching. They reported that around one third of teachers reported feeling a lack of confidence. Though not funded by the government's initiative, further research is being conducted by UK organisations to investigate school staff confidence with education technology. For example, UK Research and Innovation (UKRI) in partnership with the University of East Anglia (UEA) are currently investigating teacher's sense of agency and self-confidence using technology for teaching and learning (Gordan, no date). These findings are relevant to DGBL exploration and evaluation because teacher confidence directly shapes whether games and DGBL can be meaningfully implemented in classrooms.

Finally, within the findings of the IFF Research it was revealed that schools experienced barriers such as outdated equipment, lack of technical support staff and inconsistent access to digital devices, which was particularly prevalent for students of economic disadvantage (DfE, 2023b). The survey highlights the need for increased funding for equal access to technology, and future research to explore how more specific areas of technology such as DGBL are being used within classrooms. There is also a clear need for increased training opportunities for staff to understand how to implement education technology effectively. This is clearly on the government's agenda as from 2025, individuals undergoing teacher training must complete training to understand how to effectively use assistive technology for children with Special Educational Needs and/or Disability (SEND) (DfE, 2025b).

Regulating Technology

Ofsted released a statement in 2024 announcing their approach to AI which echoes the position of the UK Government, which was set out in their 2021 National AI Strategy. Both entities strive to include AI as part of their internal processes and believe it can aid in efficiency and autonomy (UK Government, 2025c). As previously discussed, Ofsted then provided further guidance in 2025 which supported AI use in schools (Ofsted, 2025). This is important as technology and AI are somewhat controversial topics, partly because they are not yet fully understood. Thorough research and evaluation are needed in the future to understand how AI and technology in general can be used responsibly and ethically. The UK Government has recognised that technology is outgrowing our current knowledge and practices and has called for a reform of its' regulatory process to account for new technologies (UK Government, 2022). The Government has released an AI Safety Expectation Framework, which is one of the most detailed set of expectations for use of AI in education in the world (DfE, 2025a). Many DGBL platforms increasingly incorporate AI features, such as adaptive learning algorithms, personalised feedback, and automated assessment algorithms. This framework establishes standards and guidelines for the safe, ethical, and effective integration of AI-driven tools in educational settings. The framework ensures that these technologies are implemented

responsibly, protecting student data, promoting equity, and maintaining pedagogical integrity. Consequently, schools can use the framework to guide the selection, deployment, and monitoring of technology-based pedagogical tools within the classroom. This regulatory focus is essential for monitoring DGBL as many game-based platforms now utilise AI as part of their operating system. The AI Safety Framework will help to regulate the way DGBL are designed and implemented relating to AI use.

There is a clear call from the UK Government for future research to focus on the use of technology and video games within the classroom, and the current research could be used to inform future policies and guidance which will support positive outcomes for students across the country.

Section Five- The Curriculum, academic outcomes and DGBL

The National Curriculum

The UK curriculum has been curated and established since its conception in 1988 as part of the Education Reform Act (UK Government, 1988). The national curriculum sets out the subjects and topics taught in schools. It is a framework which schools are encouraged to interpret and deliver as they see fit. This leaves scope for schools to consider implementing technology and games-based learning (GBL) within their classrooms.

The curriculum includes 3 core subjects (Maths, English and Science) and further foundational subjects. Primary aged children are expected to be taught computing and design & technology throughout their educational journey. There are clear goals set out within the current curriculum which aims for students to complete before the end of their educational journey. For computing, these are:

- To understand and apply concepts of computer science
- To analyse computational problems and have experience writing computer programs
- To evaluate new or unfamiliar technologies
- Be competent, confident users of computer technologies

For Design & Technology (DT), the goals are as follows:

- To have expertise needed to perform everyday tasks confidently and contribute to a technological world
- To build skills to design prototypes and products for users
- To critique and test their ideas and products on others
- To understand and apply the principles of nutrition

The most relevant goals related to technology are to have a clear understanding of how technology works, have skills to use technology effectively, and to evaluate and use technology responsibly. It is therefore in the interest of the national curriculum for research to be carried out which can inform schools how they can achieve these targets.

McCormick (1990) notes that the nature of "technology" is difficult to define within the curriculum as it encompasses a wide range of subjects such as computer science, Information Technology (IT) and DT. There is perhaps scope in the future for a reform of the foundational curriculum subjects to include a new subject focused solely on technology, digital devices and game-based learning technologies.

Voogt & Roblin (2010) examined eight different frameworks internationally, and explored their rationales, goals and definitions for 21st century competencies. They found that there is an inconsistency between intentions and practices within frameworks, and suggested that for IT, a new set of literacy competencies should be created which reach beyond basic operational knowledge.

Furthermore, Polizzi (2020) explored digital literacy and the UK national curriculum and argued that there is a mismatch between digital literacy skills attained and how the curriculum promotes digital literacy mastery. The curriculum does not yet consider digital literacy as academically credible, and is therefore largely omitted (McDougall & Livingstone, 2014). This again

highlights a gap or oversight in the UK curriculum to consider the power and commonality of digital technologies.

Relating specifically to GBL, Scotland released its' Curriculum for Excellence (CfE) which encourages the use of GBL and DGBL within classrooms (Education Scotland, 2018). Within this framework, it states that digital literacy should be at the heart of all learning, such as literacy, numeracy and wellbeing. This provides clear guidance for schools and also places a huge importance on DGBL as an integrated part of the curriculum. Razak, Connolly & Hainey, (2011) conducted a large-scale survey which explored how DGBL were implemented within the CfE. They found that problem-solving and memory skills were the two most important skills DGBL tools yielded. Furthermore, curiosity, pleasure, co-operation and challenge were the highest rated reasons for incorporating DGBL into learning within primary schools.

Section Six- Technology within Classroom

Screen time at school

Screen time at school can have different meanings. For example, students might use screens as part of non-academic rewards or activities (e.g., playing games with no educational content as a reward for engaging in a difficult lesson) but equally they might use screens as a tool to deliver learning- for example through DGBL activities. I found limited research studies which have explored and investigated the effects of screen usage within education settings, both for academic and non-academic activities. Research seems to focus on the effects of recreational screen time on children outside of the classroom rather than within educational contexts. This could perhaps be due to educational technology still being an emerging tool and niche topic for research.

For non-academically based screen time, teachers felt it could take up to 20 minutes to refocus students after engaging in a non-academic activity (NASUWT: The Teachers Union, 2023). However, NASUWT do not specify how they define a "non-academic activity". This raises questions around what they considered non-educational use, particularly given the increasing integration of

technology in teaching and learning. Without a clear definition, the validity of the claim is difficult to assess.

Furthermore, it has been argued that learning differences or difficulties could be masked or replicated through the effects of increased screen time (ASCL, 2023). This raises a question about responsible use of technology, and perhaps limiting or monitoring use within classrooms is something professionals must consider before implementing them.

Electronic Home and Class work

Although the impact of screen time on CYP development remains a subject of ongoing debate, educational policy highlights its potential to enhance learning. The Department for Education (2021) reports widespread use of interactive whiteboards and tablets in primary schools, with effectiveness contingent on teacher expertise. Other examples of electronic or digital learning applications are: online phonics learning via programmes such as Read, Write, Inc (RWI) (Oxford University Press, 2020), and Nessy (Nessy Learning, 2025); computing curriculum delivered through programmes such as Purple Mash (2Simple, 2025) and using Microsoft Teams for digital classrooms and homework distribution (Passey, 2019). There are a growing number of digital curriculum-based pre-made packages and programs which are now available to schools to purchase as part of their curriculum budget. These packages are from third-party companies who have created subject-specific DGBL activities to target skills (e.g., literacy, multiplication or reading fluency).

There is a notable research gap assessing specific programs like those aforementioned. For example, “Times Table Rockstars” (TTRS) (Maths Circle Ltd., 2025) is an app and pre-made package offered to schools to teach students multiplication and division skills. It is one of the most widely used DGBL applications in schools (Thomson & Wright, 2024), boasting use in almost 16,000 schools (95%) (SHINE Trust, 2025) and 17,000 worldwide (Maths Circle Ltd., 2025), however I found extremely limited academic research related to the efficacy, underpinning psychological theory or mechanisms of TTRS (Maths Circle Ltd., 2025). One preliminary study based in a primary school in

London found that children with TTRS (Maths Circle Ltd., 2025) logins were engaged and reported enjoyment in learning times tables (Viridis School, 2019). Children with TTRS (Maths Circle Ltd., 2025) logins became more confident in their ability to use times tables. However, this was a small-scale study (n=9) which looked at outcomes over one academic year. The study aimed to match students in the control group and experimental group based on their academic levels but did not account for other variables such as confidence using technology or ability to perform under pressure (for example, TTRS (Maths Circle Ltd., 2025) uses a timer function) which impacts the validity of results.

Another under-examined DGBL program is Kahoot! (https://kahoot.com), a DGBL platform which uses multiple choice quiz-style games to teach students about different academic topics. Kahoot! (https://kahoot.com) also has a limited evidence base behind it (Wang & Tahir, 2020). One study which included Kahoot! (https://kahoot.com) and similar platforms found these pre-made package programmes enhanced student performance compared to students who were not exposed (by comparing average test scores) (Sarkar, Ford & Manzo, 2017; Turan & Meral, 2018; Głowacki, Kriukova & Avshenyuk, 2018). However, findings focus on higher education students and there were virtually no studies conducted in primary schools, none of which represented primary schools in the UK (Wang & Tahir, 2020).

Homework has been analysed for efficacy in recent years, and some schools now decide to be “homework free” to reduce stress and pressure on students (Trautwein, 2007; Rosario et al, 2019). However, for schools who still use homework, many are turning to digital distribution (Magalhães, Cunha, & Ribeiro, 2020). Benefits of digital homework include instant and individualised feedback (Lunsford & Pendergrass, 2016), reduced workload for teachers marking homework assignments (Ismail et al, 2014) and for students to monitor their own learning progress and encourage practice (Rodriguez & Smith, 2016). Instant and individualised feedback can be related to behavioural theories of learning, which poses the idea that learners are reinforced by immediate

consequences (positive and negative reinforcement) (Gordan & Krishanan, 2014). This helps learners associate their actions with consequences in real time, meaning they can adjust their behaviour accordingly towards a positive outcome.

However, there are some drawbacks to digital homework. For example, platforms which allow multiple submissions of work can encourage students to use a trial-and-error method, resulting in false data and learning progress (Kortemeyer, 2015). Furthermore, platforms tend to emphasis answers rather than the reasoning or journey to the solution (Mendicino, Razzaq, & Heffernan, 2009). Some may argue that learning can be thought of as a process whereby students build skills by integrating new and established knowledge (Piaget, 1954). Therefore, if a student does not understand reasoning or explanations for new knowledge, they might not be able to integrate it into their existing knowledge.

The "Smart" Classroom

Theories of agency, one being Self-Determination Theory (SDT), suggest that when learners feel in control of their own learning process and are being driven by motivators important to their personal values (also called intrinsic motivation), they will experience more enjoyment and therefore motivation and engagement (Deci & Ryan, 2008). Newhouse (2015) suggests that "Smart" classroom technology can promote motivation and productive learning because it increases agency and collaboration in students. Therefore, if "Smart" classrooms enhance students' agency, their motivation and engagement will be enhanced too.

The "Smart" classroom uses digital technologies to enhance the classroom environment and has been a well-studied research topic since around 2012 (Yang, Pan, Zhou & Huang, 2018). For example, using visualisers and Smart whiteboards were commonly used, and teachers found them useful for sharing work and demonstrating solutions to students (Hunt, 2022). Education technology has been shown to improve students' skills to use technology to engage in society, improve learning

outcomes, increase engagement in the curriculum, and increase access to learning (Bower, 2017; ISTE, 2021; US Department for Education, 2017).

Yang, Pan, Zhou & Huang (2018) completed a large-scale survey of 5 dimensions of a "Smart" classroom: Resource, environment, enhancement, management and presentation . They found that students did not perceive a huge difference in the 5 areas between a typical and technology-enhanced classroom. Overall, the literature shows a positive trend in outcomes within "Smart" classrooms, with the main drawbacks being lack of reflexivity and flexibility to some aspects (e.g., keeping traditional classroom seating layouts) which then impact the efficacy of implemented technologies (Pan et al., 2021).

Artificial Intelligence (AI)

One classroom went one step further to integrating technology and employed AI to determine students' reactions to learning content. AI is broadly described as large-scale algorithms or models which process inputted information (e.g., student's reactions via facial expressions) and sorts it into findings through use of logic; notably, AI also has the ability to learn and adapt as it receives more information (Sheikh, Prins & Schrijvers, 2023). The study found that using AI was an effective method of assessing the attention and engagement of students (Klein & Celik, 2017).

AI can be implemented in other ways to enhance education, for example, Martin et al. (2024) completed a systematic review of AI in education literature and found that there were three top themes: AI as an academic performance predictor/indicator, AI curriculum design, and integrating AI in teaching subjects. They discuss and describe how AI can be a useful tool for gaining insight into student's abilities and outcomes via the data it can collect and analyse.

AI development mirrors trends within DGBL tool design, and furthermore, DGBL often employ AI algorithms as part of their design. For example, using automated assessment, adaptive difficulties and more bespoke feedback is becoming increasingly common within AI and DGBL tools.

Therefore, understanding AI in classrooms provides important insight into how future DGBL systems may operate.

Section Seven- Student Outcomes, GBL and DGBL

GBL and DGBL have been explored extensively when relating to student outcomes within specific subjects of the curriculum. I found a general trend of positive outcomes associated with GBL and DGBL within the literature. However, there are still some clear research gaps as to how and why games affect learning outcomes.

DGBL and learning processes

Outcomes within Core Subjects

All three core subjects of the curriculum have been explored and GBL and DGBL methods evaluated. Literacy skills and DGBL have been evaluated, one meta-analysis showing that literacy skill improvement was a consistent finding across research studies (Sun, Chen & Ruokamo, 2021). Furthermore, Lotherington & Ronda (2009) found that game development allowed digital literacy skill improvement including typing ability. However, traditional literacy skill improvements were limited within this study (Owston et al., 2007), with only improvements to sentence structure being found. Although positive outcomes are clear within the literature, it is still unclear exactly what elements of games are producing these outcomes.

One literature review noted that most GBL implemented today are individually played (Coleman & Money, 2020). Therefore, there is scope for future research to focus more on collaborative methods and explore whether the opportunity to play and learn together supports better learning outcomes (Dan, Nga & Dung, 2024). They also related this to Vygotsky's (1978) theory of social constructivism which highlights the importance of collaborative learning among children. It suggests that children learn effectively through social interaction, as they co-construct knowledge through shared experiences. Pan, Ke & Xu, (2022) proposed that collaborative GBL methods might therefore improve mathematics knowledge acquisition and improve attitudes toward math learning.

Furthermore, within the realm of maths, different game types (e.g., adventure games or simulation games) have been shown to contribute towards varying levels of learning outcomes (Kebritchi et al., 2010). Therefore, an additional question could be posed regarding whether different genres contribute to teaching different subjects effectively (Wouters, Van Nimwegen, Van Oostendorp & Van Der Spek, 2013). DGBL focused on maths outcomes have been shown to consistently contribute towards knowledge acquisition and understanding content (Hussein et al., 2022).

Social, Emotional and Mental Health (SEMH) outcomes

DGBL applications have stretched beyond the core subjects and curriculum and into student outcomes which fall under the SEMH area of need as defined by the SEND Code of Practice (2014).

Online games outside the scope of education and DGBL have provided research evidence that digital or virtual spaces provide a safe and secure environment for socially reserved individuals to create meaningful friendships (Kowert, Domahidi & Quandt, 2014) and can support them to make friendships where they may struggle in "real life". For example, Minecraft (Mojang Studios, 2011) initially started as a VG but has been expanded and adapted to now fit the criteria for a SG (achieved through its' Minecraft Education (Microsoft, 2016) extension) and DGBL. Minecraft (Mojang Studios, 2011) has been shown to support CYP who have difficulties with their social communication skills (Kilmer, Spangler & Kilmer, 2023). This study carried out a Minecraft (Mojang Studios, 2011) intervention in a therapeutic group setting with a specific focus on providing "social practice" for the CYP. It is suggested within the paper that Minecraft (Mojang Studios, 2011) (and similar first-person platforms) provide a low stakes social environment with reduced non-verbal communication opportunities (e.g., no eye contact, limited character gestures).

Within the context of schools, Mu & Sin (2018) conducted interviews with Autistic students who used Minecraft (Mojang Studios, 2011) within the classroom, to promote integration of the Autistic students and their classmates. They found that the Autistic students were more engaged and

developed deeper relationships with both peers and staff when using Minecraft (Mojang Studios, 2011).

One systematic review collated and analysed different types of Social-Emotional Learning (SEL) interventions and found that both traditional and DGBL provided positive outcomes for students' SEL, however, DGBL provided better opportunities for increased engagement (Lynn et al., 2024). This study demonstrates promising evidence that DGBL can be implemented as an effective SEMH intervention within school contexts, providing further scope for including DGBL within the curriculum.

Student's Engagement and Motivation

Increasing student's engagement and motivation through implementation of DGBL is a strong theme within the literature. I found that the majority of studies related to DGBL were examining student's engagement and desire to learn when tasks were delivered through DGBL methods. For example, student engagement was found to have increased when geography content (Tüzün et al, 2009) and science content (Khan, Ahmad & Malik, 2017; Hwang et al., 2013) was delivered through DGBL methods. This demonstrates a strong link between DGBL and increasing students' engagement with educational content and therefore learning.

These findings can be explained through the lens of SDT (Deci & Ryan, 1985). SDT proposes when learners' drive for autonomy, competence, and relatedness is met, motivation is increased, leading to better engagement. DGBL often fulfil these needs by offering students choices of tasks/games/characters (autonomy), clear feedback and opportunities to learn and refine their knowledge and understandings of tasks (competence) and opportunities for collaboration or competition (relatedness). Students are therefore more likely to experience intrinsic motivation, which is linked to sustained engagement. This is further supported by Bandura's (1977) theory of self-efficacy, which is when an individual's belief in their own ability can lead to success. DGBL typically provides immediate feedback (sometimes delivered via rewards and referred to as instant

gratification), scaffolding, and increasing difficulty, which can help students achieve competence. As students experience success in the challenges of the game, their belief in their academic abilities can increase, leading to greater resilience, engagement and motivation. One study conducted interviews with students who used DGBL in computer science lessons, and students reported that they felt using DGBL could improve their interest and confidence in learning and make their learning more efficient and enjoyable (Chen & Tu, 2021). They linked their findings to Bandura's (1977) four foundations of self-efficacy: performance achievements, vicarious experience, verbal self-persuasion, and physiological/emotional state and suggested that DGBL can provide opportunities to fulfil each of these areas.

Section Eight- Barriers to implementing technology

Barriers to Equal Access of DGBL

Being able to access DGBL depends on different factors such as knowledge on how to access the internet, economic resource, and knowledge of functions and application of technologies.

One barrier to integrating DGBL to the curriculum is teachers' difficulty in finding games with specific topics related to the curriculum (Wu, 2015). Furthermore, some games inadvertently favour certain cultural norms, gender norms, or lack diversity regarding SEND, making them less accessible to diverse student populations (Darvishinia & Goodson, 2024). DGBL has limited SEND considerations regarding the intellectual and physical disabilities some users may have; even though there are sometimes straightforward solutions such as integrating joystick operation or speech recognition software into the programs (Hersh & Leporini, 2013). As well as practical accessibility concerns, Cilauro (2015) reported that when young people were either not able to fully participate in the activity or were not able to participate in group dialogue, leading to feelings of social isolation, meaning DGBL reduced their access to social exposure.

Outside of the classroom there are also concerns relating to social exposure. When CYP prioritised gaming, they tended to neglect social interactions and were therefore susceptible to

social isolation, reduced social communication skills and increased instances of interpersonal conflicts (Demetrovics et al., 2012; Wartberg et al., 2017). Although this relates to the wider context of gaming, , it highlights a potential risk associated with gaming and social isolation which educational professionals must be aware of. Finally, teachers noticed DGBL sometimes gave rise to unhealthy competition between students, which teachers found difficult to manage (Sáez López, Cano, Fombona Cadavieco, & López Meneses 2022).

However, research has shown simple solutions can overcome some of these barriers. For example, when students were given step-by-step instructions on game mechanics, their confidence and focus on the game increased, therefore increasing their learning outcomes (Craft, 2016). One study demonstrated that having co-operative tasks with asymmetric roles could overcome differences in students' visual abilities and promote inclusion within game tasks (Goncalves et al., 2021).

Barriers to teachers implementing DGBL

Liao, Ottenbreit-Leftwich, Glazewski, & Karlin (2021) found that teachers were less likely to integrate DGBL into their curriculum when it conflicted with their pedagogical beliefs. This highlights the critical role of teachers' perceptions of DGBL, including their understanding of its functionality and their confidence in its capability to create positive student outcomes. Lack of training is arguably the largest barrier for teachers to overcome. Lack of knowledge on functionality, user interfaces and application to subjects result in teachers experiencing feelings of confusion and de-skilling (Kiryakova, Angelova, & Yordanova, 2014). Teacher confidence seemed to have a negative correlation with teachers' career length, meaning more experienced teachers were less likely to use DGBL (Dfe, 2021a). This could also be explained by generational differences, with younger teachers having more experience of digital services and technology in their personal lives. Some teachers also reported "forgetting" that the technology was available in the classroom (Hunt, 2022). This perhaps reflects a general trend of teachers favouring "classic" or non-technology-based teaching methods.

Furthermore, this exposes a potential gap in teacher training courses. Exploration on whether to include technology mastery as part of future training is therefore an area for future research.

Teachers reported that when they learned new methods of delivering content, it provided them with new ideas about how to engage students. However, they also highlighted several drawbacks to using DGBL such as needing to rely on prior knowledge of technical errors (Kaimara, Fokides, Oikonomou & Deliyannis, 2021).

Prior knowledge seems to be a key contextual factor in enabling GBL to work effectively. Sáez-López, Vázquez-Cano, Fombona & López-Meneses (2022) found that teachers who had a good understanding of GBL tools had a more positive perception towards them and valued their usefulness more than teachers who had poor understanding. Furthermore, students' attitudes towards GBL could be influenced by teachers' attitudes towards them; if teachers did not value them, neither did the students (Martín-del-Pozo, García-Valcárcel, Muñoz-Repiso & Martín, 2019).

Factors for successful use of gamification are availability of resources, time to integrate it in classroom activities, and positive teacher perceptions (Sáez López et al., 2022). The link between positive perceptions and utilisation within the classroom can be explained by psychological theory. For example, schemata theory (Rumelhart, 1980) suggests that individuals understand new information through the lens of existing mental frameworks (schemas). Therefore, DGBL and gamification techniques might fit into a teacher's schema related to entertainment and enjoyment, rather than education and learning. Therefore, leading to experiences of cognitive dissonance (Festinger, 1957) when faced with evidence that games can be used for learning. Prestige (2012) found that teacher's use of digital technology was shaped by their pre-existing, underlying beliefs about learning and what "education" means. This highlights that a shift in educator's pedagogical ideas and understanding is perhaps needed before digital technology, games and ultimately DGBL can be fully accepted into the curriculum. There is therefore a question around whether that shift

has started to develop since Prestige's 2012 study, and whether the growing mainstream use of games and digital technology has kickstarted educator's beliefs that games can be used for learning.

Criticisms of the DGBL literature

There has already been a notable change in attitude towards games (specifically video games) within the literature. Early video game research often portrayed video games as catalysts for anger and anti-social behaviour in children (Carnagey & Anderson, 2004). However, in contemporary research, a different trend seems to have developed; video games are regarded as a space for social opportunities (De Grove, 2014) and are suggested to increase cognitive skills such as attention (Bediou et al, 2018). This perceptual shift might have supported a positive perception of DGBL which seems to be increasingly recognised as powerful positive educational tool within the literature (Alotaibi, 2024). Overall, there seems to be little research which reports negative effects (e.g., anti-social behaviour) of DGBL implementation. Almeida et al. (2023) systematically mapped around 3500 literature papers and found that only 87 reported negative or undesired effects related to gamification in education. These papers focused on specific game mechanics such as including competition, using leaderboards or badges for profiles. These aspects of gamification decreased engagement and motivation in students and highlights a gap in the literature which might explore the effects of competitive or student vs student games. Furthermore, game elements designed for motivation (e.g., reward systems) have been linked to distractibility (Hussein et al, 2019).

The existing literature is homogenous in its study designs (All, Castellar & Van Looy, 2014), often using quantitative pre- and post- intervention measures as a method of measuring success within DGBL pre-made packages (such as Kahoot! (https://kahoot.com) as previously discussed). However, this rarely captures the nuances and complicated experiences learners have when using DGBL. Studies predominantly focus on the effect of one cognitive aspect within one academic subject (e.g., can DGBL improve attention or performance in a specific academic subject) (Tüzün et al, 2009; Khan, Ahmad & Malik, 2017; Hwang et al., 2013).

Studies with positive correlations (e.g., DGBL improves or supports a cognitive skill or performance in a subject) are more prevalent than studies demonstrating neutral or negative effects (Clark, Tanner-Smith & Killingsworth, 2016). Positive findings are more likely to be published and cited due to research bias (Ioannidis, 2005) which might lead to a skewed representation of DGBL's effectiveness in the literature. Additionally, studies thus far have focused on short-term outcomes (e.g., motivation or immediate learning improvement) rather than long-term outcomes (Hamari & Sarsa, 2014). This focus might falsely inflate the perceived success of DGBL. Finally, there are methodological criticisms (e.g., small sample sizes, lack of control groups etc.) which might be overlooked and therefore contribute to the over-reporting of positive effects (Wouters et al., 2013).

Furthermore, there is a call for a standardised methodology for assessment of DGBL (Gómez, Ruipérez-Valiente, & García-Clemente, 2022) as it is currently challenging to compare results across studies (All, Castellar & Van Looy, 2014). However, this might lead to a continuation of publication bias and might perpetuate the research into a smaller methodological box. There is also a distinct lack of research which has been replicated and therefore tested for reliability, meaning that the existing literature pool cannot be generalised to different cultures, contexts and settings (Clark, Tanner-Smith & Killingsworth, 2016).

Finally, there is a question regarding the motivation of researchers and stakeholders, who might possess interests in demonstrating the capabilities and positive outcomes of their DGBL programs, rather than objectively testing for reliability and validity of results (Girard et al., 2013).

Section Nine- Future Directions and Considerations

As well as a possible research bias, studies also demonstrated a methodological homogeneity; often using quantitative methods to explore the effectiveness of DGBL. Therefore, it would be useful to produce more research which utilises a qualitative approach. The majority of the literature identified centred on SGs and employed interviews with school staff to capture qualitative data. For example, Lameras et al. (2021) carried out interviews with teachers to investigate their

experiences of a science-based SG. Similarly, Spieler & Degonda (2022) used semi-structured interviews to explore Swiss teacher's beliefs about digital games. However, there is a clear gap in UK-based research, and research which focuses its' investigation on DGBL methods within the classroom.

Furthermore, there are even fewer studies which include student voice within their research. Once more, research seems focused on investigating SGs rather than DGBL. One study conducted interviews with students to explore their perceptions of a SG related to sexual health and gathered data on their attitudes towards game-based learning. They found that students expressed a preference for SGs compared to teacher-based instruction, which shows promise for DGBL to be used more widely within classrooms. However, students perhaps favoured DGBL to teacher instruction due to the sensitive nature of the topic; DGBL is less intrusive and may provide better opportunities for anonymity. There is clear need for further investigation on how DGBL are received by students, particularly in terms of student's lived experiences and long-term educational impacts.

Within UK-based practice, the majority of DGBL is delivered through pre-made learning packages such as TTRS (Maths Circle Ltd., 2025) and Kahoot! (https://kahoot.com) as previously described (Thomson & Wright, 2024). It is essential for school staff to have opportunities to use interventions and packages which derive from a research base rather than word of mouth (Pegram et al., 2022). Thomson & Wright (2024) highlight that their literature review did not provide any firm evidence to support the effectiveness of TTRS (Maths Circle Ltd., 2025), leading to a call for continued research. Furthermore, there seems to be a research gap relating to UK-based DGBL packages, and a need to provide evidence and recommendations on whether they are effective teaching tools. It is also essential that the legislation follows evidence from empirical research to create robust, effective and efficient policy (Nutley, Walter & Davies, 2007) which will ultimately lead to better outcomes for CYP.

There is also a potential for conflict of interest when research is carried out by the apps and organisations themselves (Williamson et al., 2018) which might lead to bias or skewed findings which inflate the effectiveness of DGBL. Therefore, there is a call for independent and neutral researchers to complete investigations about whether there are any effects of DGBL (using pre-made packages or not) on student's outcomes.

Finally, the majority of research was conducted on typically developed students with no known learning differences. Within Berrett and Carter's (2018) study which investigated literacy ability using DGBL, they noted that 14% of their participants had known Special Educational Needs (SEN) however did not provide details of their definition of SEN. Further studies noted similar percentages (Agee, 2019; Denham, 2013; Kromminga & Codding, 2023) between 12-17%, however none focus entirely on SEN participants. Therefore, there is a clear gap in the literature relating to SEN participants and their voices relating to DGBL within the classroom.

Section Ten- Research Aims

In conclusion, the literature review has examined and explored the literature relating to technology, gamification and DGBL starting with a political lens and working down to individual outcomes and impacts. There is a clear interest around technology and how it can be used as a tool to shape the way educators teach which has started from policy makers. This interest and curiosity has perhaps filtered down into school systems, who are adopting more digital practices including DGBL.

The literature suggests that while technology and DGBL are becoming increasingly embedded into educational practice, there are still gaps in understanding *how* these approaches are implemented within UK primary classrooms. Furthermore, the experiences of learners and educators have yet to be captured in a rich and nuanced way. The majority of the existing research has centred on secondary or international educational settings, leaving questions regarding how DGBL can be

effectively implemented in primary education settings and how it interacts with the realities and practicalities of classroom teaching.

The current study therefore seeks to explore how DGBL is being used in primary classrooms and identify any factors which support or hinder its implementation. By exploring the perspectives of both staff and pupils, this study aims to develop a rich, deep understanding of what makes DGBL effective and efficient in real-world educational settings. There is a hope that these insights might contribute to a more nuanced picture of how DGBL can be integrated efficiently and meaningfully within teaching practice, informing future research, classroom application, and educational policy.

CHAPTER TWO: Empirical Paper

Abstract

In 2023, the UK Government published a framework encouraging further exploration into the educational applications of video games and related technologies. Within Chapter One (Section 1.2) a gap was identified for exploring proposed research questions. Within this set of questions was: *"how are games used for teaching and learning, and what is their value in supporting learning?"* (Department for Digital, Culture, Media & Sport [DCMS], 2024). This study aims to respond to that call by exploring the use of Digital Game-Based Learning (DGBL) in primary school classrooms.

DGBL is defined broadly as being digital activities which utilise game mechanics and whose purpose are to provide educational content for Children and Young People (CYP) (Anastasiadis, Lampropoulos, & Siakas, 2018). Historically, throughout the literature, DGBL has been associated with increased student motivation, engagement, and subject-specific attainment (Hussein et al., 2022; Sun, Chen, & Ruokamo, 2021). However, the literature also highlights limited UK-based and qualitative research (Spieler & Degonda, 2022; Lameras et al., 2021). Furthermore, barriers such as staff confidence, access inequalities, and potential unintended consequences (e.g., unhealthy competition, reduced inclusivity) remain underexplored in empirical work (Sáez López et al., 2022; Darvishinia & Goodson, 2024). Finally, there has been critique that the literature lacks robust empirical methodology due to ambiguity within the definitions of what constitutes an educational game (Becker, 2021; Vlachopoulos & Makri, 2017) and methodological inconsistencies (All, Castellar, & Van Looy, 2014).

This qualitative study aimed to explore the identified gaps in the literature by conducting 5 focus groups: three with school staff (n = 13) and two with students (n = 10), each comprising of 3–6 participants, to gather rich, in-depth data of experiences using DGBL both as a teaching tool and as an educational activity. Transcripts were analysed using Braun and Clarke's (2006) six-phase Thematic Analysis (TA), which enabled identification of key themes and shared experiences. The themes are

discussed in the context of existing literature, to provide insight on how DGBL is being used, opinions of its use, and to start to answer the question the UK Government proposed in their 2023 framework.

By exploring participant experiences and applying them to the broader policy and research landscape, this study aims to address the research question: *How are DGBL techniques being used as educational tools in primary school classrooms to support learning and what impact do they have on students' classroom experiences?* and inform evidence-based recommendations for future practice, policy, and investigation.

Introduction and Literature Review

In the UK, children will spend as much time on screens accessing digital technologies as they do in education (McGonigal, 2011). Educational settings are mirroring this trend, and there is an increase in technology use in schools, leading to rising interest in the pedagogical applications of digital games and related technologies (DfE, 2019, 2022a).

Before investigating these applications, it is necessary to establish clear definitions, as the literature highlights significant conceptual overlap and inconsistency between terms such as gamification, game-based learning (GBL), serious games (SGs), and digital game-based learning (DGBL) (Becker, 2021; Vlachopoulos & Makri, 2017). For this study, 'gamification' refers to the application of game mechanics and dynamics to non-game contexts to promote engagement (Christopoulos & Mystakidis, 2023), 'serious games' (SGs) defines non-digital games which were created with educational intent (Becker, 2021), and 'Digital Games Based Learning' (DGBL) denotes games with an integration of gamification principles, delivered via electronic mediums, with educational purpose, content and gameplay (Clark, Tanner-Smith, & Killingsworth, 2016).

In 2023, the UK Government published a press release outlining a research framework to investigate the potential effects of video games and related technologies (DCMS, 2024). The framework, which spans three chapters, includes within Chapter One (Section 1.2) a focus on the

educational applications of games, asking: *"How are games used for teaching and learning, and what is their value in supporting learning?"* This question is situated within a policy shift from merely providing digital infrastructure (DfE, 2019) to exploring how technology and games can actively enhance learning outcomes and engagement (DfE, 2023b).

Policy and Legislation

The UK Government has shown clear interest in incorporating technology and games into the UK education system through frameworks and legislative proposals. For example, their 2019 Education Technology Strategy aimed to embed digital technology into teachers' practice and students' curriculum to improve efficiency, reduce workload, and enhance outcomes (DfE, 2019). The strategy prioritises use of digital infrastructure, teaching online safety, and improving digital services, laying the groundwork for future developments.

In 2023 the UK Government launched a research framework on video games and related technologies (DCMS, 2024). While the primary goal was to understand the broader impacts of gaming on students, the framework explicitly called for exploration on the links between video games and education, highlighting the potential of DGBL and gamification as educational tools. The framework outlined key research questions and provided a foundation for investigating the pedagogical and policy applications of gaming in education.

The Technology in Schools Survey (IFF Research, 2023) captured technology use across schools. Findings suggested there was strong digital connectivity to the internet in many schools, though rural areas faced challenges due to poor signal and infrastructure. Higher levels of connectivity within schools have been linked to higher levels of academic achievement and access to high-quality teaching resources (Underwood et al., 2005). These insights support a rationale for the UK's Digital Inclusion Action Plan (Department for Science, Innovation and Technology, 2025) which aims to reduce the digital connectivity gap within schools and provide additional funding to ensure schools adhere to the digital and technology standards (Department for Education, 2024).

Furthermore, four in five school leaders reported that most staff were confident in using education technology, contrasting with earlier studies during the pandemic which highlighted teacher uncertainty (DfE, 2021a; DfE, 2021b). Teacher confidence and competence using DGBL directly correlates to their confidence implementing it and therefore can act as both a barrier and enabling factor (Ragni et al., 2023).

Despite the UK Government providing funding, initiatives and standards, barriers still remain to incorporate technology into teaching. For example, lack of technical support, and unequal access to devices, particularly among disadvantaged pupils were found to be some of these barriers (DfE, 2023b). These findings highlight the need for more training and research into specific applications of technology, including DGBL. To address the training need, from 2025 teacher training programmes will include mandatory instruction on using assistive technologies to support pupils with Special Educational Needs and Disabilities (SEND) (DfE, 2025b).

Considered together, the UK Governments ongoing interest in technology reflects a clear trajectory: early emphasis on infrastructure and access has evolved into more nuanced exploration of technology's educational applications. The government continues to call for rigorous research to explore the applications technology and has recently shown interest in how digital games might be harnessed responsibly and effectively as teaching tools; as reflected in the 2023 Research Framework (DCMS, 2024).

Games in Education

Previous research on games in educational contexts shows that using gamification and GBL as educational tools can positively influence student motivation, engagement, and achievement (Hamari, Koivisto, & Sarsa, 2014; Ren, Xu, & Liu, 2023) through mechanisms such as immediate feedback loops and enticing game elements. SGs have also been found to enhance learning effectiveness (Lin et al., 2021), cognitive skills (Yien, Hung, Hwang, & Lin, 2011), and information processing skills (Hayes, 2008). However, this evidence must be considered with caution, as there are some methodological limitations present such as small sample sizes, lack of control groups, and

reliance on short-term quantitative measures (All, Castellar, & Van Looy, 2014). Concerns have also been raised regarding digital technology use for recreational purposes, which have been seen as a barrier to education. For example, staff have reported difficulties in refocusing students after non-academic screen use (NASUWT, 2023) and undesirable effects such as reduced attention and focus and lower motivation to complete academic work which was associated with excessive recreational screen time (Joneidy & Ayadurai, 2023).

Despite these concerns, there are positive findings. Online learning platforms have been linked to improved homework completion (Ofcom, 2023), strengthened reading skills (Wright & Huston, 1995), and improved learning abilities (Fisch & Truglio, 2014).

Digital Game-Based Learning in Education

DGBL research is less extensive than non-digital GBL due to its relative novelty. However, studies suggest promising findings, including improvements in learning processes (Maraffi, Sacerdoti, & Paris, 2017), increased motivation and academic performance (Alawajee & Delafield-Butt, 2021; Chin & Chen, 2021), and subject-specific improvements in literacy, mathematics, and history (Lee & Chen, 2009; Cheng, Chen, Chu, & Chen, 2015). However, when comparing DGBL teaching approaches with traditional, teacher-led methods, Perini et al. (2018) found that DGBL improved practical knowledge acquisition, while traditional methods better supported factual recall. However, this study explored one specific SG with a small sample of students, and therefore generalising findings should be performed with caution. This study does however provide a basis for further research on the differences between DGBL and teacher-led teaching approaches.

There is a distinct lack of qualitative research on DGBL and education; some small studies have started to explore student perceptions of DGBL. Slattery et al. (2023) for example, identified themes including collaboration, creativity, immersive environments, engagement, and digital skills when students use DGBL. These themes could reflect the wider literature; linking DGBL to increased autonomy, competence, and relatedness which map onto cognitive theories such as Self Determination Theory (Ryan & Deci, 2008).

Theoretical Mechanisms

Previous research has attempted to investigate the mechanisms behind GBL's ability to create positive outcomes for students. For example, Krath, Schürmann & von Korflesch (2021) conducted a meta-analysis of theory in research on (non-digital) GBL. They found 118 different theories which they categorised into behaviourist, cognitive, motivational, and social approaches. This demonstrates there are a large number of potential theories and mechanisms which have been applied to GBL and therefore could potentially be applied to DGBL. However, there is a clear lack of research exploring theoretical mechanisms of DGBL; and a gap for future research to explore this.

From a behaviourist perspective, GBL is thought to reinforce positive behaviour patterns through repetition and practice (Bower, 2017) and provide quick feedback which acts as positive reinforcement (Bernacki, Greene & Crompton, 2020). An example of GBL within this context might be an interactive quiz which provides immediate feedback and bring a motivating element for students (Ryan & Deci, 2000). These elements can easily be applied to DGBL; DGBL could in fact be better adept to provide immediate feedback due to the autonomous and computerised aspects of its' design.

Other theoretical approaches argue that cognitive theories better explain GBL outcomes. For example, GBL is thought to help reduce cognitive load through memorable, quick learning approaches (Passey, 2019) leading to increased absorption of information. When GBL and DGBL are properly balanced between providing a challenge and offering opportunities for success, it is theorised that learners can enter a "flow" state, leading to increased immersion of learning, better task persistence and therefore better learning outcomes (Hamari et al., 2016).

There is consistent previous research which support the idea that GBL increases motivational outcomes (Sailer & Homner, 2020; Ekici, 2021; Zimmerling et al., 2019). It is theorised that by providing intrinsic and extrinsic rewards (Ryan & Deci, 2020) and enhancing the ability for goal setting (Nebel et al., 2017), motivation for learning tasks can be increased.

Finally, GBL is theorised to work under a constructivist learning approach; using students' engagement and social interaction to enhance positive outcomes (Hirsh-Pasek et al., 2015; Bernacki, Greene & Crompton, 2020). For example, there are aspects of social comparison (for example, leaderboards) which can influence social status and group behaviour (Christy & Fox, 2014) leading to increased motivation.

It is possible that the same mechanisms and theories for GBL can be applied DGBL. However, more research specific to DGBL and the mechanisms underpinning it is essential to answer the question of how it is being used as a learning tool and how this impacts students' outcomes.

Relevance to Educational Psychology

The exploration of DGBL has clear relevance to the role of the Educational Psychologist (EP). The British Psychological Society's (BPS) Code of Ethics and Conduct (BPS, 2021) outlines that EPs are required to maintain up-to-date knowledge of evolving pedagogical practices, including the integration of technology, to inform their statutory role in providing evidence-based advice under the SEND Code of Practice (DfE, 2015; Department for Health & Education, 2017). Within this role, EPs are well positioned to evaluate the effectiveness of DGBL in supporting learning and to provide guidance to allied colleagues on evidence-based implementation of DGBL.

At an individual student level, it is within an EP's role to assess DGBL's impact on pupils' cognitive, social, and emotional development, and ensure interventions are inclusive, especially for students with SEND. At a systems level, EPs can support school staff and allied professionals in embedding DGBL within the curriculum, providing guidance on effective use and implementation.

This research should be of interest to all EPs, as it aims to contribute to the growing evidence base around DGBL in classrooms, which was highlighted as a gap in the 2023 Research Framework (DCMS, 2024).

The Current Study

Given the identified definitional inconsistencies, methodological gaps, and the scarcity of UK-based qualitative studies on DGBL incorporating both staff and student perspectives (Spieler &

Degonda, 2022; Lameras et al., 2021), there is a pressing need for research exploring how DGBL is used in classrooms and its perceived impact on learning, engagement, and wellbeing. This study addresses the government's call for more qualitative, exploratory research on DGBL (DCMS, 2024) by investigating staff and student experiences of using DGBL in UK primary schools. It aims to create qualitative insights into how DGBL is implemented, the academic outcomes it supports or hinders, and later explores the theoretical mechanisms that may explain these effects, thereby informing both educational policy and EP practice.

Research Question

Implementing DGBL into classrooms has increased in popularity over recent years which has driven a growing recognition for how they can be harnessed as educational tools to enhance learning outcomes (Annetta, 2010). Research thus far has employed primarily quantitative methods of investigation, often measuring academic outcomes, and has seldom explored the contextual and experiential aspects of how DGBL is actually being implemented within the classroom (Qian & Clark, 2016). Therefore, there is a gap in understanding not only whether DGBL "works" but also *how* it is being used, received, perceived and experienced by students and staff. This study aims to provide a novel, qualitative perspective on how DGBL is being used within classrooms; what outcomes, if any, they influence and the impact on students' and staff's classroom experiences. Qualitative approaches provide an opportunity to gather rich, deep understanding of a concept which can then inform policy and practice (Campbell et al., 2011). The primary aim is to gain the views of school staff and students by gathering thoughts, feelings, perceptions and experiences. By exploring school staff and students' experiences, this study aims to uncover the processes, meanings, and mechanisms that are often not fully uncovered in quantitative studies (Green & Britten, 1998). The secondary aim is to provide much needed qualitative data to the sparce evidence base already available.

Furthermore, educational practice should be grounded in both statistical and contextual evidence bases (Kvernbekk, 2017). Organisations who lead the creation of the national curriculum (such as the Department for Education (DfE) in England) require research which reflects the complex

contexts and experiences of how educational tools are used in order to formulate robust and informed decisions about recommendations (Whitton, 2014).

To ensure informed and robust decisions can be made, the UK government called for further research to be carried out in their Video Games Research Framework (DCMS, 2024). They asked questions such as, "*whether, and if so to what extent, there are direct and indirect impacts of learning through video games across different groups."* (DCMS, 2024).

The current study therefore aims to use this framework as a guide and aims to echo the UK Government's objectives by aiming to answer the following research question:

How are DGBL techniques being used as educational tools in primary school classrooms to support learning and what impact do they have on students' classroom experiences?

It is hoped that this research will aim to answer *how* DGBL are being used; the impact of using DGBL in classrooms on students' outcomes, and whether DGBL can be used as effective educational tools.

Methodology

Ontology and Epistemology

Ontology and Epistemology are essential frameworks for researchers to use in the analysis and interpretation of data (Braun & Clarke, 2020). Ontology concerns itself with the nature of reality and asks questions about what "truth" lies within reality, and how this "truth" is perceived (Williams et al., 2016). Epistemology examines the concept of "knowledge" and human understanding and interpretation of what "knowledge" is and how we acquire and justify what we know (Steup & Neta, 2020).

This study will adopt a realist ontology and a relativist epistemology, keeping in line with the critical realist paradigm (Bhaskar, 1978). The critical realist position offers an alternative lens to positivism and constructivism (Bhaskar, 1998) by acknowledging that although individuals interpret their experiences through personal, cultural, and social lenses, there nonetheless exist real

structures and mechanisms that shape these experiences (Bhaskar, 1978; Finlay, 2006; Willig, 2013). Critical realism allows researchers to approach their research with the aims of exploration and explanation (Easton, 2010) which also aligns with the Thematic Analysis (TA) (Braun & Clarke, 2006) methodology I have chosen for this project.

Critical realism is particularly well suited to the aims of this research, which investigates *"How are DGBL techniques being used as educational tools in primary school classrooms to support learning and what impact do they have on students' classroom experiences?"* The realist ontological position assumes that DGBL, educational practices, and learning processes have concrete features such as game mechanics, feedback loops, and logistical constraints that exist independently of how individuals perceive them.

Simultaneously, a relativist epistemology recognises that school staff and students bring subjective interpretations to their encounters with DGBL, shaped by their prior experiences and beliefs about technology, levels of digital literacy, and social emotional contexts. Understanding DGBL therefore requires consideration not only to what these tools do but also to *how* learners *experience* and interpret them. The dual consideration of critical realism for both structure and interpretation lends itself well to this study's research question and aims which seeks to identify underlying mechanisms such as engagement, perceived challenge–skill balance and relational dynamics through the lens of participant experiences.

This philosophical positioning aligns closely with the use of Reflexive Thematic Analysis (RTA) (Braun & Clarke, 2020), the methodological approach adopted in this study. RTA is compatible with critical realism as it facilitates the identification of shared patterns across data while allowing for variability and multiplicity in participants' meaning making. Within the context of this research, DGBL is treated as real phenomena that participants encounter, but their meanings are mediated through subjective experiences. This approach enables a robust exploration of how DGBL is implemented in practice and how it shapes learners' cognitive, emotional, and social experiences. By integrating realist assumptions about educational structures with a relativist appreciation of individual

interpretation, the study is able to generate a nuanced and multidimensional account of DGBL's role in primary classrooms. Critical realism is therefore well-suited to the qualitative design by positioning the research as both exploratory and explanatory. Rather than describing participants' views of DGBL, the study aims to identify potential underlying mechanisms of how DGBL works and how it is received and experienced by participants.

Researcher Reflexivity and Ensuring Qualitative Quality

Reflexivity is the process of critically reflecting on one's own philosophical positionality, prior potential assumptions, and possible biases. It is essential for ensuring transparency and rigour in qualitative research (Berger, 2015; Finlay, 2002). Reflexivity accepts that researchers are not neutral observers but active contributors who can unintentionally co-construct meaning with participants (Lincoln, Lynham, & Guba, 2011). In the context of this project, I was mindful of how my own prior interests for video games could have influenced my analysis and interpretation of data. Therefore, I sought to maintain a critical awareness throughout the project of the ways in which my personal perspectives might influence the research process.

I came to understand that my own axiological standpoint (my personal values, beliefs, and experiences) played a role in shaping this research. My positioning as both a video game player and a professional who has prior experience working with children has inevitably influenced both the focus and interpretation of this study. This aligns with Carter and Little's (2007) proposal that researchers' values and experiences shape every stage of the research process, from the creation of research questions to data analysis and interpretation.

Ensuring ongoing reflexivity and being conscious of one's own axiological dimension should not be seen as a threat to validity but an integral part of producing meaningful and ethically sound research (Slevitch, 2011). By making one's values explicit, there is a clear aim to enhance the credibility and integrity of the study, allowing readers to understand the complex lens through which interpretations were made.

To support objectivity throughout the project, several measures were implemented. I regularly returned to my own assumptions about what the data might show and made a deliberate effort to set these aside, so they did not shape the analysis. This involved creating written lists of personal assumptions and placing these physically to one side during data collection and analysis (Tufford and Newman, 2012). The approach drew on my professional practice, informed by principles from Cognitive Behavioural Therapy (Beck, 2011) and Acceptance and Commitment Therapy (Hayes, Strosahl & Wilson, 2012), both of which attempt to view thoughts as passing events rather than fixed truths that guide behaviour. I also took part in regular research supervision sessions. These meetings enabled me to stay grounded in the methodological process and provided opportunities to view the data through another lens, which strengthened my capacity to remain objective (Finlay, 2002). Finally, I used the Social GRRAACCEESS model (Burnham, 2012) to reflect on my own positionality and identity, and to consider how these factors might shape my interaction with the data.

Qualitative quality was considered throughout the research process. I referred to Yardley's (2000) criteria which sets out four key considerations: sensitivity to context, commitment and rigour, transparency and coherence, and impact and importance.

Sensitivity to context was achieved by ongoing consideration of participant experiences, and social contexts. For example, the study was grounded within critical realism, meaning I took special care to consider participants' perspectives. The inclusion of both SRB and mainstream provisions enabled attention to differing educational contexts, enhancing ecological generalisability. Focus group questions were designed with developmentally appropriate language for Years 4–6 pupils, ensuring sensitivity to age, cognitive capacity, and power dynamics. Furthermore, the Social GRRAACCEESS model (Burnham, 2012) supported reflection on social identity factors (e.g., gender distribution across groups), acknowledging how these contextual dimensions may have shaped discussions and interpretations.

Commitment and rigour was demonstrated through prolonged engagement with the dataset and ensuring I was engaged and knowledgeable about the research topic. Data analysis involved

multiple stages of coding and reviewing themes which were refined through iterative cycles. Time was deliberately taken away from the data before revisiting themes (Braun & Clarke, 2012), strengthening analytic depth. Research supervision provided critical reflection opportunities and methodological accountability, reducing the risk of researcher assumptions shaping interpretations.

Transparency was ensured through detailed documentation of the entire data collection and analysis process, including recruitment, inclusion criteria, data collection procedures, coding stages, and theme refinement (see Appendices Ten–Sixteen). The evolution of themes was documented which aims to allow readers to trace analytic decisions. Reflexivity was made explicit, including acknowledgment of my prior interest in video games and strategies used to bracket assumptions (Tufford & Newman, 2012)(see Chapter Three for further discussion of this).

Impact and importance was addressed by ensuring the research question would explore the possible underlying mechanisms shaping DGBL implementation and experience. This would therefore provide useful insight for professionals and provide a foundation for other research on DGBL.

Qualitative Research Methodology

The qualitative research methodology was ultimately chosen to align with my ontological and epistemological standings (explained in more detail in the previous sections) which uses critical realism as its' lens. Therefore, choosing a qualitative approach allowed me to gather in depth data about participant's experiences whilst also accepting that there are concepts within reality which can be interpreted in multiple ways (Bhaskar, 1998).

Had I chosen to complete a quantitative methodology, the data would perhaps be restricted to fitting within prescribed boxes that I had already chosen through quantitative questions.

Furthermore, this research aims to provide a foundation for what mechanisms, experiences and practices are taking place within the research topic, which has not yet been widely investigated using qualitative approaches. Whilst Wiltshire & Ronkainen (2021) described the characteristics of a qualitative paradigm as hard to define, there are some key features to qualitative methods which

align with the purpose of this study. For example, Robson (2011) highlighted that TA, a qualitative approach, is applicable to both constructionist and realist research methods. Therefore, this aligned with this study which aims to explore experiences through a Critical Realist lens. Therefore, Critical Realism is well suited to TA, as it enables examination of the dynamic relationship between individual experiences and social systems (Easton, 2010). Furthermore, TA is regarded as a research method that is ideal for investigating real-world complexities, as it allows for a detailed examination of contextual factors and mechanisms that influence outcomes. Selecting a methodology which reflects the nature of the research question is essential for producing robust, contextually grounded findings (McAvoy & Richards, 2006).

Focus groups were chosen as the qualitative data collection method as the research question sought to explore shared practices, experiences and views of DGBL. Focus groups allow participants to interact, respond to one another and build on each other's experiences. Focus groups also allowed for the exploration of inherently social and collaborative experiences of being in the classroom within a group context. Focus groups are well-aligned with a critical realist stance and TA as they provide opportunities not only for individual perspectives but also to the social processes through which meaning is constructed. The group format therefore supported exploration of both individual interpretations and wider structural influences. Interviews could have been selected as the data collection method, however, would have limited the data quality to be individual and isolated. Furthermore, it would limit the participant's ability to create collaborative meaning and shared experiences.

Participant Recruitment and Sample

The participant sample for this study was purposive. This is in line with most qualitative research; and although it will only capture a certain group of participants, the research aims to obtain insight into the experiences of participants which can then inform theory, guidance and policy (Gilmore, McAuliffe, Power & Vallieres, 2019). This is also in line with critical realism as it aimed to obtain varied participants across contexts to better understand the experiences of DGBL in

classrooms. Rather than seeking statistical power, this sampling method aimed for contextual diversity and experiential richness consistent with critical realist goals. I aim to fulfil HCPC standard 1.2 which outlines the importance of considering stakeholder's opinions and including them in the exploratory process (see Appendix Four for relevant BPS and HCPC Guidelines).

I conducted five focus groups: three with school staff (n = 13) and two with students (n = 10), each comprising of 3–6 participants. Focus groups happened across four educational settings; one SRB completed both a staff and student group. Focus groups are most commonly 5 participants (Carlsen & Glenton, 2011) and the number of focus groups depends on the feasibility of the research, and the context of the research questions (Lopez & Whitehead, 2015). For this study, I gathered views from two different types of primary school provisions to create commonalities and themes which can be generalised more widely than the context of one specific school or provision. Focus groups lasted between 45-60 minutes, which depended on the engagement of the participant group.

I recruited through advertising the proposed study via word of mouth and inviting schools to participate via email (Appendix Five), using schools' publicly accessible school emails. I sent a total of 8 emails to different schools, and colleagues spread awareness of the study through word of mouth to an estimated further 15 schools. Once schools agreed to participate, they received a participant information sheet and informed consent form (Appendix Six, Seven and Eight). Of the four schools who expressed interest, all four were deemed to meet the inclusion criteria and could continue with the next stage of recruitment.

Consent for the focus groups to be conducted was obtained via a gatekeeper, the school's head teacher. Informed consent was then obtained directly from staff members and the students' parents. Students were also provided with consent forms which explained the process of a focus group and ensured they understood their right to withdraw and confidentiality. Students were selected by staff members who knew them well. Staff were informed that the ideal student participant would be the student who would not be too shy or quiet and could consider and reflect on their experiences in the classroom using DGBL. Staff were asked to select students who would feel

comfortable participating in a group discussion. They were encouraged to select students representing a range of academic abilities. The focus groups all occurred face-to-face; however, considerations were made to carry these out online if face-to-face was not possible.

Participants were asked questions which derived from an interview schedule (see Appendix Nine). These questions were designed to be open-ended and aimed to stimulate conversations and discussion between participants and encourage them to share their experiences and find commonalities. Questions were also designed with the research question in mind and aimed to provide prompts for participants which might help them indirectly answer the research question through their lived experiences. I aimed to include questions which would allow participants to consider the different systems within Bronfenbrenner's EST and around the themes I had already discovered through my literature review.

Each focus group took place in a quiet meeting room or classroom within the school. Chairs were arranged in a semi-circle to facilitate discussion. At the beginning of each session, participants were reminded of group discussion ground rules (e.g., one person speaking at a time, respecting differing opinions). The same introductory script was read aloud at each session to ensure consistency. Participants were informed of their right to withdraw before participating and were reminded that it would not be possible to withdraw once the focus group was completed, as omitting their response would impact the continuity of the transcribed session. The focus groups were audio recorded and stored on a secure device until they were transcribed by hand prior to analysis.

Participant Inclusion Criteria

There were a set of inclusion criteria for participation, which included the following criteria:

- Schools must already be using DGBL techniques within their classroom(s)
- Staff and students must be familiar with how DGBL works within a classroom
- Staff and students must be willing to participate in focus groups talking about their experiences of DGBL
- Students were to be in Years 4-6

The decision to only allow schools who were already implementing and were familiar with DGBL was essential to the study as the research question could not be answered if schools had no prior knowledge or experience of using DGBL. The research also aims to capture the experiences, opinions and beliefs of participants, and this would not be possible if participants had no lived experience of using DGBL.

I thoroughly considered the ages of student participants. This was for several reasons. I wanted to ensure that the data collected would be rich and reflective and identified that the topics within the focus group might be complex and abstract. Therefore, if students were too young, data analysis might yield superficial data which would be difficult to synthesise with the staff data. Furthermore, I was aiming to complete focus groups in both specialist provisions and the mainstream classroom, meaning there would be a range of academic abilities. Therefore, I decided to include Year 4, 5 and 6 students as it was felt that this age of participant would be able to provide reflective and rich data and understand the potentially complex topics discussed in focus groups.

I felt it was essential to include both SRB and mainstream schools to provide a rich picture of the diverse contexts and previsions that UK students are part of. I also thought it was essential for generalisation purposes for data to come from different contexts.

Participant Demographics

This research involved 23 participants (13 staff members and 10 students) across four different educational settings. Staff worked in different contexts, between SRBs and mainstream classrooms. Students either attended an SRB or a mainstream classroom. Please find below Table Two and Three which outline the demographics for each participant in the staff or student focus groups.

Gender	Age range	Years Teaching	Position	Participant ID		Focus Group Number	School ID
Female	30-40	3-5	Teacher at SRB	A		1	School 1
Female	50-60	10-15	TA at SRB	B		1	School 1

Female	50-60	5-10	TA at SRB	C		1	School 1
Female	60+	20+	Teacher at SRB	D		1	School 1
Female	30-40	5-10	Teacher at SRB	E		2	School 2
Female	50-60	5-10	TA at SRB	F		2	School 2
Female	50-60	3-5	TA at SRB	G		2	School 2
Female	60+	20+	Teacher at mainstream	H		3	School 3
Male	20-30	0-3	Trainee Teacher at mainstream	I		3	School 3
Female	50-60	10-15	Teacher at mainstream	J		3	School 3
Female	40-50	10-15	Teacher at mainstream	K		3	School 3
Female	40-50	5-10	TA at mainstream	L		3	School 3
Female	60+	20+	Teacher at mainstream	M		3	School 3

Table 3: Staff Focus Group Demographics

Gender	**Age range**	**Academic Year**	**School Type**	**Participant ID**	**Focus Group Number**	**School Number**
Male	9-10	5	SRB	N	4	School 2
Male	9-10	5	SRB	O	4	School 2
Male	9-10	5	SRB	P	4	School 2
Male	8-9	4	SRB	Q	4	School 2
Male	8-9	4	SRB	R	4	School 2
Female	9-10	5	Mainstream	S	5	School 4
Female	9-10	5	Mainstream	T	5	School 4
Female	10-11	6	Mainstream	U	5	School 4
Female	10-11	6	Mainstream	V	5	School 4
Female	10-11	6	Mainstream	W	5	School 4

Table 4: Student Focus Group Demographics

Participants in the staff group ranged between 20-60+ years old, with an equally diverse range of teaching experience from 3-20+ years. Students were a mix of Year 4, 5 and 6 students. It is notable that the staff group consisted of a majority of female participants, with only 1 male participant, which might impact data relating to the range of experiences specific to social gender norms. Furthermore, all student participants from the SRB were male, and all from the mainstream

school were female, again, considerations to the limitations of this gender spread must be made and are considered (see 'Limitations' section within the Discussion).

Data Collection

Data was collected via audio recordings made on my laptop (via the Microsoft Teams app. I created a personal call and turned off my camera and turned on the meeting recording setting to capture the audio.). These audio files were stored on my laptop which was password protected, and I was the only one with access. These audio files were kept on the laptop until transcription was complete. I had initially considered using AI-technology to assist with the transcription process but ultimately decided against it as I could not guarantee data protection regulations would be met by uploading the audio to a third-party organisation. Therefore, data was transcribed by hand. During transcription, I made sure to omit any data which might be identifying such as names and locations. Transcription was completed verbatim, including pauses, laughter, and overlapping speech where relevant to meaning. After transcription, the audio was deleted from my laptop, including from the recycle bin. Transcriptions (saved as anonymous word documents) were then stored on my personal computer (PC) until the research was completed, written up and finalised. I intend to delete the transcription documents once I have completed my thesis.

Data Analysis

Critical Realist Lens

Critical Realism informed the analytic process by allowing me to use a lens which considered the meaning behind participant's experiences and how these could relate to theory. TA was used to keep in line with this lens, allowing patterns of meaning within participants' experiences to be captured. Analysis kept in line with critical realism by considering participants' experiences as being true and unique whilst also striving to provide a structure of these experiences and create patterns through theme generation.

Transcribing the data

I transcribed the audio data by hand over several weeks, which enabled me to become familiar with the data set and begin to identify several commonalities and initial codes within the dataset. After transcription, I used the NVivo 14 software programme (QSR International, 2024) to begin coding the data thoroughly.

Generating Initial Codes

I started with 46 initial codes identified from the 5 data sets (See Appendix Ten). However, there was considerable overlap between some of the initial codes. Therefore, I decided to streamline and combine the initial codes into broader subthemes and main themes. Please see Appendix Eleven for the list of subthemes and refinements.

Searching for and creating themes

I then looked at any broad, common themes the subthemes shared. I created three main themes: Balance, Mechanisms for Learning and Implementation. Please see Appendix Twelve for the initial visualisation of the main themes and subthemes. See Table Four below for the main theme and subthemes and their respective groupings.

Theme	Sub-themes
Balance	• Games for learning • Games as a reward • Games for fun • Student preference for games • Traditional teaching preferences
Mechanisms for learning	• Repetition • Self-directed and conscious learning • Falsifying ability • Emotions • Tactile vs Digital • Ability • Engagement • Social Aspects of DGBL • Staff competence
Implementation	• Logistics • DGBL pre-made packages • Curriculum Objectives • Inclusion and differentiation • The future

Table 5: Themes and Subtheme groupings

Reviewing and refining the themes

I felt that there were lots of subthemes for "mechanisms of learning" which created a skewed importance on this theme, but I did not feel it should be labelled as the "main overarching theme". I therefore decided to look at it again and split it into two themes: Cognitive & Individual Mechanisms, which focuses on how learning influences the individual learner's thinking, skills, and outcomes; and Social and Contextual Mechanisms which explores how learning can be embedded through classroom dynamics, emotional experiences, and teacher practice and presence. Please see Appendix Thirteen for the second version of the themes. I created a further visualisation (Appendix Fourteen) which organises the themes and subthemes in a more straightforward manner.

I then spent a period of time away from the data and themes so that I was able to look at the data again with fresh eyes (Braun & Clarke, 2012). On review and with discussion from my research supervisor, I felt that the theme titles were too simplistic and did not fully capture the richness and depth of the data and definitions. I therefore decided to expand the theme titles. Please see Appendix Fifteen for details of the refinements to theme titles.

After further time away and a revision of the themes, I also decided to include "Staff competence, confidence and role within learning" in the Social, Emotional and Contextual main theme where previously it was also included in the "Implementing DGBL in Educational Practice" main theme. It was felt that the data obtained from this subtheme better aligned with the social and contextual factors Theme Three aims to encompass. Please see Appendix Sixteen for a final visualisation with revised titles.

Decisions to retain or merge themes and subthemes were guided by their conceptual clarity, depth of meaning and distinctiveness. A theme or subtheme was retained where it demonstrated a clear concept which could contribute a unique finding to the research question. Where there was conceptual or experiential overlap, themes were merged. This was to ensure all themes had

meaningful differences in mechanism, context or interpretation, meaning the dataset was well-structured and organised. Throughout the analytical process, iterative review cycles and supervisory discussion supported critical reflection of whether distinctions between themes and subthemes were conceptually justified or more appropriately understood as dimensions of a broader construct.

Integrating staff and student datasets

I initially considered analysing the staff and student focus group data separately, but I ultimately decided to merge them into a single data set. This decision was made as after reviewing the first student data set, I found it lacked depth and I questioned the quality of the themes I might yield. Please see the previous section which describes my analytical decisions regarding theme retention and merging. I questioned whether the data gathered from the first student set would provide enough depth and distinctiveness for defensible themes. I then analysed the staff datasets which revealed similar themes to those found in the student groups. Combining the data therefore allowed me to capture the shared, socially co-constructed experiences of staff and students, reflecting the relational nature of DGBL in classrooms. Furthermore, it supported a critical realist perspective as both groups operate within a shared educational context and demonstrated overlapping experiences. Please refer to my reflective chapter for further discussion of this decision.

Definitions and Findings

For brief definitions of all initial codes, please see Appendix Ten. Please see Appendix Seventeen for the final themes, subthemes and their respective definitions. In interpreting findings, participants' accounts were viewed as representations of co-constructed experiences rather than being a direct account of objective reality. This was consistent with the critical realism lens. The interpretation aimed to provide insight into how DGBL is experienced within the classroom whilst simultaneously considering underlying mechanisms which are not directly observable. Therefore, psychological theories are considered as part of the interpretation and final discussion.

Theme One: Striking the Teaching–Technology Equilibrium

Definition: Participant perceptions that there is a fine balance to be struck between using "traditional" teaching methods (e.g., face-to-face) and DGBL approaches. Both offer advantages and pitfalls for achieving academic outcomes. A comprehensive teaching approach leads to a complimentary and thorough curriculum.

The data showed there is a complex and sometimes multi-faceted experience of different teaching methods, where one approach is not necessarily the "one true answer" to how best to teach students. Instead, there are clear differences in the experiences of using different teaching approaches (both digital and relational) with both positive and negative aspects. The participant consensus was to teach most effectively; educators might use a mixture of more "traditional" teaching approaches combined with technological (DGBL) approaches.

Participant H explained that using just one approach can make that approach lose its' effectiveness:

"I think everything having a good balance. If it was all digital based, and it would be… Yeah, it would lose its' effect"

Participant J added:

"you want to keep it effective. And if you use it just the right amount then it becomes- Yeah, I think exciting, and yes, we want to use it"

Furthermore, Participant E added:

"I think you need the teaching part before they can then go on and do the computing part because the computer can only teach them so much"

This described a complimentary style of teaching by using face-to-face relational approaches as foundational teaching and complimenting it with use of DGBL. DGBL therefore perhaps has most utility as a tool to support consolidation and practicing of skills, rather than new-skill acquisition. This can be further supported by Participant J's experience:

"Sometimes you can use it [DGBL] alongside it [face-to-face teaching], but sometimes it's- it's more the consolidation and practicing tool or revisiting the concept we've already taught."

There is a complicated and interlinked experience of using multiple teaching approaches, with distinctive aspects participants considered when talking about their experiences of using DGBL alongside relational teaching approaches. These aspects were realised as subthemes which came together to create the overall theme of "Striking the Teacher-Technology Equilibrium" and will be discussed in detail in the following section.

Subthemes of Theme One: Definitions and Findings

Subtheme One: DGBL as pedagogical tools

Definition: DGBL being used for the achievement of curriculum-based goals and participants perceiving them as useful tools for acquiring skills or knowledge. Participants also describe that using DGBL has a "passive" or "unconscious" aspect as a pedagogical tool; learners might not realise they are being taught using this tool.

Participant D explained broadly that DGBL is a useful and effective pedagogical tool which has a place within the classroom as an approach which can support learning outcomes for students:

"it's [DGBL] an example of something that when it works well, it's really good and really useful"

Regarding the "unconscious" aspect of DGBL as a pedagogical tool, Participant D explained:

"they don't even know they're doing question about subtraction. They're playing a game."

Which describes the phenomenon of learners not realising what they are doing is learning, therefore when using DGBL as a pedagogical tool, the learning process is happening "unconsciously", and learners experience the learning tasks as pure entertainment instead of a learning activity. It is unknown whether being conscious of learning processes aids or acts as a barrier to learning new concepts, motivation or engagement.

Participant A encompassed the main theme and subtheme concepts by explaining that DGBL is a useful pedagogical tool when used alongside other approaches and has utility for practicing skills and consolidating knowledge whilst providing an "unconscious" learning experience through entertainment purposes:

"I think it has its place, yeah, especially like the numbots. Lots of the basic skills… it's like 'subitising' ummm and it's just plugging them little tiny gaps and they don't know they're learning, they just think it's fun."

Subtheme Two: DGBL as a reward

Definition: DGBL are valued in classrooms as incentives or rewards (e.g., use at the end of a maths lesson due to the student completing the work early) sometimes more so than as a core teaching tool.

Participant G and A described their use of DGBL within the classroom as being mainly as a "treat" or reward for completing other academic tasks:

Participant G: *"This is a reward for doing your maths this week."*

Participant A: *"If we have [used DGBL], it's a Friday treat."*

Participant E showed similar experiences by using DGBL as a "filler" activity and as a reward: *"Like more of a reward-based thing or we've got 2 minutes to fill while we're doing some different."*

Participants had a clear shared experience of using DGBL as a reward and share an experience of finding value in using DGBL as a reward. There is possible discussion to be had around whether DGBL can be used as an effective reward system for enhancing motivation or engagement for learning, and whether this is its' limit of utility or whether it can provide more than just a "reward". This feeds into Theme One as it helps conceptualise what DGBL is being used for and to what extent within the wider teaching curriculum.

Participant W described their experience of using DGBL (via a laptop): *"Yeah. I like how sometimes at the minute, we get to do free time now on the laptops."*

Which indicates a positive reception of using DGBL as reward-based tools. Furthermore, Participant L described DGBL as a reward being a motivator for students to learn:

"they absolutely loved it [Nessy]. And it was so massively motivating, because you've got these accumulation of points, and it was like the hippest thing, and the boys all wanted to be doing it

really, you know. And so in terms of their reading and our phonics and everything, it was really motivating."

Subtheme Three: Games for enjoyment and social connection

Definition: DGBL and video games were described as distinctly different experiences for participants. Video games were mentioned and described as enjoyable recreational activities outside of classroom contexts which provided enjoyment and social connection. Conversely, DGBL had a clear link to learning and had a place only within the classroom setting.

Within this subtheme, DGBL and video games were described distinctly and participants – particularly the students – were aware that DGBL were educational games with educational purposes. Participant Q summarised this concept:

"Regular games, good, school games bad"

Student participants showed a clear preference for video games with no educational purpose and even described how they would stop playing video games if there was overt educational content. Participant N and my exchange about the differences between video game and DGBL content reveal preference for games not related to education:

*"**Researcher:** so you think the fortnight clothes are more interesting?*

***Participant N:** Yeah*

***Researcher:** So if maths whizz had really interesting clothes would you want to play it more?*

***Participant N:** No*

***Researcher:** Why not?*

***Participant N:** Because it's maths!!"*

Participants described using video games outside of the classroom as recreational tools for enjoyment and social connection. Video games were described as a positive and valued experience.

Subtheme Four: Perceived student preference for games and DGBL

Definition: Participant perceptions that students prefer to use DGBL within the classroom as opposed to "traditional" teaching methods. There were perceptions that DGBL can at times produce better academic outcomes than "traditional" teaching methods.

Participants described DGBL as being enjoyable and preferable to "traditional" teaching approaches. For example, Participant G described how DGBL can be used as a pseudo-recreational tool within the classroom when students become disengaged from learning, which strengthens the concept of DGBL as being an "unconscious" learning tool.

"So you, you know, say that they're refusing, but if they're on a laptop and they're on something educationally, you can kind of relax about it a little bit because you're like, OK, you are engaged in something."

Participants explained how they felt there was a student preference for DGBL when given the choice between DGBL and traditional teaching methods. There seems to be a potential hierarchy of preferred activities for students: video games being the most desirable, followed by DGBL, with "traditional" teaching methods being least desirable.

Participants F and L supported this concept through their experiences:

Participant F: *"And then they seem to enjoy it [DGBL] a little bit more as well. Actually, going on Maths whizz, I think that's why they maybe enjoy it a little bit more."*

Participant L: *"And that is the way some of them want to learn they do just want to be on a laptop or go on an iPad, yeah."*

Subtheme Five: Maintaining relational approaches

Definition: Participant perceptions that students would prefer to use traditional teaching methods within the classroom as opposed DGBL. Perceptions that teachers provide better educational utility than DGBL.

Participants showed some contradiction and duality in their experiences between subtheme "Perceived student preference for games and DGBL" and subtheme "Maintaining relational approaches". Despite having perceptions that students prefer DGBL, there were also participant

experiences which supported the idea that students prefer relational teaching approaches. There is perhaps a subtle difference between “traditional” teaching approaches and “relational” teaching approaches which needs discussion and exploration.

There was a clear experience that DGBL has limits with its’ utility and capabilities to teach, which feeds into the concept within Theme One that DGBL has utility for consolidation but not skill acquisition. Participant E explained:

“I think you need the teaching part before they can then go on and do the computing part because the computer can only teach them so much”

Participant N summed up this concept with the following quote:

“Games are boring. Teachers are actually pretty fun.”

The reasons why teachers are preferred was also explained by participants. There is value in having new concepts explained and explored by teachers, a function DGBL cannot yet perform. Participants P and O described it as having teachers available to explain things and not having to “work out” new concepts on their own:

Participant P: *“with times tables, I think that it's better with teachers, because teachers can actually explain it”*

Participant O: *“in maths, if there was, like, let's say eight times seven, because I don't really know my eight, so I could just ask the teacher. But if it was on times table rock stars, I'd just have to work it out”*

This links in with the idea that “relational” teaching approaches offer more depth, complexity and utility than DGBL currently does.

Theme Two: Cognitive and Individual Mechanisms

Definition: Participants highlighted mechanisms and processes specific to each learner and reflected on how these enable effective learning. This theme reflects how different teaching

approaches support and/or constrain students' acquisition of knowledge and skills at an individual level.

Theme Two explores the constructs and mechanisms of learning in more depth, and examines how students learn, what approaches they value when learning and what they find to be ineffective methods of teaching.

For example, participants describe independent learning as being a valuable teaching approach and aspect of learning:

Participant S: *"I think it's better to you, for you to actually work it out yourself and like a computer doing it for you, because otherwise, because you need to know how to add up yourself, like or take away times, all that stuff. Instead of a computer always doing it."*

Participant T: *"I just don't really find times tables really that fun to do, but then I do also say to myself that I kind of have to do it so then my maths can get easier."*

However, they also describe how repetition in learning is not a valuable or desired teaching approach. This was described as being more prevalent within DGBL teaching approaches:

Participant N: *"Because they're boring! […] it just repeats itself"*

Finally, there are mechanisms related to their own perceptions of competence which seem to affect their attitudes towards learning. These individual mechanisms make up the different subthemes within Theme Two, but all contribute to the overall experience that cognitive and individual mechanisms contribute towards learning successes and barriers.

Subthemes of Theme Two: Findings and Definitions

Subtheme Six: Self-directed and conscious learning

Definition: Participants described self-directed and conscious learning as important to success in learning. Students in particular felt ownership and a sense of understanding what works best for them to learn successfully, whether this be DGBL or not.

Participants described this mechanism of learning as being valuable and providing students with spaces to "test" and "practice" their knowledge. DGBL was described as perhaps having a value in its'

ability to provide independent learning spaces. Participants described DGBL as being used for independent learning rather than teacher-directed learning. This might be inherent to its' design.

Participants J and F describe DGBL platforms as providing a free space for experimentation:

Participant J: *"they do coding but they just are willing to try it and try different things out which they didn't necessarily know, but they were just testing it"*

Participant F: *"They might go on their laptops and then they can access one of those programmes whilst we're doing one-to-one work"*

Participants also described teachers purposefully giving students the opportunity to learn independently and this held value within participant's experiences. Participant S described how:

"[the teacher] wouldn't help us [on DGBL], really. She wanted us to learn to do it on our own"

Finally, there was an element of the self-directed learning which linked in with student motivation and self-efficacy. Participant V summed up this concept:

"I just don't really find times tables really that fun to do, but then I do also say to myself that I kind of have to do it so then my maths can get easier."

This also supports the idea that students have reflective and conscious elements to their learning, can reflect on the purpose of learning and which approaches they find most useful.

<u>Subtheme Seven: Repetition and its' perceived ineffectiveness</u>

Definition: Tasks (generally within DGBL) which use repetition were experienced as being an undesirable learning mechanism and as having "sameness".

Participants clearly described the experience of repetitive learning to be unvaluable and unmotivating. Both staff and students described how there was a sense of boredom when repetitive teaching approaches were used. There was also a shared experience that DGBL more prominently used repetitive teaching compared to relational teaching. Participants K and T described their experiences of repetition as boring and at times frustrating:

Participant K: *"The only trouble is, is the children get bored, the ones that can't do it and have to redo it and redo it and redo it."*

Participant T: *"in year three and year four, we would do times table rocks stars so much to the point where I would be like, because at first it was so much fun, like, really fun. But when we started, just like, stopping do it, I was like, for God's sake, this again. I don't like this anymore."*

Subtheme Eight: Falsifying digital learning data

Definition: Participants described instances where student ability was not accurately recorded by DGBL. External factors, such as parents, other students or manipulating the DGBL systems.

Participants described an interesting and somewhat surprising phenomenon where performance data on DGBL was falsified. This was done for several reasons. For example, students unintentionally created false data by using blind trial-and-error on DGBL platforms to "jailbreak" their way into new levels. Participant M explained:

"You just do it a million times until you get there sort of thing"

This was theorised to be due to lack of understanding of the learning tasks or frustration associated with the repetition and lack of progress/success students saw. Participant F explained:

Participant F: *"Then it will then come back round like however many maths questions later, but they'll just skip it again…"*

Participant M: *"They haven't got the resilience, to keep going at it, some of them"*

Secondly, data was surprisingly falsified by parents of students. It was not known exactly why parents would do this; it was theorised by participants that there was an element of unhealthy competition. Participants K and H shared their experiences:

Participant K: *"we've also had cases where we've looked to because you can track when the children have been on and it was parents at home, that were doing it, yeah, to get the points! So their children were then leader, but they'd actually- the parents were doing it at home."*

Participant H: *"The parents were doing it at home. That child was at school."*

Finally, there was students helping other students, which inadvertently falsified their data. Participant S described their friends helping them with DGBL tasks as they didn't understand what to do:

"I just had my friends, um doing it for me, Because I didn't understand it."

Participant M described how students helped each other which affected their profiles on the DGBL platforms:

"I saw a Nessy report for one of the children and I thought, there's something not right. And I just wondered who in the class even- was helping them maybe?"

Subtheme Nine: Tactile vs Digital learning

Definition: References to practical or hands-on learning being preferred compared with digital approaches. Participants described the effectiveness and barriers of both methods for teaching and learning.

Participants described that having practical activities was an effective way to keep students engaged in learning when not using DGBL. These offer an engaging alternative to DGBL.

Participant D: *"[talking about student's preferences] And I would say the hands-on apparatus which we would use a lot in here, but they would use in mainstream a lot"*

Participant L: *"The children are sensory, and they get a lot of sensory information from moving things around. You'll be using concrete materials, and they would all be engaging"*

Participants described that there was value in having alternatives to DGBL approaches and that practical or tactile approaches were even more effective than digital ones. Participant H described:

Participant H: *"I think for young children, because they are so sensory, then some things are in their memory, not based on- they remember things, whereas I don't think that you remember the same things when you've just been doing a game, do you?"*

Subtheme Ten: Learner competence and adaptability

Definition: References to students' competence, adaptability, and capacity which enabled them to use DGBL.

A final cognitive and induvial mechanism reported by participants was that of learner competence and adaptability, specifically in the context of using DGBL. Participants described how self-esteem, self-efficacy, resilience and capacity all contributed to successful learning when using DGBL. When students were missing these skills, this acted as a barrier to their learning. For example, Participant J described resilience as being a key protective factor to accessing DGBL:

Participant J: *"Yeah, always the same children that were motivated to do it and get their scores up as high, and the other ones that needed it are the ones…"*

Participant C: *"It's annoying because they can't get to that level of the game, right? Rather than their ability in that- in maths"*

Participants described student's adaptability to using DGBL as a protective factor:

Participant F: *"I haven't come across anyone that's particularly found it tricky to go on an iPad or on a laptop."*

Participant I: *"there's probably a lot of like, icons and stuff on, like, scratch that are similar to ones they've seen before. So they look at like, they'll look at an icon go, like, "oh, on my tablet or whatever if I press that, it does this. So that will probably do the same thing"."*

And finally, Participant T described their own self-esteem and self-efficacy, demonstrating it is perhaps important for motivation when using DGBL:

"Sometimes I'm smart enough"

Theme Three: Social, Emotional and Contextual Mechanisms

Definition: Participants experienced a range of emotions whilst using DGBL which related to both their own experiences and their experiences involving others. Participants emphasised the importance of interpersonal and environmental factors which shaped learning. They expressed a wider social and connected aspect of learning which makes for an effective teaching approach.

Participants described that they experienced different emotions such as frustration, excitement and boredom when using DGBL:

Participant D: *"I think he was so frustrated last week with Nessy."*

Participant N: *"I think computer games are boring!"*

Participant T: *"But I like them all. It's- It's a lot more fun than just doing like, normal other things. Yeah, so it's really fun."*

Sometimes, these emotions also linked to social experiences such as teamwork, competition and comparison:

Participant H: *"a child used the rewards on the behalf of another child and changed something, and it caused great upset"*

Participant F: *"on maths whizz sometimes as well. If they're sat next to each other, children will help each other. But I suppose it could also go the other way."*

Participants described how there were factors which reached beyond students themselves which enabled effective DGBL use. For example, participants described how staff competence and confidence acted as a protective factor for DGBL use:

Participant E: *"you do need the staff to know how to use the programmes- if you've got TAs in a classroom and you just bring in this new thing and say "this is for your group, it's great," you know…. Staff need time to look through a programme"*

This competence perhaps links to staff experience and even age. Participant D summarised this:

"the 25-year-old teachers would just say, well, why would you want a training programme? Just go on it, right? [pause] But it's a foreign language…"

Overall, there were several social, emotional and contextual factors which all seemed to contribute towards the effectiveness, efficiency and overall use of DGBL within the classrooms.

Subthemes of Theme Three: Findings and Definitions

Subtheme Eleven: Emotions experienced whilst using DGBL

Definition: Participants described a range of emotions (e.g., frustration, boredom, enjoyment) linked to DGBL and other teaching approaches.

Frustration was described as being directed towards DGBL rather than other players; and occurred due to a lack of progress within the game. Participant C and D described their students' frustration:

Participant C: *"It's annoying because they can't get to that level of the game, right? Rather than their ability in that- in maths"*

Participant D: *"there's a couple of them that get a bit frustrated if they're not getting them right."*

Participant R described their experience with losing in DGBL:

"You lose you- get angry"

There seems to be a link between frustration and lack of progress or perceived "failure" which should be explored to investigate the nature of this relationship and how it might relate to theories of self-esteem and theories of learning.

Subtheme Twelve: Engagement, attention and the absence of both

Definition: Participants described instances both where DGBL captured the attention and engagement of students and times where students were bored and disengaged.

Participants described a complicated experience of sometimes being motivated by DGBL but also experiencing boredom and disengagement:

Participant L: *"they absolutely loved it. And it was so massively motivating, because you've got these accumulation of points, and it was like the hippest thing, and the boys all wanted to be doing it really, you know. And so in terms of their reading and our phonics and everything, it was really motivating."*

Participant T: *"But I like them [DGBL] all. It's- It's a lot more fun than just doing like, normal other things. Yeah, so it's really fun."*

Participant C: *"I think Nessy holds their attention as far as the the learning to read and learning to spell. Nessy holds their attention more than if we were just doing that as a as a group and trying to go through sounds…"*

Participant Q: *"[DGBL are] just boring in general"*

Participant J: *"my class are already bored of using it"*

Participants described that students felt both motivated and disengaged by DGBL at times, and this complex balance should be investigated to determine what aspects of DGBL held student's attention and engagement, and which factors acted as barriers which resulted in disengagement and boredom.

Subtheme Thirteen: Collaborative and competitive learning dynamics

Definition: Participants described social aspects of using DGBL to be important for effective learning. Participants valued healthy competition, collaboration, and mutual understanding.

Participants described teamwork and collaboration as being a positive aspect of using DGBL which promoted healthy social interactions between students:

Participant E: *"Simple games on their smart board. They're quite good for turn taking as long as you can have a little group and they'll take it in turns to go up.*

Participant O: *"I like to play with teammates"*

Participant F: *"on maths whizz sometimes as well. If they're sat next to each other, children will help each other. But I suppose it could also go the other way."*

However, participants also described having competition built-in within DGBL platforms as being difficult for some students to experience, and that this encourages comparison between peers.

Participant C: *"for some it's an incentive, I would say to be the top, but for others it's a bit of a disincentive if they're not so… you know…"*

Participant F: *"I think there's particular children that are more aware when they can't do something and another child can. But when it comes to- think when it comes to games, I can't remember a time where it's not ever worked"*

Participant U: *"I don't do that [look at the leader board] because I don't like comparing myself because I'm not the best at times tables either."*

Participant W: *"Some people are like really good at times tables, they always get, like, the highest score, and then some like aren't the best at them, yeah. So they like, get a bit sad saying, like, "I can't win"."*

Comparison seemed to be an important factor which was experienced as being negative from students' perspectives. There perhaps needs to be exploration and discussion around the

extent of “healthy competition” and how having overt performance results can impact learning and self-esteem.

Subtheme Fourteen: Staff competence, confidence and role within learning

Definition: Staff’s confidence, familiarity, understanding and competence with utilising DGBL approaches increases their use of DGBL. Participants feel that staff have a vital role in student’s learning, and using DGBL can sometimes make this difficult to carry out.

Participants described that staff having a greater knowledge of technology supported them to use it more effectively and in turn, this helped them to support students with using it. They described how age and training opportunities provided further protective factors in the understanding and use of DGBL.

Participant B: *“[it’s easier] for the- the younger staff that probably grew up with technology, we are not those people”*

Participant A: *“we've never had the training”*

Participant D: *“the 25 year old teachers would just say, well, why would you want a training programme? Just go on it, right? [pause] But it's a foreign language…”*

Participant H: *“And they also do some CPD training as well that teachers can access. Yeah, it's a website”*

Participants also described feeling “useless” or obsolete in their role when students were using DGBL. They described that there was a role for teachers to provide continuous feedback and support for students when learning. Using DGBL at times seemed to prevent that and seemed to give students an isolating learning experience.

Participant E: *“I think the issue is is when they're using games and they're online, it's harder for you to judge what where they're doing because you're not getting that feedback from them because they're, like, stuck on a screen.”*

Participant C: *“I think it's hard as support staff to help them when they're on a game.”*

Participant W: *“there was no teacher who made sure we were doing lots of learning.”*

Participant E: *“So we didn't have a maths lesson, everything was done on maths whizz. And it was very hard then as a teacher, as a teaching assistant to sort of do anything you'd be standing around watching children on computers for an hour.”*

There is perhaps discussion for the role of teachers for effective DGBL use, and how they might adapt their role to fit in with using technology in the classroom.

Theme Four: Implementing DGBL in Educational Practice

Definition: How DGBL is implemented within the UK national curriculum and within primary schools, both mainstream and specialist. Participants described practicalities and more nuanced experiences which led to successful and not successful implementation.

Participants spoke about how often they implement DGBL within their classrooms. This was mainly implemented through DGBL pre-made packages and programmes such as Nessy (Nessy Learning, 2025), Numbots (Numbots, 2025) and Times Tables Rockstars (Maths Circle Ltd., 2025).

Participant A: *"Yeah so we use TTRS, Numbots, Nessy and Clicker."*

Participant D: *"But they're timetabled in, so Numbots, TTRS and Nessy are calendared"*

Participant E: *"Yeah so we've got it all timetabled in so it's used regularly"*

Participants described how they have adapted to some barriers such as internet connection and technological glitches:

Participant E: *"it's all the issues with the children logging us out, we kind of then- we kind of like abandoned."*

Participant C: *"we have glitches. Well, big problem with Mathletics is when the licence wasn't renewed!"*

Another barrier to DGBL implementation was ensuring DGBL is inclusive, which participants reported happened at times with some aspects of DGBL promoting differentiation and inclusivity:

Participant D: *"Even for a mainstream class you could… do that, kind of differentiate the whole class… and you'd be- you'd feel assured that they were actually doing targeted work"*

But there was perhaps some inequality regarding the funding and budgets to implement DGBL. Participant K explained that for their school, DGBL is implemented via Desty (Education DESTY, 2025) due to a grant:

"so that one, that is what we pay for. Desty, but we get a grant to do that, because we have some children in school that can get additional funding, and we use that additional funding to pay for a trainer and also to then purchasing use of it for a year"

Finally, participants described how DGBL aligns and conflicts with national curriculum goals, and its' place within the classroom as a teaching approach rather than a comprehensive solution to teaching. Participants specifically described a lack of monitoring and evaluation within DGBL:

Participant B: *"You can put in what school year they're in and sort of choose which game they play… umm but yeah, as you say, you can't really record anything"*

Participant E: *"it's harder for you to judge what where they're doing because you're not getting that feedback from them because they're, like, stuck on a screen. So it's actually easier to kind of get a feel for where they are and what if they're understanding it or not when it's face to face teaching."*

Where evaluation was used, this was done on a basic and superficial level based on student's "points" and "levels", which as participants described in Subtheme Falsifying Digital Learning Data, can sometimes not be accurate.

Participant A: *"I can see how many- who's got the most Nuggets of the week or whatever"*

Participant D: *"That's Numbots. [showing progression heat maps to group] But you can print "heat maps" on TTRS as well."*

This perhaps indicates a need for more detailed integrated monitoring and evaluation within DGBL apps so that teaching staff can evaluate any progress that is being made whilst using DGBL. Furthermore, participants described how DGBL can align with curriculum goals when those goals are broad and foundational. For example, Participant B described how they use DGBL to reach curriculum goals for adding and subtracting:

"I think it's easy for us because we concentrate on- on the basics in maths. So our, our kind of curriculum is very much adding, subtracting, dividing, multiplying, just basic math skills. So I think it's quite easy for us really to incorporate"

Overall, these factors demonstrated the barriers to implementing GBL in the classroom and exactly how DGBL was being used within UK primary classrooms. These aspects all contributed to the main theme of Implementing DGBL in Educational Practice.

Subthemes of Theme Four: Findings and Definitions

Subtheme Fifteen: Frequency of using DGBL pre-made packages

Definition: Participants mentioned how often they use DGBL and what ways they use it most. Participants described using several pre-made packages which offer DGBL activities across a range of subjects and were most widely used within classrooms.

Participants described a range of frequencies, from having DGBL timetabled into their lessons as Participants D and A explained:

Participant D: *"But they're timetabled in, so Numbots, TTRS and Nessy are calendared"*

Participant A: *"Yeah so we've got it all timetabled in so it's used regularly"*

To using DGBL on an ad-hoc basis where staff felt it would be useful to include as Participant E described:

"it's a choice that they can then go on them…. If they would like to"

Participant H: *"Overall, I'd say we use them often throughout the week."*

Participants also described the ways in which they were accessing DGBL, which was overwhelmingly reported as using pre-made DGBL packages via apps and programmes. The most popular of which were (in no particular order) Times Table Rockstars (Maths Circle Ltd., 2025), Nessy (Nessy Learning, 2025), Numbots (Numbots, 2025), and Maths Whizz (Whizz Education, 2025).

Participant A: *"Yeah so we use TTRS, Numbots, Nessy and Clicker."*

Participant E: *"Maths Whizz is one they've used for a very long time"*

Participant H: *"Children throughout the school from year one upwards, have got access to Nessy"*

Participant B: *"Numbots is the is the newest one and they, they do like they do like that."*

Participants at times mentioned apps, websites and programmes they used as being "DGBL", for example, Participant G mentioned Widgit (a visual aid resource creation website) and Participant H mentioned Oxford Owls (a digital reading and phonics scheme):

Participant G: *"Widgit we use nearly every day"*

Participant H: *"We also use Oxford Owls, which is again, a free to use- it's umm ebooks but also with activities linked to the books that they've just read."*

However, these do not meet the definition of DGBL, and this perhaps indicates that participants were not clear on exactly what constitutes as DGBL. This is reflective of the literature as there are overlapping and ambiguous definitions for DGBL and further supports the argument that DGBL needs to have a clear, well-defined set of criteria to use as its' definition so that researchers and participants are both familiar with exactly what DGBL is.

<u>Subtheme Sixteen: Practical and logistical challenges</u>

Definition: The practicalities of implementing DGBL in classrooms and the barriers such as glitches which make implementation difficult at times.

Participants described having several practical and logistical difficulties with implementing DGBL. For example, Participant D mentioned the different licenses needed to use DGBL pre-made packages, and how this can be financially difficult when there are a high number of students using DGBL at once.

"You could stick them [lower ability students] on that programme or a similar programme and then you wouldn't have to pay for the licence for the whole class. But if you had a certain number of licences, I think that's how we buy how we buy them, don't we?"

Participant J: *"Just no funding to pay for it, right? And I wouldn't, I probably wouldn't use them enough to want to pay, to justify, yeah, to justify it."*

Furthermore, there is the logistical and financial barrier of having enough digital devices such as iPads and laptops for the whole class or school to be using DGBL at once.

Participant K: *"They're [iPads] kept centrally, but there's plenty. If we suddenly decided this afternoon that we want to use them, the chances are we would be able to […] but there aren't enough for every child [in the school]."*

There were also difficulties relating to internet access, connection, and general glitches which made using DGBL impossible at times for some schools. Participant G described their experiences of being logged out of apps for example:

Participant G: *"And you had to be logged in by an adult, but they would try and log themselves in […] And I have to then phone up the company, wait for someone to talk to me, to get myself back into the programme."*

Participant G: *"It was constant, you'd think "right they know how to do it, they know how to log in" Then within 5 minutes they'll be like you can't get in it because we've locked. You've locked yourself out"*

Staff Participant H: *"the biggest hiccup has been that they will recommend something. We'll then go to the Chromebook, and we can't access it because it's got to be installed onto the system through our ICT people at the trust level."*

<u>Subtheme Seventeen: Inclusion and Differentiation</u>

Definition: How DGBL caters (or fails to cater) to diverse learner needs, including SEND.

DGBL did provide some opportunities for differentiation and inclusion, however these seemed to come at a financial cost, as Participant B explained:

"What it appears, just appears like, face value, the more expensive ones offer more differentiation. There's more control and more… Yeah"

Participants described how DGBL pre-made platforms had some built-in aspects which promoted differentiation and inclusion. For example, Participant C explained how you can adjust the response time in the apps for students with longer processing time:

"some of our children take a slow process, take a long time to think about things. So you can make the time longer, so it makes it slightly easier."

Participants reported that DGBL had some utility for helping bridge the gap for lower ability learners by letting them consolidate foundational skills via DGBL.

Participant D: *"for differentiation, you've got your lower group that are insecure on a lot of those basic things. You could stick them on that programme or a similar programme"*

Participant J: *"You know you could be working with your higher achievers, but for the lower ones you could just stick them on that programme. You know, they're catching up on those basic things"*

However, there was a trade-off of some students feeling like the differentiation of approaches (i.e., part of the class using DGBL and part of the class having a relational, face-to-face approach) caused tension and jealousy in students. Participant V described their experience with this:

"And then while we're doing like, let's say English or like, maths, which I'm not really the biggest fan of other people like out doing more fun stuff. I mean, I get it because they need, like, more kind of academic help. But you feel like it's…[a bit unfair]"

Finally, there was an aspect of physical motor skills and ability which DGBL does not seem to account for yet. Participant E described that students with poor fine motor skills can struggle with using laptops, meaning this approach is less accessible for them.

"I think sometimes like the fine motor skills I think the children struggle with the laptops."

Subtheme Eighteen: Aligning with curriculum objectives

Definition: How DGBL aligns or conflicts with national curriculum goals, and how to best create a diverse and engaging curriculum using different teaching approaches including DGBL.

Participants described how DGBL can align with numerous curriculum goals such as reading, writing and maths skills.

Participant G: *"I think they've also enjoyed that [DGBL] because there's so many different… It's not just the readers. There's so many different options. They've enjoyed sort of exploring different things and I don't think they realise they're actually doing learning."*

Participant J: *"I find I use digital games more for consolidating."*

Participant B: *"So our, our kind of curriculum is very much adding, subtracting, dividing, multiplying, just basic math skills. So I think it [DGBL] is quite easy for us really to incorporate, whereas in in mainstream it might be trickier…"*

However, they also described that DGBL has its' main utility within consolidation and practising, rather than obtaining new skills. This is in line with the other subthemes' findings and again supports the statement that DGBL can be effective as a teaching approach when used as a tool in conjunction with other learning approaches.

Subtheme Nineteen: The future of education

Definition: Predictions about how technology will be integrated in future classrooms and what the future classroom might look like.

When participants spoke about the future, they incorporated aspects of implementation of technology and general teaching approaches as well as communicating a need for balance. Participants described the future negatively when describing technology-heavy scenarios and felt that there was still value in both technologies and human teaching.

When asked what the future might look like for education as we enter a new era of integrating technology, participants reflected that technology use will most likely increase and become even more integrated into our lives. Participant V imagined a classroom where all students had their own iPads to learn through:

"I think, like everybody would have, like a designated iPad like that [The School] keeps safe, but they like use it for maths, they use it for, like, geography, they use it for history, like your- everything would kind of be online, and you would get, like, even- tests and even SATs and stuff"

Some participants worried about their job roles and what the future might hold if technology was further implemented into education. However, other participants felt secure in their roles as teaching staff as they believed technology wasn't yet capable of "doing it all".

Participant H: *"I could see that being used as the lessons take place with that on the screen, with a class of 60 children, two TAs, maybe a teacher supervising."*

Participant J: *"he said my job thats to do with people is safe. Any job that's not to do with people is not safe, which implies that our jobs should be safe"*

Participant H summarised that education is more than just assessment and consolidation of learning and that teachers have an irreplaceable role as the facilitators in learning:

"Education is a social construct, so if you were sat there on your own with it, with your computer, and nobody around you, then I don't think you would learn, and we- wouldn't be so motivating, would it? Because it's the incidental conversations, people explaining their knowledge that shows that they've learned-"

Findings conclusion

Participants reflected on numerous topics and provided rich and valuable insights into how DGBL is used, the mechanisms behind how it might see success and barriers, and their opinions on how to effectively and efficiently incorporate it as a tool within a wider teaching curriculum. The findings and their implications will be discussed in the Discussion section.

Relationality between themes and subthemes

I noted that it seemed that the main themes were directly related to the subthemes. I felt that the subthemes within main themes did not have direct or straightforward links between each other, rather they all fed into their respective main theme. I also felt there was no hierarchical order to the subthemes as I felt they all fed into their main theme equally. There was however one subtheme that I felt had some interchangeability between main themes and fed into all main themes but in slightly different capacities.

Data Quality

I considered during data analysis whether to split the staff and student focus group data into two data sets, or whether to combine them into one data set. I initially started analysis with the two student focus groups, as I wanted a clear idea of the richness and depth of this data before making the decision to split or combine. The data from these two groups did yield some initial common themes, and I considered keeping this data separate. However, when I began to analyse the staff data, I felt that this data was yielding similar results and themes to the student data. Therefore, the decision was made to merge the data into one set, creating a unified group of themes and subthemes. This keeps in line with the critical-realist lens which has been adopted for this piece of research which accepts that experiences are socially co-constructed phenomena which are shared by

participants. Furthermore, the experiences and phenomena of interest (uses of DGBL in classrooms) is inherently relational as staff perspectives shape student perspectives and vice versa. Please see Chapter Three: Reflective Chapter for my detailed considerations regarding this decision.

Ethical Considerations

Ethical Approval was obtained via the University of East Anglia's (UEA's) School of Education and Lifelong Learning Research Ethics Committee, and all relevant guidelines will be considered including the HCPC Standards of Conduct, Performance and Ethics and the British Psychological Society (BPS) Code of Ethics and Conduct. Please see Appendix Eighteen for a copy of the ethical approval email.

Participants were reminded of their right to withdraw before and during focus groups and were able to withdraw their data up until after the focus groups. Participants' data was anonymised, and no identifiable information was included in the analysis or write up of the study findings. Participation was voluntary; this was clearly explained to participants at every stage of involvement. Participants were asked to read the participant information sheet before participating.

Children are considered to be a vulnerable group, and so special considerations were made regarding their understanding of participation. A child-friendly participant sheet was created to ensure that participants fully understand what participation means, and full informed consent was obtained.

I considered that I might also be the allocated Trainee EP for the schools who choose to participate, meaning that there will be a dual role and relationship for the Trainee EP. In this case, I would make it clear that schools' focus groups would not affect any other planned or future work within the school, and that declining to participate would also not affect any planned or future work.

Discussion

Introduction

General Commentary on the Findings

Across the focus groups, participants described DGBL as an increasingly embedded feature of their classrooms. Most staff participants reported that DGBL activities were timetabled or used most often via pre-made DGBL packages such as) Times Table Rockstars (Maths Circle Ltd., 2025), Nessy (Nessy Learning, 2025) and Numbots (Numbots, 2025). These findings align with national trends and recently created governmental initiatives such as the 2023 Research Framework (DCMS, 2024). Findings also indicated that DGBL is integrated across multiple curriculum areas such as reading, spelling and maths skill development. DGBL appeared not as an experimental approach but as an established pedagogical tool used mainly to consolidate learning. Participants' reflections suggest that DGBL is used in different classrooms settings, including both specialist and mainstream settings. Findings were consistent throughout both types of settings, indicating that DGBL is widely consumed in similar ways by staff and students across educational settings.

Participants reflected that despite widespread use of DGBL as a pedagogical tool and teaching approach, human interaction and relational teaching remained essential and central to perceived learning effectiveness. Staff and student participants emphasised a need to find a balance between using face-to-face and digital teaching approaches. This echoes a broader perspective that technology should support and enhance educators, not replace them (Department for Education, 2025). Reiss (2021) conducted a study on AI and educational implementation and suggested that as we continue to use technology which will continue to evolve, we must be conscious and cautious that technology has the potential to enrich student learning and compliment the work of teachers without rendering them obsolete.

Participants were reflective in their experiences of learning and teaching, and themes emerged that there were important individual cognitive mechanisms occurring which acted as facilitators to efficient learning using DGBL. Understanding *how* learning happens seems to be centrally important to designing effective DGBL. Learning mechanisms in this context refer to the cognitive, behavioural and metacognitive processes through which learners receive, process, retain

and transfer information (Rajan, 2024). From a cognitive-behavioural perspective, learning mechanisms include processes such as encoding, storage, retrieval, rehearsal and feedback (Baddeley, Eysenck, & Anderson, 2020). Behavioural learning theories emphasise the link between stimuli and responses, reinforcement and repetition (Schunk, 2017). Self-regulation and metacognition shape learning by enabling learners to plan, monitor and adjust their strategies (Azevedo, 2020). These mechanisms will be explored and discussed in detail, and recommendations for future DGBL applications will be made.

In addition to cognitive mechanisms, participants described and reflected on emotional aspects related to learning. For example, mechanisms such as self-esteem and self-efficacy seem to play a crucial role in shaping academic outcomes. Self-efficacy which is described as one's belief in their own ability (Bandura, 1997) has been consistently linked to increased motivation, persistence and better academic performance (Schunk & Pajares, 2002). Learners with higher levels of self-efficacy are more likely to approach challenges confidently, engage in metacognition and demonstrate higher resilience towards perceived "failure" (Zimmerman, 2000). Similarly, self-esteem has been shown to influence how learners perceive their own competence which affects engagement and attention towards learning (Covington, 1984). In the context of DGBL, participants reflected that some features supported better engagement and attention, but other features such as competition and overt progress data hindered self-esteem. These emotional mechanisms will be explored and discussed in detail, and recommendations for future adjustments to DGBL will be made.

Finally, participants spoke about the wider context which stretched beyond the classroom, including funding and governmental backing to incorporate DGBL within classrooms. There are important considerations to be made about the future direction of DGBL within the classroom, and implications and recommendations will be discussed.

The Intersectionality of Relational Teaching Approaches and DGBL

Defining "Traditional Teaching Approaches" and Moving Towards "Relational Teaching Approaches"

The data demonstrated that participants valued both instructional and structured teaching approaches and relational approaches. This is evident through the data gathered to represent Subthemes One, Five and Ten. Both teaching approaches played an important role in how participants engaged with Digital Game-Based Learning (DGBL). Within this study, the term Traditional Teaching Approaches (TTA) has been adopted to describe an overarching category of pedagogical practices grounded in established, teacher-led methods of instruction. These approaches involve direct, face-to-face interaction between teachers and students, where the educator assumes a central role in providing knowledge through verbal explanation, modelling, and visual demonstration (Kyriacou, 2010). This is sometimes referred to as "Explicit teaching" which means teachers provide guided instructions to students when introducing new knowledge and skills (Sweller, 2016). One framework for applying this approach which is not mentioned explicitly in the UK National Curriculum documents however is included as a resource in the UK Government's *Support for Early Career Teachers* site is the "I Do-We Do-You Do" approach (Lemov, 2015). This method follows a structured sequence of teacher demonstration, plenary consolidation, and guided or independent practice, reflecting a linear and systematic model of knowledge acquisition (Rosenshine, 2012). This approach draws heavily from Rosenshine's (2012) Principles of Instruction which emphasises the importance of modelling, guided practice and frequency check-ins to promote effective learning. The "I Do-We Do-You Do" approach within the context of this study would be considered a TTA.

TTAs have been widely valued for their ability to efficiently convey content, support curriculum alignment, and maintain classroom order, particularly in settings where consistency, assessment, and accountability are prioritised (Coe et al., 2014). However, while effective in promoting academic attainment, TTAs have been critiqued for offering limited opportunities for student voice, emotional engagement, and autonomy in learning (Alexander, 2021).

In recent years, there has been an increasing pedagogical shift toward what this study has termed Relational Teaching Approaches (RelTA). This attempts to define a movement reflecting a growing awareness of the social, emotional, and psychological dimensions of learning. This shift has perhaps resulted from rising levels of Social, Emotional, and Mental Health (SEMH) needs among pupils in UK schools (DfE, 2023; Public Health England, 2021). RelTAs focus on the quality of teacher–student relationships as a central aspect of learning, emphasising trust, empathy, belonging, and emotional safety as prerequisites for academic engagement and cognitive development (Cornelius-White, 2007; Riley, 2010). These principles draw from humanistic psychology, for example, Maslow's Hierarchy of Needs (Maslow, 1943), which suggests that learners must have their foundational needs (such as security and belonging) met before they can effectively engage in higher-order processes such as problem-solving and creativity. In practice, this means that relationally attuned educators prioritise encouragement, affirmation, and trust-building before offering critique or corrective feedback.

Relational pedagogy is further supported by contemporary literature, which highlights the importance of connection and attunement in promoting both academic resilience and emotional regulation (Noddings, 2013; Roffey, 2016). Furthermore, positive teacher–student relationships have been found to contribute to increased motivation, engagement, and achievement, particularly in vulnerable students or students who experience barriers to learning (Hattie, 2008; Pianta, Hamre, & Allen, 2012). From this perspective, RelTAs are not simply more pastoral approaches to teaching, but rather evidence-informed practices that recognise the interdependence of emotional wellbeing and cognitive performance. The relational environment created by such approaches can act as a protective factor for students with SEMH needs, providing them with a sense of safety and predictability that supports learning readiness (Roffey, 2012).

The findings of the current research align with this theoretical and empirical evidence. For example, participants expressed that the relational dimension of teaching remains a crucial element

of effective learning as described by Subtheme Five. Teachers were perceived by participants as not only sources of knowledge but also as responsive facilitators capable of offering personalised explanations, reassurance, and emotional support. For example, Participant O reflected: *"In maths, if there was, like, let's say eight times seven, because I don't really know my eight, so I could just ask the teacher. But if it was on Times Table Rock Stars, I'd just have to work it out."* This perspective emphasises the value of immediate, human interaction in learning contexts, particularly in contrast to the often impersonal or inflexible nature of pre-programmed DGBL. While DGBL offers motivational affordances and opportunities for independent exploration, participants appeared to place more value on relational exchanges that provided clarity, encouragement, and emotional attunement.

In conclusion, although TTAs continue to serve an important instructional function, the more recent integration of RelTAs represents a necessary evolution in teaching practice which recognises the holistic nature of learning as being a cognitive, emotional, and social process. RelTAs are most effective when used in conjunction with TTAs (Hattie, 2009) to provide a thorough and holistic pedagogical practice through an emphasis on connection, empathy, and inclusion followed by correction and guidance. Therefore, there is rationale for a recommendation for the design of DGBL tools to simulate both TTA and RelTA approaches. For Educational Psychologists (EPs), these findings highlight the importance of advocating for classroom environments and interventions which balance academic outcomes with relational sensitivity, thereby promoting both emotional wellbeing and educational progress.

The Role of the Educator in Learning

Continuing from the discussion of approaches educators might employ for effective learning, consideration is necessary regarding the role of the educator and how this might change in the future to accommodate the growing implementation of technology, especially DGBL. Participants reflected that teacher's value was in their ability to provide bespoke explanation and guidance for difficult parts of learning. Subtheme Fourteen specifically references the role of the educator.

The role of the educator has clearly already undergone transformation, evolving from that of a transmitter of knowledge to that of a facilitator, guide, and co-constructor of learning. Within TTAs, the teacher's primary function has historically been that of an instructor who delivers structured content, models skills, and oversees the acquisition and consolidation of knowledge (Kyriacou, 2019; Rosenshine, 2012). This model aligns closely instructional hierarchy, which is a framework that suggests learning progresses through sequential stages: acquisition, fluency, generalisation, and adaptation (Haring et al., 1978). During the acquisition stage, teachers act as explicit instructors, modelling new skills, providing guided practice, and offering immediate corrective feedback, employing TTA skills (Rosenshine, 2012). At the fluency stage, the teacher's role shifts to that of a coach, reinforcing accurate performance through repetition and positive feedback to build automaticity (Binder, 1996). In the generalisation phase, teachers are facilitators for students to transfer skills to new contexts by encouraging reflection and collaborative learning to deepen understanding (Bransford et al., 2000). Finally, during adaptation, teachers function as mentors, supporting learners to creatively apply and extend skills to novel situations while fostering independence and self-regulation (Zimmerman, 2002). When applying DGBL to this framework, the acquisition and fluency stages align most closely with DGBL principles as it provides structured, data-driven feedback practice. This is also consistent with the study's own findings as participants reflected that DGBL had utility for consolidation and practicing as Participant J shared, *"I find I use digital games more for consolidating […] it's more the consolidation and practising tool or revisiting the concept we've already taught.".* Therefore, there is a question of whether DGBL acts as the explicit instructor or coach role to students, similar to the role of a teacher at these stages during face-to-face teaching. Participant data and the findings of this study suggest this is not the case, perhaps due to the rudimentary design of DGBL tools. For example, Participant F shared "*I think you need the teaching part before they can then go on and do the computing part because the computer can only teach them so much*.". Other participants reflected that DGBL had utility for "basic" learning such as practicing skills already taught or consolidating learning. However, participants did not

describe DGBL to be capable of simulating a facilitator or coach of learning. Thus, effective teaching requires the educator to be capable of adapting and blending different roles to fit the learner's individual needs and stage of learning. Educators must blend instruction, reinforcement and relational facilitation to ensure that students are provided with holistic opportunities to learn. DGBL does not yet meet these standards, and therefore a recommendation for the future design of DGBL tools would be to ensure they are simulating this complex role as accurately as possible.

The Role of the Educator in Engagement

Student engagement is a complex concept which encompasses behavioural, emotional, and cognitive components (Fredricks, Blumenfeld & Paris, 2004). The role of the educator is instrumental in cultivating all three. Behavioural engagement can be facilitated through structured classroom routines and immediate reinforcement (Skinner & Belmont, 1993), cognitive engagement through challenging and meaningful tasks (Appleton, Christenson, & Furlong, 2008), and emotional engagement through warmth, respect, and authentic relationships (Roorda et al., 2011). However, engagement is impacted when instruction lacks personal relevance or when repetition becomes monotonous, leading to disengagement or superficial compliance (Bjork & Bjork, 2011). This is consistent with the study's findings as participants reflected that they became disengaged with DGBL due to its repetitive nature and impersonal instruction. Participant N shared *"they [teachers] actually talk. Maths Whizz just goes, 'answer this, answer this'."*. Therefore, the most effective educators adapt their methods by incorporating behavioural, cognitive and emotional where appropriate to sustain learner attention and motivation during learning tasks.

Therefore, it is clear that DGBL requires further consideration regarding how it might improve its ability to enhance engagement. Active learning is a teaching approach which DGBL apps might model themselves on to enhance engagement. Active learning principles emphasise students participating in meaningful activities and reflecting on their learning rather than passively receiving information (Prince, 2004). Active learning strategies like problem-solving, peer discussion, and

collaborative inquiry have been shown to significantly improve motivation, understanding, and retention compared with traditional lecture-based instruction (Freeman et al., 2014). Furthermore, research has demonstrated engagement is enhanced when learners are cognitively, behaviourally, and emotionally involved in the learning process (Bonwell & Eison, 1991).

DGBL can closely simulate the principles of active learning by immersing learners in interactive game environments which require decision-making, collaboration, and reflection. Games encourage opportunities for learners to experiment, receive immediate feedback, and supports autonomy whilst promoting intrinsic motivation through challenge and reward structures (Gee, 2003; Hamari et al., 2016). Therefore, it is possible that when well-designed, DGBL can replicate the experiential, participatory, and reflective features of active learning in digital contexts, potentially making learning both engaging and effective.

However, participants also shared experiences of students being enticed and engaged with DGBL, participants even feeling that students preferred DGBL over teachers. This is summarised in Subtheme Four. For example, Participant F shared *"And then they seem to enjoy it [DGBL] a little bit more as well. actually going on Maths whizz, I think that's why they maybe enjoy it a little bit more.".* These findings suggest that DGBL does have the capability to provide an engaging learning experience; this has perhaps been achieved through incorporating game elements to the learning experience which elevated student engagement and motivation.

As technology becomes more embedded in educational practice, the educator's role is likely to extend into that of a mediator of digital learning experiences. Teachers who employ DGBL will likely be required to transition from direct content delivery to facilitating digital environments that support engagement, attention and motivation (Hamari et al., 2016). While DGBL can facilitate independent and self-directed learning, its success will depend on how teachers structure its use and integrate their own unique skills such as providing rich feedback with DGBL's strengths of providing a game-based style of learning. This could be achieved by teachers explicitly connecting gameplay

experiences to curricular goals and by facilitating post-game discussions that promote consolidation and transfer of knowledge (Clark et al., 2016).

In conclusion, there is an inherently 'human' aspect of engaging students which is not yet simulated by DGBL approaches or tools. Participant D summarised this idea by sharing, *"You need that conversation… it's the human element. However good these games are, they're not a human being, are they?".* This suggests that for DGBL to be successful at engaging and teaching students in the future, more relational and 'humanistic' aspects must be incorporated into their design.

Cognitive Mechanisms and DGBL

Metacognition and Passive Learning in DGBL

Findings from this study suggest that participants felt they had increased learning ability when they were conscious of their learning. Participants showed reflective and nuanced perspectives on their own strengths and areas of difficulty within certain academic subjects and described their personal learning experiences during the focus groups, summarised in Subtheme Six. Staff participants reflected that students often did not perceive DGBL activities as being learning activities; Participant D described, *"they don't even know they're doing question about subtraction. They're playing a game."* highlighting an unconscious learning process. Being conscious of your own learning and cognition (or "thinking about your thinking") is often described as "metacognition" (Flavell, 1979). This is generally regarded within the literature as being a protective factor for efficient learning (Schraw & Dennison, 1994). This is due to metacognition requiring the learner to be aware of their own cognitive strengths and weaknesses, be able to self-regulate their learning behaviour and self-selecting efficient learning methods (Flavell, 1979). One recent study found that having better metacognitive awareness was significantly correlated with better academic and learning outcomes (Agrawal et al., 2022) suggesting that conscious learning can produce better learning outcomes. Further evidence suggests that learners who are aware of their own learning are more

likely to adjust their learning style when things are not working and are therefore more likely to find success (An et al., 2024). Learners who are able to actively reflect on how and why they are learning tend to engage in higher levels of rehearsal and processing of information, rather than engaging with information on a surface level as part of rote learning (Pintrich, 2000). From a cognitive perspective, having an awareness of your learning processes can enable better information processing and can strengthen neural consolidation (Bjork et al., 2013). Participants described conscious learning as being important to success as summarised in Subtheme Six.

Participants in this study described their learning through play whilst using DGBL as being unconscious or passive, where students were sometimes not aware that they were learning or engaging in academic activities but rather were under the impression that they were simply playing games. For example, Participant A shared, "*they don't know they're learning, they just think it's fun.".* "Learning through play" has historically been regarded as being a strong learning approach due to how it promotes exploration and experimentation (Vygotsky, 1978). It can also support the development of higher-order cognitive skills; problem-solving and collaboration in low-stakes environments (Zosh et al., 2018). Furthermore, play enhances intrinsic motivation and – when executed properly – can satisfy the player's need for autonomy, competence and relatedness (Deci & Ryan, 2008). In educational settings, play-based learning has been linked to improved engagement and emotional wellbeing (Fisher et al., 2011).

However, although there are strengths to a play-based approach, the literature suggests that passive learning can limit the depth of understanding (Marton & Säljö, 1976). When learning remains passive, self-regulatory mechanisms such as self-regulation of behaviour as previously mentioned are unlikely to be activated, therefore reducing the learner's ability to adapt and change depending on their cognitive strengths and weaknesses (Behnagh & Azevedo, 2014). This might hinder long-term achievement and academic success. Furthermore, the strengths of metacognition suggest that having DGBL utilise unconscious or passive learning might not be most effective for learners.

Therefore, the solution for future DGBL approaches to see success might be for them to ensure they activate conscious learning processes and encourage players to use metacognition. DGBL, and games more generally, which primarily focus on creating opportunities for rote learning might promote procedural fluency of information but might fail to develop a learner's conceptual understanding or transferable skills (Clark, Tanner-Smith, & Killingsworth, 2016; Annetta, 2010). Research on DGBL effectiveness has cited that scaffolding and use of reflective questioning within games can support learners to achieve deeper learning outcomes (Kiili, Devlin & Multisilta, 2018).

Furthermore, if students are conscious about how they are playing, consolidating and practicing academic skills whilst using DGBL, they might demonstrate some better academic achievement. It might be possible for students to use DGBL and metacognitive skills simultaneously. DGBL has been found to help students independently reflect on mistakes and adjust their strategy so that they experience better success (Hwang et al., 2015). This was due to the cycles of immediate feedback DGBLs provide, which gave students the opportunity to immediately reflect and adjust their learning behaviour. Additionally, there is an important potential role for staff to help build metacognitive scaffolds around DGBL, for example by prompting students to reflect on how they might be learning through the game, what the game might be trying to teach them etc. (Broadbent & Poon, 2015).

Being conscious of your learning and using metacognition do have some pitfalls. For example, Veenman (2011) suggested that metacognitive awareness with an absence of regulatory skills can lead to self-conscious learners who can overthink or ruminate on their failure rather than adapt their behaviour. Therefore, educators should ensure that learners have the appropriate regulatory skills to self-regulate and adapt their behaviour before they encourage them to use metacognitive skills. Furthermore, the chronological age and developmental stage of students coupled with cognitive load of tasks make a difference to the effectiveness of learning when using metacognition. One study compared older primary school children with younger ones and found that

for younger children, metacognition was less mature and less beneficial (Arianto & Hanif, 2024). Therefore, when considering educational contexts, educators should consider the cognitive abilities and developmental stage of their students. This is also in line with this study's findings, which had richer, more reflective data yielded from participants in the mainstream setting rather than the SRB.

In the context of this project, the concept of metacognition links in nicely with Theme Two: Cognitive and Individual Mechanisms as it suggests that there is an individual mechanism linked to metacognition which can lead to more effective use of DGBL. Furthermore, it supports the findings from Theme Three: Social, Emotional and Contextual Mechanisms as it highlights an important role of educators in providing scaffolding for students to develop their metacognition skills whilst using DGBL. Therefore, a recommendation could be made to ensure that DGBL packages are designed to promote metacognition skills and therefore strengthen their effectiveness.

Repetition and Rote Learning

The findings of this study clearly link to the concept of repetition and rote learning as summarised in Subtheme Seven. Participants reflected that they experienced boredom and frustration whilst using DGBL, perhaps due to a lack of structured feedback, resulting in diminishing returns of repetition whereby repeated undirected and unstructured repetition results in reduced cognitive engagement and progressively smaller learning gains (Rohrer & Taylor, 2006; Bjork & Bjork, 2011).

As discussed in the previous section, passive learning can act as a barrier to deeper learning and understanding; however, repetition and rote learning do have a place within educational practice. Although criticised for producing surface-level engagement, rote learning can play an important role in the consolidation and automatic retrieval of information, particularly in the early stages of skill acquisition and foundational knowledge (Baddeley, 1997; De Jong, 2010). Learning through repetition allows learners to rehearse information and therefore improve their fluency and enables them to recall key information more efficiently. Therefore, while rote learning alone may not

promote deep understanding, it can serve as the foundation toward more complex, metacognitively informed learning (Entwistle & Ramsden, 2015).

This concept aligns with the current study's findings, as participants described DGBL as being most effective for practising and consolidation existing knowledge rather than for acquiring new skills or applying novel concepts to new contexts. Staff participants in particular reflected that DGBL was most effective for "consolidating" or "revisiting" learning that had already been taught through traditional teaching methods. Therefore, rather than dismissing repetition as a passive process with little utility for learning, it might be more appropriate to recommend educators use DGBL as a complementary learning tool that can act as a foundational learning tool.

Using rote learning and repetition as a tool for consolidation and practicing foundational learning skills is not a new concept. Precision Teaching (PT) is an instructional approach which focuses on creating fluency in learners and achieves this through repetition and measurement of progress (Lindsley, 1992). It draws on behavioural learning theory principles of reinforcement and aims to build accuracy and speed in learners (which is termed fluency in the context of PT) (Kubina & Yurich, 2012) via short, repeated bursts of practice which learners carry out on a daily basis until retrieval becomes automatic (Quigley et al., 2018). Repetition within PT is purposeful, structured and has a systematic approach to measuring progress (Kubina & Yurich, 2012).

There are some parallels between PT principles and DGBL. For example, DGBL typically provide short practice bursts using repetition and rote learning (Amresh, Verma & Zandieh, 2024). Furthermore, DGBL often provides immediate feedback to learners on their progress and successes and provides opportunities for learners to retry tasks which they have previously failed (Hamari et al., 2016). When learners receive immediate feedback they are engaging in the same feedback-practice loop that underpins PT. Therefore, there is scope for future DGBL packages to create a self-directed fluency intervention which use the same principles as PT to provide learners with opportunities to consolidate and practice information. For DGBL to echo PT principles, it would have

to include explicit goals and a high level of progress tracking to inform learners when they are ready to introduce new information or increase the difficulty of tasks. Therefore, there is perhaps a recommendation for DGBL designers to incorporate PT principles into future DGBL packages.

Independent and Self-directed Learning

DGBL has enormous potential to act as a self-directed learning tool, and this is reflected in the findings of Subtheme Six. Participants reflected that DGBL allowed students to complete their own learning in the absence of teacher input. This aligns with principles of self-directed learning where learners actively participate in choosing strategies and evaluating their progress (Knowles, 1975; Zimmerman, 2002). Participants also recognised that the level of autonomy depended on the individual's level of confidence, motivation and ability to self-regulate, which links back to previously discussed findings around metacognitive awareness.

There are several benefits to using self-directed learning as a learning approach. For example, self-directed learning is often associated with higher levels of intrinsic motivation as learners can choose tasks which align with their interests (Meyer et al., 2008). Furthermore, it has been shown to support the development of critical skills such as time-management and problem solving (Chin et al., 2024). Therefore, if DGBL could be harnessed as a self-directed learning tool, it could have benefits to learners within the classroom.

Independent and self-directed learning seems to be the inverse approach to relational teaching. For example, where self-directed learning encourages autonomy and intrinsic motivation, RelTAs emphasise the importance of scaffolding, co-constructed learning and modelling (Daniels, 2016; Bruner, 1985). Whilst relational teaching approaches do not inherently encourage self-directed learning; there are still human-based approaches within classrooms which do not utilise DGBL and still support self-directed learning. For example, one key approach is inquiry-based learning, which encourages students to ask questions, investigate topics and construct their own understanding of problems and solutions (Spronken-Smith & Walker, 2010). Another approach is project-based

learning (PBL) which provides opportunities for students to plan, research and evaluate tasks which enables development of decision-making skills and self-regulatory behaviours (Thomas, 2000). It is clear that there are human-based approaches which facilitate self-directed learning.

DGBL appears to straddle between these two approaches as it can provide relational characteristics of learning (e.g., collaboration with other players, hints similar to scaffolding and immediate feedback) as well as self-directed characteristics (e.g., autonomy and learner control in pace, difficulty and strategy). DGBL therefore has scope to provide a complimentary learning approach to learners, however there is perhaps further investigation needed to explore the exact balance between the two approaches to promote effective learning.

This also raises a question about whether DGBL is a better tool for independent and self-directed learning than other human-based approaches. Given that DGBL has some naturally built-in characteristics which promote independent learning one might argue that it is a better tool for this style of learning. Further, DGBL has several advantages including a high level of autonomy, immediate feedback and learner control over strategy and difficulty. However, other factors such as design, content and context must be considered. In the absence of scaffolding and relational support aspects, DGBL risks slipping into a surface-level tool for repeating skills (Bjork & Bjork, 2011). Even the aforementioned human-based approaches include elements of co-construction. Therefore, it seems that even independent learning and self-directed teaching cannot exist and be efficient in a vacuum. Therefore, there is a recommendation that for DGBL to become more effective, it might pull aspects from human-based self-directed learning approaches and aim to incorporate scaffolding opportunities within its' activities. Without scaffolding or teacher interaction, independent learners might lack corrective feedback and social motivation which might hinder learning effectiveness (Meyer, 2008). Additionally, self-directed learning has been found to be less effective for new or young learners who might lack prior knowledge or skills (Kirschner, Sweller & Clark, 2006).

In summary, while self-directed learning is clearly a strong learning approach which encourages learners to use autonomy, choose strategy and promotes intrinsic motivation, it relies on the learner having metacognitive abilities and self-regulatory behavioural capability, and is most effective when used in conjunction with instructional teaching and scaffolding (Charokar, 2022). Therefore, when thinking about DGBL, for this to be an effective self-directed learning tool it should echo the methods already used in human-based teaching.

Positive Reinforcement and Learning

Behaviourists suggest that rewards and positive reinforcement are central mechanisms for shaping and maintaining desired learning behaviours. Skinner's (1965) work in particular demonstrated that behaviour accompanied by reward is more likely to be repeated. This phenomenon was termed operant conditioning. Operant conditioning is still present and used in classrooms through point systems, verbal praise and reward schemes which encourage students to display "positive behaviours" within the classroom. Reinforcement can also support fluency and consistency in academic performance by building an association between behaviour and positive outcomes (Schunk, 2017). The findings of this study reflect the principles of reinforcement and conditioning. For example, participants described that DGBL is being used as a reward whereby students access DGBL after completing other academic tasks which used TTA. Staff participants in particular reflected on DGBL being used as a reward or motivator for students to complete classwork, Participant L for example shared their view that the promise of DGBL as a reward provided motivation for male students to complete their phonics and reading tasks so that they could spend time on DGBL platforms. The interactive and play-based nature of DGBL might provide opportunities for intrinsic rewards such as enjoyment, challenge and immediate feedback which are all elements which support sustained attention and engagement, therefore leading to better learning outcomes (Hamari et al., 2016). Furthermore, DGBL inherently incorporates behavioural learning cycles as learners receive instant feedback, accumulate measurable progress via points and progress indicators such as levels and experience small incremental success based on their performance. Applied to

reinforcement and conditioning principles, the successful action (e.g., getting a puzzle correct on a DGBL app) functions as the reinforcing stimulus, motivating students to repeat this action to gain more success (Skinner, 2016). The game loop DGBL provides mirrors operant conditioning by embedding reinforcement directly alongside the learning process (Kiili et al., 2018). Therefore, considerations should be made for whether DGBL can be integrated into the curriculum not only as a reward-based tool, but as a tool which employs operant learning to capitalise on the motivational and cognitive benefits of reinforcement.

Contrastingly, RelTAs also employ reinforcement but do so via a social and emotional channel; teachers provide verbal and written feedback to students such as praise, encouragement and positive correction to sustain student's attention. Social reinforcement satisfies a learner's psychological need for belonging and competence (Ryan & Deci, 2008) which simultaneously enhances intrinsic motivation. A strength of a social reinforcement approach is that educational staff can personalise their reinforcement, acting in the moment to adapt their tone and timing to ensure they can provide bespoke and nuanced feedback which supports emotional connection and trust (Hattie & Timperley, 2007). This social and interpersonal approach is difficult to replicate via DGBL, and this is consistent with the study's findings. For example, Participant P described how one DGBL app's feedback system used flashing blue text on the screen to indicate correct responses and flashing red text and a cross to indicate an incorrect response. Participant P shared *"I don't know if I'm smart or not"* because they were unsure exactly how successful they were on DGBL tasks due to the basic and broad feedback they received. This suggests that relational reinforcement holds distinct advantages for building learning confidence and resilience. A future recommendation for the design of DGBL would therefore be the essential inclusion of relational-style feedback systems which provide personalised and bespoke feedback to learners.

When comparing DGBL and relational teaching approaches for producing academic outcomes via reinforcement and conditioning, it seems that using a complementary approach is the

most effective. For example, findings from this study demonstrate that DGBL offers utility as a reward for learning and can provide scalable, data-driven feedback for staff members to use to assess a student's learning progress. Participant A shared the "heat maps" that staff can retrieve from Nessy, which provides visual data for staff to use to assess a student's strengths and needs within the Nessy program. However, relational approaches must also be used in conjunction with DGBL approaches as they provide contextual and socially based reinforcement which supports learner's engagement with learning and their confidence. Participant P summarised this by sharing their experiences of learning times tables and shared, *"With times tables, I think that it's better [with] teachers, because teachers can actually explain it."*. She went on to explain, "*Yes, going on like the games are fun, but you can't just do it by yourself. You need, like, someone to that you can go for to help."* Participant O also described a similar experience*: "in maths, if there was, like, let's say eight times seven, because I don't really know my eight, so I could just ask the teacher. But if it was on Times Table Rock Stars, I'd just have to work it out".*

Overall, using DGBL as a reward can positively reinforce learning behaviours, but it has greater potential in its ability to embed reinforcement within the learning experience itself. By merging behavioural reinforcement cycles with relational feedback, DGBL could be designed in a way which supports learning environments to be both motivating and pedagogically robust.

The Balance of Success and Challenge

Effective learning requires a balance between challenge and success; having either too much difficulty or not enough challenge can impact engagement and motivation. Vygotsky's (1978) Zone of Proximal Development (ZPD) provides a useful theoretical lens to examine this balance as it proposes that learning occurs most effectively when tasks are situated just beyond the learner's current level of competence but remain achievable with appropriate support. The ZPD also highlights the importance of having appropriate support- typically through relational adult input. Participant S shared her experiences when the challenge of a task was too great and adult support was not available: "*I don't really like when we have to do like math, because I don't really get it […] she [the*

teacher] wouldn't help us really. She wanted us to learn to do it on our own.". Participant U echoed these experiences: "*If it was on Times Table Rock Stars, I'd just have to work it out. But with a teacher, I could just ask*." This further supports the idea that there is a relational value to learning that educators offer which supports learners to be in the optimal stage of ZPD when learning. This value is perhaps something that DGBL cannot yet provide fully.

The findings from this study support the idea of an optimal learning difficulty, as participants frequently described feelings of frustration and discouragement when DGBL tasks were perceived as too difficult or repetitive. Participant K shared their experiences of students becoming frustrated with the repetitive nature of DGBL; *"The children get bored — the ones that can't do it and have to redo it and redo it… [student] got so bored with it she didn't want to then go on it".* Repeated experiences of failure without sufficient support and scaffolding can lead to disengagement from tasks (Deci & Ryan, 2008). This can be linked to self-efficacy, defined by Bandura (1997) as an individual's own belief in their ability to complete tasks to achieve outcomes. Learners with higher self-efficacy are more likely to interpret challenges as opportunities for growth, utilise effective learning strategies, and have a better ability to recover from setbacks (Schunk & Pajares, 2002). In contrast, repeated failure can reduce one's self-efficacy leading to a reduction in motivation, and foster avoidance behaviours, ultimately leading to complete disengagement from tasks. It could be that this is the phenomenon Participant K was describing when sharing that their student experienced boredom to the point of giving up on a task. It is therefore likely that DGBL might inhibit the growth of a learner's self-efficacy, however more in-depth research is required to specifically examine the intersectionality of self-efficacy and DGBL in order to understand the link between the two.

Resilience is a related construct which can moderate how individuals respond to challenge and failure. Educational resilience refers to a learner's ability to maintain sustained effort and adapt their learning strategies in the face of failure (Martin & Marsh, 2006). Resilient learners typically

possess higher self-efficacy and are better equipped to manage uncertainty and temporary failure within the learning process (Bandura, 1997). In this way, resilience and self-efficacy interact to determine how much challenge a learner can tolerate before disengaging. In the context of DGBL, these two concepts must be effectively managed to enable effective learning. If game difficulty is poorly calibrated, learners may experience impacts on their resilience and self-efficacy, resulting in either frustration or disengagement. This concept appears mainly within Theme Two and Theme Three of the research findings. Participant K describes when tasks are too difficult for students who "*can't do it [DGBL tasks] and have to redo it and redo it,"* leading to boredom, frustration and disengagement.

Educators also play an essential role in scaffolding DGBL to ensure it provides optimal challenge, fosters resilience, and preserves motivation and engagement. A recommendation for future DGBL therefore would be to ensure they are created with the ability to tailor difficulty to a high degree, for example provide multiple difficulty settings for educators to set for each individual learner, or to provide automatic challenge adjustments depending on the learner's rate of success or failure on the last task they have completed.

Flow theory

The balance between challenge and success underpins Flow Theory which was first proposed by Csikszentmihalyi (1975, 1990) and describes a state of optimum experience where individuals become fully absorbed in an activity, experience deep focus, enjoyment, and a sense of control. The concept of flow theory aligns with the findings of this study, particularly Subthemes Eleven and Twelve. "Flow" is achieved when there is a balance between perceived challenge and the learner's skills level. This balance must be achieved as if the challenge is too high, it can result in learner anxiety and if too low, boredom can occur (Shernoff et al., 2003). When this balance is struck, learners direct their attention towards the activity completely and they become fully immmersed in the task, sometimes learners can become so engrossed their perception of time can be altered (Csikszentmihalyi, 1997). Participants reflected that whilst using DGBL they experienced both

boredom and engrossment, perhaps suggesting that they were at times experiencing flow theory, and other times the challenges might have been too great, resulting in boredom. It is particularly interesting that participants who reported most frequently were from the SRB setting, where there was a lower level of academic ability. It is therefore possible that the DGBL they were using was pitched at a higher level than their true abilities.

Flow Theory also proposes that intrinsic motivation is central to engagement, meaning individuals engage in tasks for their own personal motivations rather than for external rewards (Nakamura & Csikszentmihalyi, 2009). Participants perhaps lacked intrinsic motivation and therefore lacked engagement. Participants from the SRB described a general dislike for learning which included learning via DGBL. Participant Q described learning as *"boring, all the time boring"* which could reflect the learning tasks they are being exposed to being either too difficult or too easy, or perhaps Participant Q does not feel a personal motivation or value to education and learning and therefore finds tasks related to learning boring in general.

Previous research has shown that experiences of being in a flow state are linked to improved cognitive performance, resilience, and emotional wellbeing (Moneta, 2012; Peifer et al., 2014). In educational contexts, flow has been applied to explain how learners can become deeply engaged when task difficulty matches their ability, supported by clear goals and immediate feedback (Shernoff et al., 2014). Thus, Flow Theory offers a valuable framework for understanding the motivational mechanisms underpinning effective educational game design. DGBL tasks are well suited to inducing flow as they naturally provide adaptive challenges, immediate feedback loops, and opportunities for incremental learning (Hamari et al., 2016; Kiili et al., 2018). Further research will be necessary to determine what features within DGBL enhance a flow state and therefore provide an enhanced learning environment for learners.

Social and Emotional Influences on Learning

Self-esteem, self-efficacy and learning

The study's findings for Theme Three and Subthemes Eleven to Fourteen demonstrate that participants had a strong, shared experience relating to the intersectionality of student's social and emotional wellbeing and their learning. These findings align with established psychological research on self-awareness, self-esteem and social awareness. Contemporary social and emotional learning frameworks conceptualise learning as an inherently relational and affective process, emphasising the importance of self-awareness, self-management, social understanding, relationship skills, and responsible decision-making for effective engagement (Geesa, Robbins, & Shively, 2022). Pekrun's (2006) Control–Value Theory further explains how learners' emotions are linked to their perceived control over, and subjective value they assign to, academic tasks. Participants' reflections and experiences in this study's findings reflected this dynamic; frustration emerged when game progress felt unattainable, suggesting low perceived control. Furthermore, boredom arose when tasks lacked meaning or sufficient challenge, indicating low perceived value. These emotional responses also align with self-efficacy and self-worth theories, both which emphasise the role of perceived learner competence in shaping emotional reactions to success and failure (Bandura, 1997; Covington, 1992). These frameworks demonstrate how learners' emotional evaluations underpin their engagement with DGBL and help explain the variability in participant's experiences of engagement and motivation towards DGBL.

As well as emotional reactions and experiences, participants described the social aspects of using DGBL. They described instances of teamwork and collaboration, with Participant F sharing their experience of classmates helping each other during a class DGBL activity; "*It started off individually, they were trying to get the most, but then they realised that […] if they work together… They all benefit from it because they will win at least once.".* These social influences and experiences described by participants can be explained though socio-constructivist and cooperative learning perspectives. For example, Vygotskian theory proposes that learning is fundamentally mediated by social interaction, with peers and adults providing scaffolding within the ZPD (Vygotsky, 1978).

Findings suggest that when peer interactions are structured and guided, this can have positive effects on both academic outcomes and social-emotional skills (Johnson & Johnson, 2009).

Finally, staff competence and confidence in the classroom is essential to creating a positive learning environment for students. Teacher self-efficacy is associated with positive instructional quality, classroom environment and student outcomes (Tschannen-Moran & Hoy, 2001).

Participants within this study described feeling incompetent and purposeless when students were absorbed in DGBL. Participant E summarised this by sharing, "*When I first worked here, it was very much everything was computer based… everything was done on Maths Whizz. And it was very hard then as a teacher, because you'd be standing around watching children on computers for an hour*". This indicates a potential risk to teachers perceived professional role and their capacity to provide relational, ongoing feedback and emotional containment to students.

Overall, these findings clearly demonstrate that there are complex social and emotional mechanisms which are part of the learning process which are inherently human. It is not yet determinable whether DGBL can operate as a complex socio-emotional learning tool. Participant data suggests that this is not the case. Participant H for example shared, "*Education is a social construct, so if you were sat there on your own with it, with your computer, and nobody around you, then I don't think you would learn, and we wouldn't be so motivating, would it?".*

Overt and Covert performance scores

Within the findings of this study, participants described occasions where student "scores" or performance indicators within DGBL were publicly visible to teachers and, in some cases, to peers. Several participants shared the social and emotional consequences of this visibility and noted higher instances of self-consciousness and discomfort; particularly among students who consistently scored lower than their classmates. This was described by Participant P, who expressed, *"I hate it [the scoring system] because I get so low,"* and Participant N, who noted, *"Some people say, 'Oh, you got last'… people would make fun of you.".* These experiences highlight a tendency for overt DGBL

scoring systems to prompt social comparison that can negatively influence learners' emotional and social wellbeing.

Psychological theory and research support these concerns. For example, social comparison theory (Festinger, 1954) suggests that individuals naturally compare their abilities to others, and when these comparisons are deemed to be 'worse', they can lead to lower motivation and self-esteem. In classroom contexts, overt performance scores have been linked to decreased self-esteem (Harter, 2015) and reduced self-efficacy, particularly among lower-performing students who may internalise repeated experiences of failure (Schunk & Pajares, 2002). Furthermore, research suggests that competitive or publicly comparative learning environments can increase performance anxiety, and contribute to avoidance behaviours (Ryan & Deci, 2000; Eccles & Wigfield, 2002). These findings align with the current study's data as participants expressed experiences of social comparison and even instances of bullying when student's scores were shared publicly. For Example, Participant R shared, *"Some people say, 'Oh, you got last.'"*. Participant S added, "*Yeah, people would make fun of you.".* When asked about class leaderboards and scoring, Participant U shared *"I don't do that sort of thing.",* indicating a complete disengagement from public performance scoring, perhaps a self-identified coping mechanism to ensure they are not affected by scores. These findings strongly suggest that overt or public scoring systems within DGBL can create emotional vulnerabilities and exacerbate social pressures among learners. Therefore, there is a clear recommendation to future DGBL designers to omit the use of overt scoring systems.

However, the relationship between performance transparency and learning is complex. Some participants noted that visible scores offered motivational benefits for certain students, providing clarity about their current performance level and supporting metacognitive awareness. As Participant C explained, *"For some it's an incentive… for others it's a disincentive… it becomes a distraction."*. This aligns with research suggesting that performance feedback can enhance learning when it is perceived as informative rather than evaluative (Shute, 2008). This can support students to

identify their position within learning stages and determine appropriate next steps with adult guidance (Hattie & Timperley, 2007). For some learners, transparent scoring can function as a motivational cue that encourages persistence and goal setting (Zimmerman, 2002). This also aligns with participants' experiences at times, for example, Participant C shared that "*they'd like to know that [how many nuggets – points – they have]"* referring to the 'nugget' scoring system Nessy employs. Furthermore, Participant S shared "*if I do get my certificate, then I'll probably be very happy.".* This was in relation to certificates students received based on their performance scores, with higher achieving students obtaining certificates. Certificates are perhaps an example of overt performance scores which have been used in classrooms before the creation of DGBL, and highlights that the student's individual self-esteem level and resilience determines whether they are comfortable with overt performance scores. Therefore, in both face-to-face and DGBL techniques, considerations should be made on an individual basis as to whether overt scores for that student should be shared more widely. Research further supports this idea, the evidence base indicates that the effects of performance visibility are highly individualised and mediated by learners' emotional resilience, prior attainment, self-efficacy beliefs, and peer dynamics (Wormington & Linnenbrink-Garcia, 2017).

There is a clear need for further systematic research to examine the nuanced social and emotional consequences of overt versus covert scoring systems in DGBL. Developers and educators must consider the potential harms associated with overt performance scores to ensure that DGBL is designed and implemented in ways that support psychological safety rather than pose as a potential risk.

Contextual Considerations when Implementing DGBL

Equal access to DGBL

Findings suggest that iPads and laptops are the most common mediums to deliver DGBL. All schools involved in this study had access to between 10-30 digital devices within school. It is worth noting that the schools who completed focus groups were all moderately sized primary schools (with

Specialist Resource Bases (SRBs) attached to a mainstream primary school in the case of the focus groups which took place in specialist settings) in urban settings. This could have potentially impacted the access they had to digital devices and DGBL and additionally could have impacted the data. Previous research suggests that access barriers such as insufficient numbers of devices, inconsistent internet connection and licence restrictions due to reduced available funds can affect the implementation and use of DGBL within schools (IFF, 2023). Had this study had the opportunity to complete focus groups in rural schools, the findings might have yielded different results regarding how often DGBL is implemented or how many digital devices the schools had access to.

This is an important factor to consider as it has been shown that when connectivity and access to technology was reliable, participants felt that they had enhanced opportunities for differentiated learning and immediate feedback (Underwood et al., 2005). This is also supported by the Department for Education (2017) who emphasised that robust technological infrastructure enables access to tools which can raise attainment levels through instant feedback and personalised teaching opportunities. Furthermore, Major, Francis & Tsapali (2012) carried out a meta-analysis and found that access to adaptive technology supported better learning outcomes in low- and middle-income countries. This further supports the idea that access to technology can enable better learning outcomes.

Policy, Funding and Training

Further research is required to understand the psychological, pedagogical, and contextual mechanisms through which DGB works, and to determine whether it classifies as a robust and effective educational intervention. The findings of this study highlighted several potential benefits of DGBL including experiences of enjoyment and engagement due to its interactive and game-based properties, utility as a positive reward and a mechanism to re-engage students. However, findings also revealed experiences of an overreliance on repetition, insufficient feedback scaffolds, and limited opportunities for relational interaction which indicate there are some substantial limitations in its design. These findings echo broader concerns in the literature that technological interventions

often fail to reach their pedagogical potential when implemented without theoretical grounding or adequate support and scaffolding from educators (Selwyn, 2016; Clark, Tanner-Smith, & Killingsworth, 2016).

The current interest from the UK government in the educational potential of digital technology includes artificial intelligence (AI), immersive tools, and video games. This offers a promising foundation for the development of a stronger evidence base. The UK government has provided further guidance such as the Realising the Potential of Technology in Education strategy (Department for Education, 2019) which acted as a guide and framework for schools to understand how to use technology in their classrooms. Furthermore, they have created promotional projects such as the EdTech Demonstrator Programme (Department for Education, 2020) which aimed to have 'lead schools' who showcased the ways in which they were using technology effectively to disseminate best practice to other schools. This demonstrates that the UK Government understands the value of digital tools for enhancing learning, reducing workload, and improving accessibility. However, there remains no specific national policy that outlines how DGBL specifically should be implemented, evaluated, or integrated within classroom pedagogy despite DGBL platforms such as Timestable Rockstars reporting being implemented in 16,000 schools (Maths Circle Ltd, 2025); which is around 95% of mainstream UK primary schools (British Educational Suppliers Association, 2025).

Furthermore, the Teachers' Standards (DfE, 2021b) only indirectly references the use of technology, placing responsibility on educators to "use relevant data" and "adapt teaching," without providing guidance on how technological tools like DGBL should be effectively implemented. Similarly, the Ofsted Education Inspection Framework (2019) emphasises intent within the curriculum to implement technology but provides no guidance on how to use DGBL or gaming-based pedagogies.

The absence of policy is reflected by an absence of structured professional development pathways. For example, there is currently no national framework or mandated training for pre-

service or in-service teachers regarding the integration of educational digital technologies, despite the increasing prevalence of digital tools in UK classrooms. Teacher confidence and competence in using technology is therefore highly variable, and findings from this study indicate that staff often feel underprepared and unsupported to use DGBL and technology in general. Participants reported needing to rely on informal peer-led learning and trial-and-error methods to navigate DGBL platforms (please see Subtheme Sixteen). Participant D summarised this by sharing, "*you do need the staff to know how to use the programmes- if you've got TAs in a classroom and you just bring in this new thing and say, 'this is for your group, it's great,' you know…. Staff need time to look through a program*". Participant J added, "*And then also some of the technology. It's being unfamiliar with the program you're having to learn how to learn it, yeah, how to navigate it.".* These findings are concurrent with prior research demonstrating that the success of digital interventions often depends not on the tool itself, but on the knowledge and pedagogical skill of the staff member implementing it (Ertmer & Ottenbreit-Leftwich, 2010; Somekh, 2007). Only a small portion of DGBL pre-made packages offer formal training, and schools typically fund this themselves, creating further inequalities in implementation quality.

The issue of monitoring and evaluating DGBL use is equally significant. Despite the popularity of pre-made DGBL packages such as Times Table Rock Stars (Maths Circle Ltd, 2025) there is a notable lack of independent empirical research evaluating their effectiveness or long-term impact (Papastergiou, 2009). Widespread implementation of DGBL without a rigorous evidence base raises significant concerns around unintended outcomes such as overreliance on competitive scoring or repetitive, ineffective gameplay. As digital tools become increasingly common, there is an urgent need for systematic evaluation frameworks to be created to assess not only outcomes but also implementation quality, psychological mechanisms, and contextual influences.

Finally, the limited evidence base presents a challenge for EPs, whose practice relies on evidence-based decision-making. Presently, the lack of robust research prevents EPs from confidently

recommending DGBL as an intervention for learning, engagement, or wellbeing. This research gap further highlights the need for targeted government funding and investment to enable further research to be conducted to examine the pedagogical and psychological impact of DGBL across diverse learners, including those with SEND. This would enable EPs to offer more nuanced and well-founded recommendations, ensuring that technological tools are used ethically, effectively, and inclusively.

Conclusions and Recommendations

Conclusions

This study provides a novel understanding of how DGBL is currently being used as an educational tool and the extent to which it supports, hinders, or shapes students' learning experiences and academic outcomes. The findings demonstrate that DGBL is already integrated into everyday classroom practice, most commonly as a supplementary tool for practising foundational skills, consolidating knowledge, and providing rapid rehearsal opportunities. This aligns with existing evidence that digital games can effectively support fluency, motivation, and repetitive practice when appropriately aligned with curricular aims (Papastergiou, 2009; Clark et al., 2016). However, the study's findings also revealed that DGBL is not the singular solution to educational challenges and should not be regarded as a replacement for traditional instructional teaching approaches or RelTAs.

A central finding is that many pre-made DGBL packages which are widely implemented within UK primary school classrooms lack the same level of pedagogical sophistication that human, relational teaching provides. Participants reported design flaws of DGBL such as excessive repetition, lack of conceptual scaffolding, glitches, and inconsistent difficulty to learning tasks; all which impeded learning and, at times, led to frustration or disengagement. These findings directly relate to the research question, highlighting that DGBL's impact on academic outcomes is heavily dependent on its design quality and alignment with learning principles. Poorly managed 'difficulty levels' within learning challenges were found to undermine learners' perceived control and task value, thereby

reducing engagement (Pekrun, 2006). Similarly, overt performance scores were experienced by some students as being emotionally distressing, reinforcing social comparison and diminishing self-efficacy (Bandura, 1997; Harter, 2012). These findings emphasise the importance of psychological and emotional mechanisms in shaping the educational impact of DGBL.

Another key finding relates to the role of the educator. Participants consistently emphasised that teachers remain essential for providing emotional support, relational connection, and conceptual clarification. These elements were reported by participants to not be replicable by DGBL as of yet. In many cases, teachers compensated for DGBL design limitations by offering tailored feedback or alternative explanations. This supports the broader argument that the success of digital interventions depends more on the pedagogical knowledge, relational skill, and implementation practices of the educator than on the technology itself (Ertmer & Ottenbreit-Leftwich, 2010; Somekh, 2007). Thus, DGBL's academic impact is mediated by educators' ability to integrate it effectively within instructional sequences and relational contexts.

The findings also revealed several logistical barriers such as insufficient staff training, limited guidance on effective use, inconsistent access to devices, and technical malfunctions. These challenges acted as barriers which reduced DGBL's ability to be implemented in evidence-informed ways. Furthermore, these barriers meant DGBL has not been implemented successfully long enough to yield measurable academic benefits. Participants expressed that professional learning about DGBL is largely self-directed and reliant on peer support rather than structured training. This pattern was echoed by national gaps in teacher development on digital pedagogy (DfE, 2019). Thus, a key recommendation is that the UK Government and local authorities invest in systematic training, evaluation frameworks, and research funding to ensure teachers can confidently and ethically integrate DGBL into practice.

Finally, while this study's findings revealed several limitations to DGBL, it also offers meaningful strengths. Participants valued DGBL for its novelty, enjoyment, accessibility, and capacity

to encourage repetition whilst providing an entertaining and engaging platform. When used cautiously and in combination with relational and traditional pedagogies, DGBL has the potential to enhance engagement, support independent practice, and complement broader instructional teaching approaches.

Overall, this study concludes that DGBL is not the solution for future educational improvement, but instead is a promising tool best used within a wider pedagogical repertoire. Its effectiveness depends on thoughtful integration, high-quality design, and strong staff mediation. As participants envisioned a technologically enriched future for classrooms, the educational community must continue to investigate how, when, and for whom DGBL works to ensure its use promotes inclusion, motivation, and meaningful academic learning across diverse educational settings.

Limitations

An important consideration for the interpretation of the findings of this study relates to the demographic composition of the participant sample. The staff participant groups were predominantly female, with only one male member, while the student focus groups comprised of only male pupils from the Specialist Resource Base (SRB) and only female pupils from the mainstream primary school (please note that I believes all participants identified with their birth-assigned gender). This gender imbalance means there might be potential bias that may limit the representativeness of the findings. Gendered patterns of participation are common within educational research, particularly in school-based studies where recruitment is constrained by practical and ethical considerations (Cohen, Manion, & Morrison, 2018). Despite my efforts to achieve participant diversity, logistical constraints such as timetabling and availability were barriers and made it unfeasible to recruit more male staff members and recruit students from additional mainstream and SRB settings within the available timeframe. Consequently, the perspectives captured may not fully reflect the breadth of experiences present within the wider school population. The gender composition of the participant sample is particularly relevant when

considering attitudes towards DGBL. Previous research indicates that gaming behaviours are often shaped by gendered socialisation, with cis-male students typically demonstrating higher engagement with and confidence in digital gaming (Griffiths et al., 2004; Lucas & Sherry, 2004). Furthermore, empirical evidence suggests that cis-males often prefer hands-on, interactive, and competitive learning experiences, which align with the design principles underpinning DGBL (Papastergiou, 2009). In contrast, cis-females have been found to prefer collaborative and narrative-driven approaches to learning through technology (Joiner et al., 2011). Therefore, the absence of male mainstream pupils in this study may have excluded valuable perspectives that could provide gendered variations in how DGBL is experienced and perceived within primary education. Future research might therefore explore these differences to contribute to a more nuanced understanding of how DGBL can be optimised for diverse learner profiles.

Another limitation of this study was its' small scale which creates additional constraints on the generalisability of its findings. The data was collected from a single SRB and single mainstream primary school, and the total number of participants was small comparatively to the UK primary school population. Qualitative research does not seek statistical generalisability; its value lies in the depth and transferability of insights to similar contexts (Yin, 2018). However, the restricted scope of this study means that the findings should be interpreted with caution and not assumed to represent the broader UK educational landscape.

Finally, although pre-packaged DGBL packages such as Times Table Rockstars (Maths Circle Ltd., 2025) are widely used across UK schools, there remains a lack of robust empirical evidence regarding their efficacy as learning interventions or pedagogical tools (Clark, Tanner-Smith, & Killingsworth, 2016). EPs, therefore, should exercise caution when recommending such resources until further research establishes their pedagogical utility. As educational technologies continue to evolve, future studies should explore not only the perceived usefulness of DGBL across diverse educational contexts but also its measurable impact on learning outcomes, engagement, and

inclusivity. Expanding the evidence base in this way will enable EPs and educators to make more informed, evidence-based decisions about the integration of DGBL into everyday classroom practice.

Future Directions

The findings of this study underscore a clear and significant need for further empirical investigation into the intersection between technology, pedagogy, and learning; particularly within the context of DGBL and the increasing use of commercially developed DGBL packages. Despite the increasing implementation of technology within classrooms, the current evidence base remains limited, broad and ambiguous (Clark, Tanner-Smith, & Killingsworth, 2016). While this study has uncovered how DGBL is being implemented in primary educational settings and how educators and learners perceive its value, critical questions remain regarding its mechanisms of effectiveness, for example, *what works, for whom, in what contexts, and how*. Such questions align closely with the framework of realist evaluation (Pawson & Tilley, 1997), which seeks to identify and examine the underlying mechanisms by which interventions produce outcomes within specific contexts. Employing realist methodologies in future research could therefore extend this study's findings by exploring the contextual influences and psychological processes through which DGBL impacts motivation, engagement, and learning outcomes.

There is also a clear need for critical scrutiny of pre-made DGBL packages, many of which are now embedded into everyday classroom use across UK schools (Williamson & Piattoeva, 2022). This gap in evidence highlights an ethical and professional concern that DGBL interventions are being implemented on a large scale without a robust understanding of their pedagogical value or potential unintended consequences (Selwyn, 2021). The current study's findings suggest that DGBL, when used in isolation, may offer limited depth of learning and can risk promoting surface-level engagement or repetition without reflection. Therefore, future investigations should focus not only on the efficacy of such tools but also on the pedagogical integration of DGBL within broader instructional frameworks.

The results of this study further suggest that DGBL should be used in conjunction with RelTAs and other evidence-informed pedagogical practices to maximise its utility as a pedagogical tool. This study's findings suggest that RelTAs, which draw on principles such as trust, belonging, and emotional safety, create the relational foundation upon which DGBL can be used most effectively. Therefore, a comprehensive approach which integrates DGBL's capacity for engagement and fluency-building in conjunction with relational and reflective teaching strategies which provide bespoke feedback is likely to produce sustained engagement and deeper learning outcomes. This echoes broader calls within educational research for the exploration of technological, pedagogical, and relational knowledge relating to the design of learning experiences (Mishra & Koehler, 2006).

Finally, as education systems continue to evolve towards greater digital integration, the findings highlight a critical role for EPs in shaping the ethical and effective use of technology. EPs are uniquely positioned to evaluate the psychological mechanisms underpinning learning technologies and to guide schools in evidence-based decision-making (BPS, 2023). As Participant F summarised, "*That's the thing is that when they are using technology so much at home, although it's not for learning, you have to have it a little bit in school 'cause like that is what's going to happen. And even in the future it's going to become more and more and more. The thing has to be incorporated a little bit at school I think…"* indicating the future of education will likely be characterised by increasing technological integration. It is therefore essential for EPs and allied professionals to ensure they have a sophisticated understanding of niche and novel trends in research and education such as DGBL. This can be achieved through actively engaging and building the evidence base through systematic, theoretically grounded research to ensure that technology serves as an enabler of learning rather than a barrier.

CHAPTER THREE: A Critically Reflective Account

This chapter provides a reflective account of my experiences whilst completing this study. I considered my own positionality which potentially influenced the study and critical decision points which might have affected the outcome of the research findings.

Researcher Positionality

There are multiple dimensions of my positionality that have influenced my approach to this research. I initially reflected on Burnham's (2012) Social GRRAACCEESS model, which provides a framework for consideration of how aspects such as gender, race, age and class shape identity and interactions within research contexts. I identify as a white, middle-class, female trainee Educational Psychologist (EP) who also self-identifies as a "gamer." "Gamers" are defined as individuals who enjoy playing video games (Cambridge University Press, 2025). My personal interest in technology, particularly playing video games, is a significant part of my identity. I have increasingly come to embrace my position as a "girl gamer," acknowledging both the empowerment and marginalisation that accompany this identity (Cameron, 2019). Research has documented persistent gendered stereotypes within gaming culture, with women frequently encountering exclusion or bias within male-dominated gaming spaces (Gray, 2012; Shaw, 2012). Popular media discussion has also tended to depict "gamers" through deficit-based narratives, often describing socially isolated, "lazy", and even addicted individuals (Griffiths et al., 2017; Markey, 2016). I therefore acknowledge that my own experiences and beliefs surrounding gaming and technology have shaped my perceptions of their societal value. I personally view technology as a novel and innovative tool that, when appropriately harnessed, can enhance human experience, including within education and learning contexts.

These values have inevitably influenced the conception, design, and interpretation of this study and its' findings. I initially started thinking about my study in the context of interventions for learning using technology. I wanted to add to empirical evidence which could be used to support recommendations for technology use in EP advice and reports for children. However, it became evident that there is a significant gap in the literature regarding the effectiveness of technology-

based learning interventions, particularly those grounded in educational psychology frameworks (Cheung & Slavin, 2013; Major, Francis & Tsapali, 2021). Though notably there has been emerging research on Minecraft Education and its' potential effectiveness for re-engaging students who experience Emotionally Based School Non-Attendance (EBSNA) (Alawajee & Delafield-Butt 2021). Consequently, this project aimed to explore how technology, particularly DGBL, is currently being utilised within classrooms, and whether staff and students perceive it as an effective learning tool.

Maintaining reflexivity and methodological integrity is critical to ensuring research findings are credible, trustworthy, and transferable (Berger, 2015; Finlay, 2002). Reflexivity requires ongoing critical self-reflection of how the researcher's identity, assumptions, and experiences influence every stage of the research process (Creswell & Poth, 2016). Throughout this project, I have engaged in continuous critical reflection on my positionality and its potential influence on data interpretation, participant interactions, and theoretical framing. This reflexive awareness is not intended to eliminate subjectivity but rather to acknowledge it as a means of enhancing the rigour and authenticity of the research (Pillow, 2003).

Ontology and Epistemology

Initially I was unsure of my own ontological and epistemological standings as I felt that these were complex concepts to comprehend and understand. Through critical reflection and research, I came to understand that my worldview aligns most closely with social constructionism, which suggests that knowledge and meaning are constructed through social interaction and shared experience (Berger & Luckmann, 2016; Burr, 2015). From this perspective, reality is not fixed but rather a co-constructed phenomenon emerging from discourse, culture, and interpersonal relationships. However, I also resonated with some aspects of realism, which suggests that there is an underlying, objective reality (Bhaskar, 2013), even if it is imperfectly perceived through human experience and interpretation. This duality led me to identify with critical realism, a philosophical position that bridges realist ontology with constructionist epistemology and acknowledges that while

reality exists independently of our knowledge, it is understood through socially and historically created human perspectives (Bhaskar, 1978; Maxwell, 2012).

I also made a conscious and purposeful decision to adopt a methodology which would be harmonious with my own positioning, as I felt it would be difficult for me to adopt an external lens (e.g., positivism) and apply it accurately to research. As Crotty (1998) argues, methodology should be congruent with a researcher's ontological and epistemological stance to ensure philosophical coherence. Therefore, my choice in methodology was influenced by my pre-existing ontological and epistemological views. I selected a qualitative, exploratory design that was consistent with a critical realist paradigm, allowing for the interpretation of participants' subjective experiences while also recognising the influence of broader structural and contextual factors.

I acknowledge that had I adopted an alternative philosophical stance, my methodological decisions would have been different. For instance, adopting a positivist orientation might have directed me toward using quantitative measures (such as frequency counts or Likert-scale ratings) to establish observable, objective patterns (Cohen, Manion & Morrison, 2002), whereas a social constructionist paradigm might have led me to focus more deeply on discourse and meaning-making to capture the richness of participants' lived experiences (Guba & Lincoln, 1994).

Data collection

Careful consideration was given to the design and practicalities of data collection to ensure both methodological rigour and ethical integrity. Initially I planned to conduct focus groups, as they allow me to gather collective experiences and stimulate dialogue between participants (Kitzinger, 1995), which fit in with my research question and methodology. Focus groups typically consist of four to six participants, however, I anticipated potential challenges with recruitment and participation. I recognised that arranging focus groups with four to six members of staff simultaneously would likely be logistically challenging, as teachers often have limited non-student-facing time during the school day and may be unwilling to participate outside of working hours without tangible incentives

(Robson & McCartan, 2016). Therefore, I developed a contingency plan to conduct semi-structured interviews should recruitment for focus groups prove unfeasible.

Interviews would have allowed for a similar level of richness and depth in exploring participant's lived experiences while providing greater flexibility in scheduling (Cohen, Manion, & Morrison, 2002). However, I acknowledged that conducting individual interviews would likely yield fewer total participants than focus groups, which may have reduced the diversity of perspectives and limited the transferability of findings (Braun & Clarke, 2013). Despite these potential limitations, the planned method of analysis would remain the same as this approach is equally applicable to both focus group and interview data (Braun & Clarke, 2006).

I also reflected on how group dynamics might have influenced the quality and richness of data, particularly in relation to the first student focus group, which took place within a Specialist Resource Base (SRB). The SRB supports pupils with learning and cognitive needs, and I was aware that neurodiversity and varying levels of communication ability were likely to be present within the group. This awareness led me to consider how such factors might affect participation, turn-taking, and the complexity of responses. I made a purposeful decision to maintain consistency in my focus group interview schedule to provide data which would be homogenous to the questions asked but made minor linguistic adaptations to ensure accessibility for younger and neurodiverse participants. Upon reflection, however, I recognise that further adaptations like simplified phrasing, visual prompts, and the inclusion of interactive elements may have facilitated better engagement and understanding in participants, particularly those who attended the SRB. Research suggests that the use of visual aids can enhance communication and comprehension among neurodiverse learners and those with cognitive difficulties (Detheridge & Detheridge, 2002; Parsons et al., 2013). Introducing visual supports or an introductory "icebreaker" activity may also have reduced anxiety and encouraged participation, fostering a more inclusive research environment (Creswell & Poth, 2016).

Within the first SRB focus group, students often appeared distracted or provided limited responses such as "yes" or "no" and at times gave responses which were not contextually relevant.

This outcome prompted reflection on both my methodological data analysis choices and facilitation style. Following this focus group, I reconsidered my analytical approach, having originally planned to analyse staff and student data separately. Given the uneven richness of data across groups, I later decided that a combined analysis would allow for a more comprehensive exploration of overarching themes (see "Data Analysis" section below for further discussion regarding my rationale for this decision).

During the staff focus groups, I observed a similar need for active facilitation. While staff were generally engaged, discussions sometimes required me to use structured prompting to allow elaboration and to encourage interaction between participants. As Krueger (2014) notes, effective focus group facilitation requires a balance between structure and flexibility, allowing participants to guide the discussion while ensuring that key topics are addressed. To achieve this balance, I employed open-ended follow-up questions and reflective summarising, inviting participants to expand upon or clarify their experiences.

I also reflected on my purposeful decision to include both SRB and mainstream student focus groups within the participant sample. This decision was underpinned by a commitment to capturing a breadth of learner experiences and ensuring that the findings reflected the diversity of the UK educational landscape. As both groups engage with DGBL within their classroom environments, it was important to me to explore whether their experiences, accessibility needs, and perceptions of DGBL effectiveness differed across their educational contexts. The inclusion of students with Special Educational Needs and Disabilities (SEND) aligns with the principles of inclusive research, which advocate for the meaningful participation of learners who have historically been underrepresented in educational research (Nind, 2014; Norwich, 2013). Moreover, such inclusion is consistent with EP practice which emphasises the importance of understanding and supporting diverse learner needs through evidence-informed practice (BPS, 2023). By integrating both SRB and mainstream student perspectives, the research sought to produce findings that are ecologically valid, inclusive, and

applicable to the full range of learners EPs encounter in practice, thereby contributing to a comprehensive understanding of DGBL implementation in varied learning contexts.

Another important area of reflection emerged regarding my own objectivity and positionality within the focus groups, particularly when participant narratives differed from my personal assumptions. I had initially held a hypothesis that students would express positive attitudes towards DGBL and advocate for its increased use in the classroom. However, student participants articulated ambivalence or even frustration toward repetitive or unchallenging DGBL activities. Recognising this discrepancy prompted me to engage in conscious bracketing which is described as an intentional effort to suspend personal bias and remain open to participants' perspectives (Tufford & Newman, 2012). I achieved this by employing active listening strategies, using clarifying questions, and paraphrasing participant statements to confirm accurate understanding. This reflexive awareness was crucial to maintaining interpretative integrity, as researcher preconceptions can inadvertently shape data interpretation without consideration (Berger, 2015).

Data analysis

Making analytical decisions regarding data analysis presented a significant personal challenge, as I experienced periods of uncertainty and deliberation between multiple analytic approaches. Initially, I had considered analysing the student and staff data sets separately, as each group occupies a distinct position within the educational context. This approach could have facilitated a comparative analysis of perspectives, potentially employing Qualitative Comparative Analysis (QCA) to explore differences and convergences across cases. QCA is particularly useful for identifying complex causal configurations and relationships between conditions and outcomes (Ragin, 2014; Rihoux & Ragin, 2009). However, upon further reflection and research, I felt that QCA was not epistemologically aligned with the purpose of my study. QCA seeks to establish causal inferences (Ragin, 2014), whereas my research was primarily exploratory, aiming to understand the experiences and perceptions of staff and students regarding the use and implementation of DGBL. As Braun and Clarke (2021) argue, the selection of analytic methods should reflect the researcher's

theoretical orientation and research aims rather than methodological principles. Therefore, I decided that a Reflective Thematic Analysis (RTA) would be better suited for capturing the shared meanings and contextual nuances present within my participant's experiences.

Following the first student focus group, it became evident that the data was less detailed and conceptually rich than I had originally anticipated. Responses from participants in this group were often brief and lacked the reflective depth typically required for a robust, stand-alone thematic analysis. Given this, I revisited my analytic plan and considered the value of integrating student and staff data into a single set. This decision was both pragmatic and conceptually defensible, as both groups operate within the same educational policy and legislative frameworks governing technology use and inclusive education (Department for Education, 2023). Furthermore, combining data sets aligns with a critical realist perspective, which acknowledges the existence of multiple, contextually mediated realities while recognising shared structural influences that shape experience (Bhaskar, 2013; Maxwell, 2012).

Furthermore, as coding progressed, it became increasingly apparent that several subthemes and initial codes overlapped across the two groups. Both staff and students provided similar reflections on the strengths and limitations of DGBL, particularly regarding engagement, repetition, and inclusivity. The similarities of these experiences and therefore the themes I found provided additional justification for treating the data as a unified set. Analysing the data collectively enabled the identification of shared experiences that demonstrated how DGBL is experienced within the broader educational environment, rather than separate perspectives. This integrative approach supported the generation of themes that more holistically represent the shared realities of educators and learners engaging with technology in educational settings.

Themes

The process of theme development was one of the most intellectually demanding aspects of the data analysis process, requiring me to engage in multiple iterative cycles of coding, reviewing, and refining. This aligns with Braun and Clarke's (2006, 2021) conceptualisation of thematic analysis

as a recursive rather than linear process where researchers move back and forth between the data analysis stages and slowly create emerging interpretations to ensure conceptual clarity and analytic depth. At times, I found the dataset to be particularly complex and unwieldy, containing experiences and perceptions that appeared paradoxical or even contradictory. Capturing the richness of participants' experiences while condensing them into coherent and meaningful themes was therefore a nuanced and challenging endeavour which I had difficulty with.

To support this process, I created several iterations of visual thematic maps, which enabled me to conceptualise relationships between codes, subthemes, and overarching themes. Visual mapping has been recognised as a valuable analytic tool in qualitative research, facilitating the organisation of large and complex datasets and supporting deeper interpretation of meaning (Nowell et al., 2017; Clarke & Braun, 2018). These visual representations acted as cognitive scaffolds, allowing me to refine theme boundaries and identify overlaps or redundancies. The final thematic maps presented in this thesis' final write up reflects a culmination of several versions that evolved through extensive reflection, reorganisation, and synthesis of ideas.

Throughout this process, I continually reflected on how my positionality and prior experiences might influence interpretation and analysis of the data. As a researcher with pre-existing interest and experience in DGBL, technology and video games, I recognised there was a risk of inadvertently prioritising data and themes which aligned with my expectations or personal beliefs. This reflexive awareness aligns with the guidance of Finlay (2002), who argues that qualitative researchers must continuously evaluate their assumptions and positionalities to maintain analytic integrity. To mitigate potential bias, I utilised research supervision as a reflexive space to critically evaluate my emerging interpretations and ensure they remained grounded in the data. Supervision can function as a form of collaborative sense-making, supporting the researcher to test interpretations, maintain transparency, and enhance analytic rigour (Berger, 2015; Haverkamp, Morrow, & Ponterotto, 2005). Discussing my preliminary themes and definitions with my supervisor

not only clarified the concepts of each theme but also helped ensure that the final analytic framework authentically and accurately represented participants' voices and experiences.

Ultimately, the cyclical and reflective nature of this process demonstrated the epistemological alignment between thematic analysis and a critical realist stance, acknowledging both the interpretive act of meaning-making and the commitment to representing participant's lived experiences as faithfully as possible.

Dissemination of findings

Harmsworth et al. (2000) propose three core purposes for research dissemination: awareness, understanding, and action. 'Awareness' involves making research accessible and visible to relevant audiences, therefore extending new knowledge beyond simply academic circles (Davies, Nutley & Walter, 2010). 'Understanding' refers to ensuring that research findings are interpreted accurately and meaningfully, which may be achieved through enabling dialogue, training, or collaborative reflection (Lavis et al., 2003). Finally, 'action' consists of transforming research into practical strategies that influence professional practice and policy. In alignment with these principles, dissemination of this study's findings will focus on raising awareness of what DGBL is and how it might be useful to understand for EP's and allied professional's practice.

Within my employing Local Authority (LA), there is a systemic emphasis and focus on the integration of digital technologies, particularly Artificial Intelligence (AI), to enhance our service's capacity, efficiency, and innovation. I intend to propose that the findings from this study are used to inform local practice development and policy. I intend to do this through possible continuing professional development (CPD) sessions that introduce colleagues to evidence-based applications of DGBL in classrooms. Moreover, I aim to extend this work through leading future studies within the LA that build upon these findings and contribute to the empirical evidence base surrounding the effective implementation of technology-enhanced learning interventions.

References

2Simple. (2025). *Purple Mash*. https://www.2simple.com/purple-mash/

ACT Government. (2025). *Screen time and children*. Kids at Play Active Play. https://www.act.gov.au/campaigns/kids-at-play-active-play/keeping-children-active/screen-time-and-children

Agee, F.R. (2019). Effect of Technology-assisted Learning Platform on Multiplication Fact Fluency and Self-efficacy [Ed.D.Ed.Lead., Union University]. https:// www.proquest.com/docview/2290955610/ abstract/1E6F59FB307649D7PQ/1

Agrawal, R., Yaduvanshi, S., Kumar, A., & Singh, S. P. (2022). Metacognitive awareness and academic performance: Implications from a cognitive neuroscience perspective in pre-service teacher education. *Brain Sciences, 12*(7), 899

Alawajee, O., & Delafield-Butt, J. (2021). Minecraft in education benefits learning and social engagement. *International Journal of Game-Based Learning (IJGBL)*, *11*(4), 19-56

Alexander, R. (2021). *Education in spite of policy*. Routledge.

All, A., Castellar, E. P. N., & Van Looy, J. (2014). Measuring effectiveness in digital game-based learning: A methodological review. *International Journal of Serious Games, 1*(2).

Alotaibi, M. S. (2024). Game-based learning in early childhood education: a systematic review and meta-analysis. *Frontiers in Psychology*, *15*, 1307881.

Amresh, A., Verma, V., & Zandieh, M. (2024). An In-Depth Evaluation of Educational Burst Games in Relation to Learner Proficiency. *Multimodal Technologies and Interaction*, *8*(10), 88.

Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital Game-based Learning and Serious Games in Education. *International Journal of Advances in Scientific Research and Engineering*, 4(12), 139–144.

Annetta, L. A. (2010). The "I's" have it: A framework for serious educational game design. *Review of General Psychology, 14*(2), 105–112.

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*(5), 369–386.

Arianto, F., & Hanif, M. (2024). Evaluating Metacognitive Strategies and Self-Regulated Learning to Predict Primary School Students' Self-Efficacy and Problem-Solving Skills in Science Learning. *Journal of Pedagogical Research*, *8*(3), 301-319.

Baddeley, A. D. (1997). *Human memory: Theory and practice* (Rev. ed.). Psychology Press.

Baddeley, A. D., Eysenck, M. W., & Anderson, M. C. (2020). *Memory* (3rd ed.). Routledge.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman.

BBC. (2023). *Children in China to be limited to two hours of screen time a day*. BBC. https://www.bbc.co.uk/newsround/66397511

Beck, A. T., Brown, G. K., Steer, R. A., Kuyken, W., & Grisham, J. (2001). Psychometric properties of the beck self-esteem scales. *Behaviour research and therapy*, *39*(1), 115-124.

Beck, J. S. (2011). *Cognitive behavior therapy: Basics and beyond* (2nd ed.). Guilford Press.

Becker, K. (2021). *What's the difference between gamification, serious games, educational games, and game-based learning?* Academia Letters, Article 209.

Bediou, B., Adams, D. M., Mayer, R. E., Tipton, E., Green, C. S., & Bavelier, D. (2018). *Meta-analysis of action video game impact on perceptual, attentional, and cognitive skills. Psychological Bulletin, 144*(1), 77–110. https://doi.org/10.1037/bul0000130

Behnagh, R. F., & Azevedo, R. (2014). A Review of Theoretical, Methodological, and Analytical Challenges in Interpreting Learners' Use of Self-Regulated Learning Processes in Intelligent Tutoring Systems. *The Role of Metacognition in Complex Learning with Computer-based Learning Environments*, 6.

Berger, P., & Luckmann, T. (2016). The social construction of reality. In *Social theory re-wired* (pp. 110-122). Routledge.

Berger, R. (2015). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative research*, *15*(2), 219-234.

Bernacki, M.L., Greene, J.A. and Crompton, H. (2020) Mobile Technology, Learning, and Achievement: Advances in Understanding and Measuring the Role of Mobile Technology in Education. Contemporary Educational Psychology, 60, (10), 18-27.

Bhaskar, R. (1978). On the possibility of social scientific knowledge and the limits of naturalism. Journal for the Theory of Social Behaviour, 8(1), 1-28.

Bhaskar, R. (1998). Philosophy and scientific realism. In M. Archer, R. Bhaskar, A. Collier, T. Lawson, & A. Norrie (Eds.). *Critical realism: Essential readings* (pp. 16-47). Routledge.

Bhaskar, R. (2013). *A realist theory of science*. Routledge.

Binder, C. (1996). Behavioural fluency: Evolution of a new paradigm. *The behaviour analyst*, *19*(2), 163-197.

Bjork, R. A., & Bjork, E. L. (2011). Making things hard on yourself, but in a good way: Creating desirable difficulties to enhance learning. In M. A. Gernsbacher, R. W. Pew, L. M. Hough, & J. R. Pomerantz (Eds.), *Psychology and the real world: Essays illustrating fundamental contributions to society* (pp. 56–64). Worth Publishers.

Bjork, R. A., Dunlosky, J., & Kornell, N. (2013). Self-regulated learning: Beliefs, techniques, and illusions. *Annual Review of Psychology, 64*(1), 417–444

Blankenbach, K. (2016). What is a display? An introduction to visual displays and display systems. *Handbook of visual display technology*, 1-22.

Boer, M., Stevens, G. W., Finkenauer, C., de Looze, M. E., & van den Eijnden, R. J. (2020). Social media use intensity, social media use problems, and mental health among adolescents. *Journal of Adolescence*, 80, 1–11.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom. 1991 ASHE-ERIC higher education reports*. ERIC Clearinghouse on Higher Education, The George Washington University, One Dupont Circle, Suite 630, Washington, DC 20036-1183.

Bower, M. (2017) Design of technology-enhanced learning. *Emerald Publishing Limited.*

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn* (Vol. 11). Washington, DC: National academy press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper (Ed.), *APA handbook of research methods in psychology: Vol. 2. Research designs (pp. 57–71).* American Psychological Association.

Braun, V., & Clarke, V. (2013). Successful qualitative research: A practical guide for beginners.

Braun, V., & Clarke, V. (2020). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18(3), 328-352.

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide.* Sage Publications.

Breuer, J., & Bente, G. (2010). Why so serious? On the relation of serious games and learning. *Journal for computer game culture*, *4*, 7-24.

British Psychological Society. (2023). *Code of ethics and conduct.* BPS. https://www.bps.org.uk

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies and academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education, 27*, 1–13.

Bruner, J. (1985). Vygotsky: A historical and conceptual perspective. *Culture, communication, and cognition: Vygotskian perspectives*, *21*, 34.

Burnham, J. (2018). Developments in Social GRRRAAACCEEESSS: visible–invisible and voiced–unvoiced 1. In *Culture and reflexivity in systemic psychotherapy* (pp. 139-160). Routledge.

Burr, V. (2015). *Social constructionism* (3rd ed.). Routledge/Taylor & Francis Group.

Bushner, A. J. (2015). *Press A to Retry: Teaching and Motivating Players Through Failure in Difficult Games*. Purdue University.

Cambridge University Press. (n.d.). *Gamer.* In *Cambridge Dictionary.* Retrieved October 29, 2025, from https://dictionary.cambridge.org/dictionary/english/gamer

Cameron, A. (2019). No more games: An intersectional approach to geek masculinity and marginalization in video gaming culture. *A journal of communication, culture & technology*, *19*(2), 19-31.

Campbell, M., Fitzpatrick, R., Haines, A., Kinmonth, A. L., Sandercock, P., Spiegelhalter, D., & Tyrer, P. (2011). Framework for design and evaluation of complex interventions to improve health. *BMJ, 334*(7591), 455–459.

Carlsen, B., & Glenton, C. (2011). What about N? A methodological study of sample-size reporting in focus group studies. BMC Med Res Methodol, 11, 26. https://doi.org/10.1186/1471-2288-11-26

Carnagey, N. L., & Anderson, C. A. (2004). Violent video game exposure and aggression. *Minerva psichiatrica*, *45*(1), 1-18.

Carter, S. M., & Little, M. (2007). Justifying knowledge, justifying method, taking action: Epistemologies, methodologies, and methods in qualitative research. *Qualitative Health Research, 17*(10), 1316–1328.

Castells, M. (1996). The Information Age: Economy, Society and Culture. Volume I. *The rise of the network society*.

Cilauro, R. (2015). Community building through a public library Minecraft Gaming Day. *The Australian Library Journal,64*(2),87–93.doi:10.1080/00049670.2015.1015209

Cheng, M.-T., Chen, J.-H., Chu, S.-J., & Chen, S.-Y. (2015). The use of serious games in science education: A review of selected empirical research from 2002 to 2013. *Journal of Computers in Education, 2*(3), 353–375. https://doi.org/10.1007/s40692- 015-0039-9

Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational research review*, *9*, 88-113.

Chin, K. Y., & Chen, Y. L. (2021). Potential effects of a role-playing digital gaming learning system on the learning performance and motivation in a humanities course. Interactive Learning Environments, 31(8), 5078-5091.

Chin, P., Sam, R., Serey, M., & Em, S. (2024). Exploring the Benefits and Drawbacks of Directing Undergraduates' Self-Study Pursuits: An In-depth Analysis through Literature Review. *Journal of General Education and Humanities*, *3*(2), 117-132.

Christopoulos, A., & Mystakidis, S. (2023). Gamification in education. *Encyclopaedia*, *3*(4), 1223-1243.

Clark, D. B., Tanner-Smith, E. E., & Killingsworth, S. S. (2016). Digital games, design, and learning: A systematic review and meta-analysis. *Review of Educational Research, 86*(1), 79-122.

Clarke, V., & Braun, V. (2018). Using thematic analysis in counselling and psychotherapy research: A critical reflection. Counselling and psychotherapy research, 18(2), 107-110.

Coe, R., Aloisi, C., Higgins, S., & Major, L. E. (2014). What makes great teaching. *Review of the underpinning research*, *44*, 0-57.

Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*. Routledge.

Coleman, T. E., & Money, A. G. (2020). Student-centred digital game-based learning: A conceptual framework and survey of the state of the art. *Higher Education, 79*(3), 415–457.

Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of educational research*, *77*(1), 113-143.

Covington, M. V. (1984). The motive for self-worth. In R. Ames & C. Ames (Eds.), *Research on motivation in education: Student motivation* (Vol. 1, pp. 77–113). Academic Press.

Covington, M. V. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. Cambridge University Press.

Craft, J.(2016). Rebuilding an empire with Minecraft: Bringing the classics into the digital space. *The Classical Journal,111*(3),347–364.doi:10.5184/classicalj.111.3.0347

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Crotty, M. J. (1998). The foundations of social research: Meaning and perspective in the research process.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety: The experience of play in work and games.* Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* Harper & Row.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life.* Basic Books.

D Griffiths, M., J Kuss, D., & L King, D. (2012). Video game addiction: Past, present and future. *Current Psychiatry Reviews*, *8*(4), 308-318.

Dan, N. N., Nga, N. T., & Dung, T. M. (2024). Digital game-based learning in mathematics education at primary school level: A systematic literature review. *Eurasia Journal of Mathematics, Science and Technology Education*, *20*(4), em2423.

Daniels, H. (2016). Vygotsky and dialogic pedagogy. *Dialogic pedagogy: The importance of dialogue in teaching and learning*, *10*(3), 48-67.

Darvishinia, N., & Goodson, T. (2024). Diversity, Representation, and Accessibility Concerns in Game Development. *arXiv preprint arXiv:2407.04892*.

Davies, H., Nutley, S., & Walter, I. (2010). Using evidence: how social research could be better used to improve public service performance. *Connecting knowledge and performance in public services: From knowing to doing*, 199-225.

De Grove F. (2014). Youth, friendship, and gaming: a network perspective. *Cyberpsychology, behaviour and social networking*, *17*(9), 603–608. https://doi.org/10.1089/cyber.2014.0088Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, *49*(3), 182.

De Jong, T. (2010). Cognitive load theory, educational research, and instructional design: Some food for thought. *Instructional Science, 38*(2), 105–134.

Demetrovics, Z., Urbán, R., Nagygyörgy, K., Farkas, J., Griffiths, M. D., Pápay, O., ... & Oláh, A. (2012). The development of the problematic online gaming questionnaire (POGQ). *PloS one, 7*(5), e36417.

Denham, A.R. (2013). Strategy Instruction and Maintenance of Basic Multiplication Facts through Digital Game Play. International Journal of GameBased Learning (IJGBL), 3(2), 36–54. https://doi. org/10.4018/ijgbl.2013040103

Department for Digital, Culture, Media & Sport (DCMS). (2024). *Video Games Research Framework*. GOV.UK. Retrieved from https://www.gov.uk/government/publications/video-games-research-framework/video-games-research-framework

Department for Education (DfE) (2021a) Education Technology (EdTech) Survey 2020-21. Retrieved January 2025 from https://assets.publishing.service.gov.uk/media/621ce8ec8fa8f54915f43838/Education_Technology_EdTech_Survey.pdf

Department for Education (DfE) (2021b). *Remote education research*. GOV.UK. https://www.gov.uk/government/publications/remote-education-research/remote-education-research

Department for Education (DfE). (2019). *Realising the potential of technology in education: A strategy for education providers and the technology industry*. UK Government. https://assets.publishing.service.gov.uk/media/5ca360bee5274a77d479facc/DfE-Education_Technology_Strategy.pdf

Department for Education (DfE). (2022a). *Opportunity for all: Strong schools with great teachers for your child*. UK Government.

https://assets.publishing.service.gov.uk/media/62416cb5d3bf7f32add7819f/Opportunity_for_all_strong_schools_with_great_teachers_for_your_child__print_version_.pdf

Department for Education. (2020). *EdTech demonstrator schools and colleges: About the programme.* GOV.UK.

Department for Education. (2021b). *Teachers' standards.* DfE.

Department for Education. (2022b). *Education technology (EdTech) survey*. UK Government. https://assets.publishing.service.gov.uk/media/621ce8ec8fa8f54915f43838/Education_Technology_EdTech_Survey.pdf

Department for Education. (2023a). *Special educational needs and disability (SEND) and alternative provision improvement plan.* HM Government.

Department for Education. (2023b). *Technology in schools survey: 2022 to 2023*. UK Government. https://assets.publishing.service.gov.uk/media/655f8b823d7741000d420114/Technology_in_schools_survey__2022_to_2023.pdf

Department for Education. (2024). *No child left behind in plans to narrow the digital divide in education.* GOV.UK.

Department for Education. (2025b). *Education Secretary outlines plans to modernise education sector [Press release].* UK Government.

Department for Education. (2025a). *Generative artificial intelligence in education.* UK Government. https://www.gov.uk/government/publications/generative-artificial-intelligence-in-education/generative-artificial-intelligence-ai-in-education

Department for Science, Innovation and Technology. (2025, February 26). *Digital Inclusion Action Plan: First Steps* [Policy paper]. GOV.UK.

Detheridge, T., & Detheridge, M. (2013). *Literacy through symbols: Improving access for children and adults*. David Fulton Publishers.

Domingues-Montanari, S. (2017). Clinical and psychological effects of excessive screen time on children. *Journal of paediatrics and child health, 53*(4), 333-338.

Dweck, C. S. (2013). *Self-theories: Their role in motivation, personality, and development*. Psychology press.

Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management*, *39*(1), 118–128. https://doi.org/10.1016/j.indmarman.2008.06.004

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual review of psychology*, *53*(1), 109-132.

Education Committee. (2024, May 25). *Screen time: Impacts on education and wellbeing (House of Commons Paper No. HC 118).* UK Parliament.

Education DESTY. (n.d.). *DESTY Island Emotional Resilience Programme*. https://www.educationdesty.com/

Ekici, M. (2021). A systematic review of the use of gamification in flipped learning. *Education and Information Technologies, 26*(3), 3327-3346.

Encyclopaedia Britannica (2025) *Internet.* Britannica.com Retrieved June 1, 2025, from https://www.britannica.com/technology/Internet

Entwistle, N. J., & Ramsden, P. (2015). *Understanding student learning* (Routledge Revivals ed.). Routledge.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education*, *42*(3), 255-284.

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, *7*(2), 117-140.

Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford University Press.

Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. *Qualitative Research, 2*(2), 209–230.

Finlay, L. (2006). The body's disclosure in phenomenological research. Qualitative Research in Psychology, 3(1), 19-30.

Fisch, S. M., & Truglio, R. T. (Eds.). (2014). *G is for growing: Thirty years of research on children and Sesame Street*

Fisher, K. R., Hirsh-Pasek, K., Golinkoff, R. M., Singer, D. G., & Berk, L. E. (2011). Playing around in school: Implications for learning and educational policy. *Oxford Review of Education, 37*(2), 223–241.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906–911

Floridi, L. (2014). *The fourth revolution: How the infosphere is reshaping human reality*. OUP Oxford.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the national academy of sciences*, *111*(23), 8410-8415.

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

Geesa, R. L., Robbins, K., & Shively, K. (2022). The collaborative model for teaching o-SEL: Preparing educators to design online environments for social-emotional learning. *Journal of Online Learning Research*, *8*(1), 67-100.

Gilmore, B., McAuliffe, E., Power, J., & Vallières, F. (2019). Data Analysis and Synthesis Within a Realist Evaluation: Toward More Transparent Methodological Approaches. *International Journal of Qualitative Methods*, *18*. https://doi.org/10.1177/1609406919859754

Girard, C., Ecalle, J., & Magnan, A. (2013). Serious games as new educational tools: How effective are they? A meta-analysis of recent studies. *Journal of Computer Assisted Learning, 29*(3), 207-219. https://doi.org/10.1111/j.1365-2729.2012.00485.x

Głowacki, J., Kriukova, Y., & Avshenyuk, N. (2018). Gamification in higher education: Experience of Poland and Ukraine. *Advanced Education*, (10), 105-110.

Gómez, M. J., Ruipérez-Valiente, J. A., & García Clemente, F. J. (2022). A systematic literature review of game-based assessment studies: Trends and challenges. *arXiv preprint arXiv:2207.07369*

Gonçalves, D., Rodrigues, A., Richardson, M. L., De Sousa, A. A., Proulx, M. J., & Guerreiro, T. (2021, May). Exploring asymmetric roles in mixed-ability gaming. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1-14).

Gordan, M., & Krishanan, I. A. (2014). A review of BF Skinner's 'Reinforcement Theory of Motivation'. *International journal of research in education methodology*, *5*(3), 680-688.

Gordon, J. (2022–present). *Enhancing teacher agency with technology: Creating an ecological model through a place-based study of teaching and learning.* Economic and Social Research Council; University of East Anglia.

Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American psychologist*, *69*(1), 66.

Gray, K. L. (2012). Intersecting oppressions and online communities: Examining the experiences of women of color in Xbox Live. *Information, Communication & Society, 15*(3), 411–428.

Green, J., & Britten, N. (1998). Qualitative research and evidence-based medicine. *BMJ, 316*(7139), 1230–1232.

Gregory, S., Reiners, T., Wood, L. C., Teräs, H., Teräs, M., & Henderson, M. (2015). Gamification and digital games-based learning in the classroom. In M. Henderson & G. Romeo (Eds.), *Teaching and Digital Technologies: Big Issues and Critical Questions* (pp. 127–141). Chapter 11, Cambridge: Cambridge University Press.

Griffiths, M. D., Davies, M. N., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *Cyberpsychology & behaviour*, *7*(4), 479-487.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, *2*(163-194), 105.

Guy-Evans, O. (2025). *Bronfenbrenner's ecological systems theory*. Simply Psychology. https://www.simplypsychology.org/bronfenbrenner.html

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?--a literature review of empirical studies on gamification. In *2014 47th Hawaii international conference on system sciences* (pp. 3025-3034). Ieee.

Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behaviour, 54*, 170–179.

Haring, N. G., Lovitt Thomas, C., Eaton, M. D., & Hansen, C. L. (1978). The fourth R: Research in the classroom. Merrill.

Harmsworth, S., Turpin, S., Rees, A., & Pell, G. (2000). Creating an effective dissemination strategy. *An Expanded Interactive Workbook for Educational Development Projects*.

Harter, S. (2015). *The construction of the self: Developmental and sociocultural foundations*. Guilford Publications.

Hartstein, L. E., Mathew, G. M., Reichenberger, D. A., Rodriguez, I., Allen, N., Chang, A. M., ... & Hale, L. (2024). The impact of screen use on sleep health across the lifespan: a national sleep foundation consensus statement. *Sleep Health*.

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research*, *77*(1), 81-112.

Haverkamp, B. E., Morrow, S. L., & Ponterotto, J. G. (2005). A time and place for qualitative and mixed methods in counseling psychology research. *Journal of counseling psychology*, *52*(2), 123.

Hayes, E. (2008). Game content creation and it proficiency: An exploratory study. *Computers & Education, 51*(1), 97-108.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and commitment therapy: The process and practice of mindful change* (2nd ed.). Guilford Press.

Hersh, M. A., & Leporini, B. (2013). An overview of accessibility and usability of educational games. *Student usability in educational software and games: Improving experiences*, 1-40.

Hilpert, J. C. (2018). Complex systems research in educational psychology. *Frontiers in Psychology, 9*, 2235.

Hirsh-Pasek, K., Zosh, J.M., Michnick Golinkoff, Gray, J.H., Robb, M.B., and Kaufman, J. (2015) 'Putting Education in "Educational" Apps: Lessons From the Science of Learning', *Psychological Science in the Public Interest, 16*, pp. 3–34.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057817/Education_Technology_EdTech_Survey.pdf

https://plato.stanford.edu/archives/spr2024/entries/epistemology/

Hunt, S. (2022). *The use of solution-oriented coaching to facilitate teacher's applications of education technology in a primary school* (Doctoral dissertation, University of Nottingham).

Hussein, M. H., Ow, S. H., Cheong, L. S., Thong, M. K., & Ebrahim, N. A. (2019). Effects of digital game-based learning on elementary science learning: A systematic review. *IEEE Access*, *7*, 62465-62478.

Hussein, M. H., Ow, S. H., Elaish, M. M., & Jensen, E. O. (2022). Digital game-based learning in K-12 mathematics education: A systematic literature review. *Education and Information*

Hwang, G. J., Sung, H. Y., Hung, C. M., Yang, L. H., & Huang, I. (2013). A knowledge engineering approach to developing educational computer games for improving students' differentiating knowledge. *British journal of educational technology*, *44*(2), 183-196.

Hwang, G.-J., Chiu, L.-Y., & Chen, C.-H. (2015). A contextual game-based learning approach to improving students' inquiry-based learning performance in social studies courses. *Computers & Education, 81*, 13–25.

IFF Research. (2023, November 28). 2022-23 *Technology in schools survey : Research report (RR1400).* Department for Education.

International Society for Technology in Education (2021) Standards for coaches. Retrieved January 2025 from https://www.iste.org/standards/iste-standards-for-coaches

Ioannidis, J. P. (2005). Why most published research findings are false. *PLoS medicine*, *2*(8), e124.

Ismail, M., Mokhtar, W. Z., Nasir, N. N., Rashid, N. R., & Ariffin, A. K. (2014). The development of a web-based homework system (WBH) via TCExam. *Mediterranean Journal of Social Sciences.* https://doi.org/10.5901/mjss.2014.v5n15p249.

Ito, M., Baumer, S., Bittanti, M., Boyd, D., Cody, R., Herr-Stephenson, B., … Tripp, L. (2010). *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media.* MIT Press.

Jalali, S., & Wohlin, C. (2012). *Systematic Literature Studies: Database Searches vs. Backward Snowballing*. http://scholar.google.com/intl/en/scholar/about.html

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational researcher*, *38*(5), 365-379.

Joiner, R., Iacovides, J., Owen, M., Gavin, C., Clibbery, S., Darling, J., & Drew, B. (2011). Digital games, gender and learning in engineering: Do females benefit as much as males?. *Journal of Science Education and Technology*, *20*(2), 178-185.

Joneidy, S., & Ayadurai, C., (2023) *Written evidence submitted by the National Centre for Social Research (GVC0029).* House of Commons. (2023). Retrieved from https://committees.parliament.uk/writtenevidence/124884/pdf/

Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential barriers to the implementation of digital game-based learning in the classroom: Pre-service teachers' views. *Technology, Knowledge and Learning*, *26*(4), 825-844.

Kebritchi, M., Hirumi, A., & Bai, H. (2010). The effect of modern computer games on mathematics achievement and class motivation. *Computers & Education, 55*, 427– 443. doi:10.1016/j.compedu.2010.02 .007

Khan, A., Ahmad, F. H., & Malik, M. M. (2017). Use of digital game-based learning and gamification in secondary school science: The effect on student engagement, learning and gender difference. *Education and Information Technologies*, *22*(6), 2767-2804.

Kiili, K., Devlin, K., & Multisilta, J. (2018). The role of challenge in educational digital games. *Computers in Human Behaviour, 78*, 296–305.

Kirschner, P., Sweller, J., & Clark, R. E. (2006). Why unguided learning does not work: An analysis of the failure of discovery learning, problem-based learning, experiential learning and inquiry-based learning. *Educational psychologist*, *41*(2), 75-86.

Kiryakova, G., Angelova, N., & Yordanova, L. (2014). Gamification in education. Proceedings of the 9th International Balkan Education and Science Conference.

Kitchenham, B., Pearl Brereton, O., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering - A systematic literature review. In *Information and Software Technology* (Vol. 51, Issue 1, pp. 7–15).

Kitzinger, J. (1995). Qualitative research: introducing focus groups. *Bmj*, *311*(7000), 299-302.

Klein, R., & Celik, T. (2017). The Wits Intelligent Teaching System: Detecting student engagement during lectures using convolutional neural networks. In *2017 IEEE international conference on image processing (ICIP)* (pp. 2856-2860). IEEE.Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in entertainment (CIE)*, *1*(1), 20-20.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers.* Association Press.

Kortemeyer, G. (2015). An empirical study of the effect of granting multiple tries for online homework. *American Journal of Physics, 83*(7), 646–653. https://doi.org/ 10.1119/1.4922256.

Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R. (2014). Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. *Psychological Bulletin*, 140(4), 1073–1137.

Kowert, R., Domahidi, E., & Quandt, T. (2014). The relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. *Cyberpsychology, Behaviour, and Social Networking*, *17*(7), 447-453.

Krath, J., Schürmann, L., & Von Korflesch, H. F. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behaviour, 125*, 106963.

Kromminga, K.R. & Codding, R.S. (2023). The impact of intervention modality on students' multiplication fact fluency. Psychology in the Schools, 1–23. https://doi.org/10.1002/pits.23054

Krueger, R. A. (2014). *Focus groups: A practical guide for applied research*. Sage publications.

Kubina, R. M., & Yurich, K. K. (2012). *Precision teaching book*. Lemont, PA: Greatness Achieved Publishing Company.

Kvernbekk, T. (2017, December 19). Evidence-Based Educational Practice. *Oxford Research Encyclopedia of Education.* Retrieved 27 Sep. 2025, from https://oxfordre.com/education/view/10.1093/acrefore/9780190264093.001.0001/acrefore-9780190264093-e-187.

Kyriacou, C. (2010). *Effective teaching in schools theory and practice*. Oxford University Press-Children.

Lameras, P., Arnab, S., De Freitas, S., Petridis, P., & Dunwell, I. (2021). Science teachers' experiences of inquiry-based learning through a serious game: a phenomenographic perspective. *Smart Learning Environments*, *8*(1), 7.

Lauricella, A. R., Wartella, E., & Rideout, V. J. (2015). Young children's screen time: The complex role of parent and child factors. *Journal of Applied Developmental Psychology, 36*, 11–17.

Lavis, J. N., Robertson, D., Woodside, J. M., McLeod, C. B., & Abelson, J. (2003). How can research organizations more effectively transfer research knowledge to decision makers?. *The milbank quarterly*, *81*(2), 221-248.

Lee, C. Y., and Chen, M. P. (2009). A computer game as a context for non-routine mathematical problem solving: the effects of type of question prompt and level of prior knowledge. Comput. Educ. 52, 530–542. doi: 10.1016/j.compedu.2008.10.008

Lemov, D. (2015). *Teach Like a Champion 2.0* (2nd ed.). San Francisco: Jossey-Bass

Liao, Y-C., Ottenbreit-Leftwich, A., Glazewski K., and Karlin, M. (2021). Coaching to support teacher technology integration in elementary classrooms: A multiple case study. *Teacher and teacher education*, 104, 1-13. https://doi.org/10.1016/J.TATE.2021.103384

Lin, H.-C. K., Lin, Y.-H., Wang, T.-H., Su, L.-K., & Huang, Y.-M. (2021). Effects of incorporating augmented reality into a board game for high school students' learning motivation and acceptance in health education. Sustainability (Basel), 13(6), 3333–3347. doi:10.3390/su13063333

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (4th ed., pp. 97–128). Thousand Oaks, CA: SAGE.

Lindsley, O. R. (1992). Precision teaching: Discoveries and effects. *Journal of Applied Behaviour Analysis, 25*(1), 51–57.

Lopez, J. Y. A., Huaycho, R. N. N., Santos, F. I. Y., Talavera-Mendoza, F., & Paucar, F. H. R. (2023). The impact of serious games on learning in primary education: a systematic literature review. *International Journal of Learning, Teaching and Educational Research*, *22*(3), 379-395

Lopez, V., & Whitehead, D. (2013). Sampling data and data collection in qualitative research. *Nursing & midwifery research: Methods and appraisal for evidence-based practice*, *123*, 140.

Lotherington, H., & Ronda, N. S. (2009). Gaming geography: Educational games and literacy development in the Grade 4 classroom. *Canadian Journal of Learning and Technology*, *35*(3), n3.

Lucas, K., & Sherry, J. L. (2004). Sex differences in video game play: A communication-based explanation. *Communication research*, *31*(5), 499-523.

Lunsford, M. L., & Pendergrass, M. (2016). Making online homework work. *Primus*, *26*(6), 531-544.

Lynn, S., Carroll, A., Nankervis, K., & Antrobus, E. (2024). A systematic review of delivery modes in school-based adolescent social–emotional learning programs—Current perspectives and future directions. *Review of Education*, *12*(3), e70019.

Madigan, S., Eirich, R., Pador, P., McArthur, B. A., & Neville, R. D. (2022). Assessment of changes in child and adolescent screen time during the COVID-19 pandemic: a systematic review and meta-analysis. *JAMA paediatrics*, *176*(12), 1188-1198.

Magalhães, T., Cunha, J., & Ribeiro, C. (2020). *Online vs. traditional homework: A systematic review on the benefits to students' performance*. Computers & Education, 152, 103869. https://doi.org/10.1016/j.compedu.2020.103869

Major, L., Francis, G. A., & Tsapali, M. (2021). The effectiveness of technology-supported personalised and adaptive learning in low- and middle-income countries: A meta-analysis. *British Journal of Educational Technology, 52*(6), 2029–2048.

Maraffi, S., Sacerdoti, F. M., & Paris, E. (2017). Learning on gaming: A new digital game based learning approach to improve education outcomes. *US-China Education Review A*, *7*(9), 421-432.

Markey, P. M. (2016). The video game debate: Unravelling the physical, social, and psychological effects of digital games. *American Journal of Play*, *8*(3), 404-406.

Martin, A. J., & Marsh, H. W. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools*, *43*(3), 267-281.

Martinez, L., Gimenes, M., & Lambert, E. (2022). Entertainment video games for academic learning: A systematic review. *Journal of Educational Computing Research*, *60*(5), 1083-1109.

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I—Outcome and process. *British Journal of Educational Psychology, 46*(1), 4–11.

Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, *50*(4), 370.

Maths Circle Ltd. (2025). *Times Tables Rock Stars – Times Tables Rock Stars*. https://ttrockstars.com/

Maxwell, J. A. (2012). *A realist approach for qualitative research*. Sage.

McArthur, B. A., Tough, S., & Madigan, S. (2022). Screen time and developmental and behavioural outcomes for preschool children. *Pediatric research, 91*(6), 1616-1621.

McCormick, R. (1990). Technology and the National Curriculum: the creation of a 'subject' by committee?. *The Curriculum Journal*, *1*(1), 39-51.

McDonagh, M., Peterson, K., Rainer, P., Chang, S., & Shekelle, P. (2013). *Methods Guide for Comparative Effectiveness Reviews - Avoiding Bias in Selecting Studies*. www.effectivehealthcare.ahrq.gov/reports/final.cfm.

McDougall, J., & Livingstone, S. (2014). Media and information literacy policies in the UK. London, England: London School of Economics and Political Science. Retrieved from https://eprints.lse.ac.uk/57103/.

McGonigal, J. (2011) *Reality is broken: why games make us better and how they can change the world.* New York: Penguin Press.

Mendicino, M., Razzaq, L., & Heffernan, N. T. (2009). A comparison of traditional homework to computer-supported homework. *Journal of Research on Technology in Education, 41*(3), 331–359. https://doi.org/10.1080/15391523.2009.10782534.

Meyer, B. (2008). Independent learning: Literature review. Association for Psychology Teachers.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, *108*(6), 1017-1054.

Moneta, G. B. (2012). On the measurement and conceptualization of flow. In *Advances in flow research* (pp. 23-50). New York, NY: Springer New York.

Mu, W.-W., & Sin, K.-F. (2018). The application of Minecraft in education for children with autism in special schools. In S.-C. Kong, D. Andone, G. Biswas, T. Crick, H. U. Hoppe, T.-C. Hsu, . . . J. Vahrenhold (Eds.), Proceedings of International Conference on Computational Thinking Education 2018 (pp. 107-111). Hong Kong: The Education University of Hong Kong.

Nakamura, J., & Csikszentmihalyi, M. (2009). Flow theory and research. In C. R. Snyder & S. Lopez (Eds.), *Oxford handbook of positive psychology* (2nd ed., pp. 195–206). Oxford University Press.

National Association of Schoolmasters Union of Women Teachers (NASUWT): The Teacher's Union (2023) *Written evidence submitted by the National Centre for Social Research (GVC0029).* House of Commons. (2023). Retrieved from https://committees.parliament.uk/writtenevidence/124884/pdf/

Nebel, S., Schneider, S., Schledjewski, J., & Rey, G. D. (2017). Goal-setting in educational video games: Comparing goal-setting theory and the goal-free effect. *Simulation and Gaming, 48*(1), 98–130. https://doi.org/10.1177/1046878116680869

Nessy Learning. (2025). *Phonics*. https://www.nessy.com/en-gb

Newhouse, C.P. (2015). When does technology improve learning? In Henderson, M., and Romeo, G. (Eds.) *Teaching and digital technologies: Big issues and critical questions*. Cambridge, United Kingdom: Cambridge University Press.

Nikken, P., & Schols, M. (2015). How and why parents guide the media use of young children. *Journal of Child and Family Studies, 24*(11), 3423–3435.

Nind, M. (2014). *What is inclusive research? Bloomsbury Academic*.

Noddings, N. (2013). *Caring: A relational approach to ethics and moral education*. Univ of California Press.

Norwich, B. (2013). *Addressing tensions and dilemmas in inclusive education: Living with uncertainty*. Routledge.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International journal of qualitative methods*, *16*(1), 1609406917733847.

NumBots. (2025). *NumBots*. https://numbots.com/

Nutley, S. M., Walter, I., & Davies, H. T. O. (2007). *Using evidence: How research can inform public services* (1st ed.). Bristol University Press. https://doi.org/10.2307/j.ctt9qgwt1

Ofcom. (2023). *Children's Media Use and Attitudes Report 2023.* Retrieved from https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/childrens-media-use-and-attitudes-2023/childrens-media-use-and-attitudes-report-2023.pdf

Ofsted. (2019). *Education inspection framework.*

Ofsted. (2025). Ofsted's use of AI. GOV.UK. https://www.gov.uk/government/publications/ofsteds-approach-to-ai/ofsteds-use-of-ai

Owston, R., Wideman, H., Lotherington, H., Sinitskaya Ronda, N., & Brown, C. (2007). *Computer game development as a literacy activity.* Institute for Research on Learning Technologies, Technical Report 2007-3.

Oxford University Press. (2020). *Read Write Inc.* Oxford University Press. https://global.oup.com/education/content/primary/series/rwi/phonics/?region=uk&srsltid=AfmBOoq7bRr0siDQbL6IkoRSFaIlp0E2H3f1Y1ofTwYYDRbpSoSqp3cA

Pan, L., Tlili, A., Li, J., Jiang, F., Shi, G., Yu, H., & Yang, J. (2021). How to implement game-based learning in a smart classroom? A model based on a systematic literature review and Delphi method. *Frontiers in psychology*, *12*, 749837.

Pan, Y., Ke, F., & Xu, X. (2022). A systematic review of the role of learning games in fostering mathematics education in K-12 settings. *Educational Research Review, 36*, 100448. https://doi.org/10.1016/j. edurev.2022.100448

Panayiotou, M., Black, L., Carmichael-Murphy, P. *et al.* Time spent on social media among the least influential factors in adolescent mental health: preliminary results from a panel network analysis. *Nat. Mental Health* **1**, 316–326 (2023). https://doi.org/10.1038/s44220-023-00063-7

Papanis, E., Giavrimis, P., & Papani, E. M. (2010). The contribution of the internet into learning. *Rev. Eur. Stud.*, *2*, 54.

Papastergiou, M. (2009). Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation. *Computers & education*, *52*(1), 1-12.

Parsons, S., Charman, T., Faulkner, R., Ragan, J., Wallace, S., & Wittemeyer, K. (2013). Commentary–bridging the research and practice gap in autism: The importance of creating research partnerships with schools. *Autism*, *17*(3), 268-280.

Passey, D. (2019) Technology-enhanced learning: Rethinking the term, the concept and its theoretical background. British journal of educational technology, 50(3), 972-986

Pawson, R., & Tilley, N. (1997). *Realistic evaluation.* SAGE Publications.

Pegram, J., Watkins, R.C., Hoerger, M. & Hughes, J.C. (2022). Assessing the range and evidencebase of interventions in a cluster of schools. Review of Education, 10(1), e3336. https://doi. org/10.1002/rev3.3336

Peifer, C., Schulz, A., Schächinger, H., Baumann, N., & Antoni, C. H. (2014). The relation of flow-experience and physiological arousal under stress—can u shape it?. *Journal of Experimental Social Psychology*, *53*, 62-69.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational psychology review*, *18*(4), 315-341.

Perini, S., Luglietti, R., Margoudi, M., Oliveira, M., & Taisch, M. (2018). Learning and motivational effects of digital game-based learning (DGBL) for manufacturing education–The Life Cycle Assessment (LCA) game. *Computers in Industry*, *102*, 40-49.

Pianta, R. C., Hamre, B. K., & Allen, J. P. (2012). Teacher-student relationships and engagement: Conceptualizing, measuring, and improving the capacity of classroom interactions. In *Handbook of research on student engagement* (pp. 365-386). Boston, MA: Springer US.

Pillow, W. (2003). Confession, catharsis, or cure? Rethinking the uses of reflexivity as methodological power in qualitative research. *International journal of qualitative studies in education*, *16*(2), 175-196.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451–502). San Diego, CA: Academic Press.

Polizzi, G. (2020). Digital literacy and the national curriculum for England: Learning from how the experts engage with and evaluate online content. *Computers & Education*, *152*, 103859.

Polizzi, G., Taylor, R., (2019) Misinformation, digital literacy and the school curriculum. Media Policy Brief 22. London: Media Policy Project, London School of Economics and Political Science

Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers & Education*, 58(1), 449–458.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of engineering education*, *93*(3), 223-231.

Przybylski, A. K., & Weinstein, N. (2017). Digital screen time limits and young children's psychological well-being: Evidence from a population-based study. *Child Development, 88*(6), 1793–1805.

Public Health England. (2021). *Promoting children and young people's emotional health and wellbeing: A whole school and college approach.* Public Health England.

Pullig, H., (2023) *Phones at 50: Expert explains how mobiles became more than just a phone*. University of Kent.

Qian, M., & Clark, K. R. (2016). Game-based learning and 21st century skills: A review of recent research. *Computers in Human Behaviour, 63*, 50–58.

Quigley, S. P., Peterson, S. M., Frieder, J. E., & Peck, K. M. (2018). A review of SAFMEDS: Evidence for procedures, outcomes and directions for future research. *Perspectives on Behaviour Science*, *41*(1), 283-301.

Ragin, C. C. (2014). *The comparative method: Moving beyond qualitative and quantitative strategies*. Univ of California Press.

Ragni, B., Toto, G. A., di Furia, M., Lavanga, A., & Limone, P. (2023). The use of Digital Game-Based Learning (DGBL) in teachers' training: a scoping review. In *Frontiers in Education* (Vol. 8, p. 1092022). Frontiers Media SA.

Razak, A. A., Connolly, T., & Hainey, T. (2011, June). The use of games-based learning within the curriculum for excellence: the teachers' perspective. In *European Conference on Games Based Learning* (p. 1). Academic Conferences International Limited.

Ren, J., Xu, W., & Liu, Z. (2023). Impact of gamification on children's learning: A case study on literacy games in primary school. In *Handbook of Research on Adapting Remote Learning Practices for Early Childhood and Elementary School Classrooms* (pp. 1-21). IGI Global. Retrieved from https://www.igi-global.com/pdf.aspx?tid=336478&ptid=333368&ctid=4&oa=true&isxn=9798369325162

Rihoux, B., & Ragin, C. C. (Eds.). (2009). Configurational comparative methods: Qualitative comparative analysis (QCA) and related techniques (Vol. 51). Sage.

Riley, K. (2019). Agency and belonging: What transformative actions can schools take to help create a sense of place and belonging? *Journal of Educational & Child Psychology, 36*(4), 91-103.

Riley, P. (2010). *Attachment theory and the teacher-student relationship: A practical guide for teachers, teacher educators and school leaders*. Routledge.

Robson, C., & McCartan, K. (2016). Real world research, 4th edn. hokoben.

Rodriguez, P., & Smith, L. M. (2016). Using an online homework management system in tax accounting: Does it advance learning? *International Journal of Learning Technology, 11*(1), 44–65. https://doi.org/10.1504/ijlt.2016.076062.

Roffey, S. (2016). Positive relationships at work. *The Wiley Blackwell Handbook of the Psychology of Positivity and Strengths-Based Approaches at Work*, 171-190.

Rogers, C. R. (1959). *Toward a theory of personality and interpersonal relationships, as developed in the client-centered framework*. In S. Koch (Ed.), Psychology: A study of a science (Vol. 3, pp. 184–256). McGraw-Hill.

Rohrer, D., & Taylor, K. (2006). The effects of overlearning and distributed practice on the retention of mathematics knowledge. *Applied Cognitive Psychology, 20*(9), 1209–1224.

Roorda, D. L., Koomen, H. M., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher–student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of educational research*, *81*(4), 493-529.

Rosário, P., Núñez, J. C., Vallejo, G., Cunha, J., Nunes, T., Suárez, N., ... & Moreira, T. (2015). The effects of teachers' homework follow-up practices on students' EFL performance: a randomized-group design. *Frontiers in Psychology*, *6*, 1528.

Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. *American educator*, *36*(1), 12.

Rowe, M. W. (1992). The Definition of 'Game.' *Philosophy*, *67*(262), 467–479. doi:10.1017/S0031819100040663

Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R.J. Spiro, B.C.

Ryan, R. M., & Deci, E. L. (2008). Self-determination theory and the role of basic psychological needs in personality and the organization of behaviour. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 654–678). The Guilford Press.

Sáez López, J. M., Vázquez Cano, E., Fombona Cadavieco, A. J., & López Meneses, E. (2022). Gamification and gaming proposals, teachers' perceptions and practices in Primary Education. *Interaction Design and Architecture*.

Safieddine, F., Dordevic, M., & Pourghomi, P. (2017). Spread of misinformation online: Simulation impact of social media newsgroups. In *2017 Computing Conference* (pp. 899-906). IEEE.

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational psychology review, 32*(1), 77-112.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in human behaviour*, *69*, 371-380.

Sarkar, N., Ford, W., & Manzo, C. (2017). Engaging digital natives through social learning. *Systemics, Cybernetics and Informatics*, *15*(2), 1-4.

Schrader, C. (2023). Serious games and game-based learning. In *Handbook of open, distance and digital education* (pp. 1255-1268). Singapore: Springer Nature Singapore.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460–475

Schunk, D. H. (2017). *Learning theories: An educational perspective* (7th ed.). Pearson.

Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 15–31). Academic Press.

Scibora, L. M., Mead, T. P., & Larson, C. (2018). The influence of iPads on course performance and student perceptions of learning in human anatomy. *Journal of Teaching and Learning with Technology*, *7*(1), 108-124.

Selwyn, N. (2021). *Education and technology: Key issues and debates*. Bloomsbury Publishing.

Shaw, A. (2012). Do you identify as a gamer? Gender, race, sexuality, and gamer identity. *New Media & Society, 14*(1), 28–44.

Sheikh, H., Prins, C., & Schrijvers, E. (2023). Artificial intelligence: definition and background. In *Mission AI: The new system technology* (pp. 15-41). Cham: Springer International Publishing.

Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly, 18*(2), 158–176

Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Shernoff, E. S. (2014). Student engagement in high school classrooms from the perspective of flow theory. In *Applications of flow in human development and education: The collected works of Mihaly Csikszentmihalyi* (pp. 475-494). Dordrecht: Springer Netherlands.

SHINE Trust. (2025, January 8). *Times Tables Rock Stars*. SHINE Trust. https://shinetrust.org.uk/case-study/times-tables-rock-stars/

Shute, V. J. (2008). Focus on formative feedback. *Review of educational research*, *78*(1), 153-189.

Skinner, B. F. (1965). *Science and human behaviour* (No. 92904). Simon and Schuster.

Skinner, B. F. (2016). *The technology of teaching*. BF Skinner Foundation.

Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behaviour and student engagement across the school year. *Journal of educational psychology*, *85*(4), 571.

Skripkauskaite, S., Fazel, M., & OxWell Study Team. (2022). Time spent gaming, device type, addiction scores, and well-being of adolescent English gamers in the 2021 OxWell survey: Latent profile analysis. JMIR Paediatrics and Parenting, 5(4), e41480. https://doi.org/10.2196/41480

Slattery, E. J., Butler, D., O'Leary, M., & Marshall, K. (2023). Primary school students' experiences using Minecraft Education during a national project-based initiative: An Irish study. *TechTrends*, 1-13.

Slevitch, L. (2011). Qualitative and quantitative methodologies compared: Ontological and epistemological perspectives. *Journal of Quality Assurance in Hospitality & Tourism, 12*(1), 73–81.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of business research*, *104*, 333-339.

Somekh, B. (2007). *Pedagogy and learning with ICT: Researching the art of innovation*. Routledge.

Spieler, B., & Degonda, A. (2022). Digital games in schools: a qualitative study on teacher's beliefs. In *European Conference on Games Based Learning* (Vol. 16, No. 1, pp. 543-551). Academic Conferences International Limited.

Spronken-Smith, R., & Walker, R. (2010). Can inquiry-based learning strengthen the links between teaching and disciplinary research?. *Studies in higher education*, *35*(6), 723-740.
Stanford Encyclopedia of Philosophy (Spring 2024 ed.). Stanford University.

Steup, M., & Neta, R. (2024). *Epistemology*. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Spring 2024 Edition). The Metaphysics Research Lab, Stanford University.

Stiglic, N., & Viner, R. M. (2019). Effects of screen time on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open, 9*(1), e023191.

Sun, L., Chen, X., & Ruokamo, H. (2021). Digital game-based pedagogical activities in primary education: A review of ten years' studies. *International Journal of Technology in Teaching and Learning*, *16*(2), 78-92.

Sweller, J. (2016). Working Memory, Long-term Memory, and Instructional Design. *Journal of Applied Research in Memory and Cognition*, 5(4), 360-367.
Technologies, 27(2), 2859-2891. https://doi.org/10.1007/s10639-021-10721-x

The Association of School and College Leaders (ASCL) (2023) *Written evidence submitted by the National Centre for Social Research (GVC0029).* House of Commons. (2023). Retrieved from https://committees.parliament.uk/writtenevidence/124884/pdf/

Thomas, J. W. (2000). *A review of research on project-based learning.* The Autodesk Foundation.

Thomson, J., & Wright, S. (2024). *Times Tables Rock Stars: An academic critique*. DECP Debate, 1(189), 14–35. https://explore.bps.org.uk/content/bpsdeb/1/189/14.full.pdf

Trautwein, U., & Lüdtke, O. (2007). Students' self-reported effort and time on homework in six school subjects: Between-students differences and within-student variation. *Journal of Educational Psychology, 99*(2), 432–444.

Tufford, L., & Newman, P. (2012). Bracketing in qualitative research. *Qualitative social work*, *11*(1), 80-96.

Turan, Z., & Meral, E. (2018). Game-Based versus to Non-Game-Based: The Impact of Student Response Systems on Students' Achievements, Engagements and Test Anxieties. *Informatics in Education*, *17*(1), 105-116.

Tüzün, H., Yılmaz-Soylu, M., Karakuş, T., Inal, Y., & Kızılkaya, G. (2009). The effects of computer games on primary school students' achievement and motivation in geography learning. *Computers & education*, *52*(1), 68-77.

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological wellbeing among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, 12, 271–283.

UK Government. (1988). *Education Reform Act 1988 (c. 40)*. Legislation.gov.uk. https://www.legislation.gov.uk/ukpga/1988/40/contents

UK Government. (2022). *Computing education essential in technologically diverse world*. GOV.UK. Last updated: 16 May 2022. Retrieved from: https://www.gov.uk/government/news/computing-education-essential-in-technologically-diverse-world

UK Government. (2025a). *Ofsted: Office for Standards in Education, Children's Services and Skills.* GOV.UK. Retrieved January 25, 2025, from https://www.gov.uk/government/organisations/ofsted

UK Government. (2025b). *Meeting digital and technology standards in schools and colleges*. GOV.UK. https://www.gov.uk/guidance/meeting-digital-and-technology-standards-in-schools-and-colleges

UK Government. (2025c). *Ofsted's approach to artificial intelligence (AI)*. GOV.UK. https://www.gov.uk/government/publications/ofsteds-approach-to-ai/ofsteds-approach-to-artificial-intelligence-ai

UK Parliament Education Committee. (2024, May 25). *Stronger guidance and controls needed to protect children from screen time, Education Committee finds*. UK Parliament. Retrieved July 19, 2025, from https://committees.parliament.uk/committee/203/education-committee/news/201715/stronger-guidance-and-controls-needed-to-protect-children-from-screen-time-education-committee-finds/

Underwood, Jean; Ault, Alison; Banyard, Phil; Bird, Karen; Dillon, Gayle; Hayes, Mary; Selwood, Ian; Somekh, Bridget and Twining, Peter (2005). The impact of broadband in schools: Summary report. Becta, Coventry.

United States Department for Education (2017) Reimagining the role of technology in education. Retrieved January 2025 from https://tech.ed.gov/files/2017/01/NETP17.pdf

Veenman, M. V. J. (2011). Learning to self-monitor and self-regulate. In R. E. Mayer & P. A. Alexander (Eds.), *Handbook of research on learning and instruction* (pp. 197–218). Routledge.

Viridis School, (2019). To what extent does technology enhance the acquisition of times table knowledge and the fast and accurate recall of times table facts? Viridis Schools (2025). Retrieved January 2025 from https://viridis-schools.co.uk/research_cases/to-what-extent-

does-technology-enhance-the-acquisition-of-times-table-knowledge-and-the-fast-and-accurate-recall-of-times-table-facts/

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1).

Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, *44*(3), 299–321. https://doi.org/10.1080/00220272.2012.668938

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. *Computers & Education*, *149*, 103818.

Wartberg, L., Kriston, L., Kramer, M., Schwedler, A., Lincoln, T. M., & Kammerl, R. (2017). Internet gaming disorder in early adolescence: Associations with parental and adolescent mental health. *European Psychiatry*, *43*, 14-18.

Whitton, N. (2014). *Digital games and learning: Research and theory*. Routledge.

Whizz Education. (2025). *Whizz.com*. https://www.whizz.com/

Williams, A. J., Billington, T., Goodley, D., & Corcoran, T. (Eds.). (2016). Critical

Williamson, B., & Piattoeva, N. (2022). *Education governance and datafication: A comparative analysis of policy technologies in Europe.* Journal of Education Policy, 37(2), 194–213

Williamson, B., Bergviken-Rensfeldt, A., Player-Koro, C., & Selwyn, N. (2018). Education recoded: policy mobilities in the international 'learning to code' agenda. *Journal of Education Policy*, *34*(5), 705–725. https://doi.org/10.1080/02680939.2018.1476735

Willig, C. (2013). Introducing qualitative research in psychology (3rd ed.). Berkshire: McGraw-Hill Education (UK).

Wormington, S. V., & Linnenbrink-Garcia, L. (2017). A new look at multiple goal pursuit: The promise of a person-centered approach. *Educational Psychology Review*, *29*(3), 407-445.

Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of educational psychology*, *105*(2), 249.

Wright, J. C., & Huston, A. C. (1995). Effects of educational TV viewing of lower income preschoolers on academic skills, school readiness, and school adjustment one to three years later: A report to Children's Television Workshop. *University of Kansas, Center for Research on the Influences of Television on Children.*

Wu, M. L. (2015). *Teachers' experience, attitudes, self-efficacy and perceived barriers to the use of digital game-based learning: A survey study through the lens of a typology of educational digital games*. Michigan State University.

Yang, J., Pan, H., Zhou, W., & Huang, R. (2018). Evaluation of smart classroom from the perspective of infusing technology into pedagogy. *Smart Learning Environments, 5,* 1-11.

Yien, J. M., Hung, C. M., Hwang, G. J., & Lin, Y. C. (2011). A game-based learning approach to improving students' learning achievements in a nutrition course. *The Turkish Online Journal of Educational Technology, 10(*2), 1–10.

Yin, R. K. (2018). *Case study research and applications* (Vol. 6). Thousand Oaks, CA: Sage.

Zagal, J. P., Debus, M. S., & Cardona-Rivera, R. E. (2019). *On the ultimate goals of games: Winning, finishing, and prolonging.* In Proceedings of the 13th International Philosophy of Computer Games Conference (Vol. 11, pp. 1-11).

Zimmerling, E., Höllig, C. E., Sandner, P. G., & Welpe, I. M. (2019). Exploring the influence of common game elements on ideation output and motivation. *Journal of business research, 94*, 302-312.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*(2), 64–70.

Zyda, M., 2005. From visual simulation to virtual reality to games. Computer, 38(9), 25-32

Appendices

Appendix One: Key Terms and their definitions

Term	Definition	Source
Video Game	*"A game played by electronically manipulating images produced by a computer program on a monitor or other displays such as phones and tablets."*	Oxford Languages https://languages.oup.com/google-dictionary-en/
Player	*"Any person who has participated in a video game, for any period of time."*	UK Government Video Game Research Framework https://www.gov.uk/government/publications/video-games-research-framework/video-games-research-framework#introduction
Gamification	*"The application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity, typically as an online marketing technique to encourage engagement with a product or service e.g., a rewards card.*	Oxford Languages https://languages.oup.com/google-dictionary-en/
Serious Games	*"A game designed for a primary purpose of education."*	Wikipedia https://en.wikipedia.org/wiki/Serious_game
Games Based Learning	*"Learning facilitated by the use of a game. More specifically, it aims to increase positive outcomes within the classroom by using principles such as rewards systems, scoreboards, and customisable characters to represent students." pp 1337–1340*	Encyclopaedia of the Sciences of Learning https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1428-6_437
Digital Games Based Learning	*"Digital games-based learning (DGBL) involves the use of digital educational games that can be accessed through computer-based applications. DGBL are usually aimed to improve the students' learning outcomes by balancing educational content and gameplay." pp 250-266*	IGI Global https://www.igi-global.com/dictionary/mobility-games-education/7627#:~:text=Digital%20games%2Dbased%20learning%20(DGBL,balancing%20educational%20content%20and%20gameplay.
Online Platform	*"A digital service which uses the Internet to enable interactions between two or more distinct but interdependent groups of users so as to generate value for at least one of the groups."*	UK Parliament https://publications.parliament.uk/pa/ld201516/ldselect/ldeucom/129/12906.htm
Screens	*The electronic display on a technological device.*	Blankenbach, K. (2016). What is a display? An introduction to visual displays and display

		systems. Handbook of visual display technology, 1-22 https://www.researchgate.net/publication/310461672_What_is_a_Display_An_Introduction_to_Visual_Displays_and_Display_Systems
SMART Board	*"A SMART Board is an interactive whiteboard that allows users to interact with digital content. Unlike typical whiteboards, SMART Boards are touch-sensitive devices that allow users to write on them with the touch of a finger or a special stylus."*	Master Technology Group (MTG) https://www.callmtg.com/what-is-a-smart-board/#:~:text=A%20SMART%20Board%20is%20an,finger%20or%20a%20special%20stylus.
Internet	*"The large system of connected computers around the world that allows people to share information and communicate with each other"*	Cambridge Dictionary https://dictionary.cambridge.org/dictionary/english/internet
Wi-fi	*"The abbreviation for 'wireless fidelity'(a system for sending data over computer networks using radio waves instead of wires)"*	Oxford Learner's Dictionary https://www.oxfordlearnersdictionaries.com/definition/american_english/wi-fi
PC (Personal Computer)	*"A personal computer, commonly referred to as PC or computer, is a computer designed for individual use. It is typically used for tasks such as word processing, internet browsing, email, multimedia playback, and gaming."*	Wikipedia https://en.wikipedia.org/wiki/Personal_computer
App	*"A computer program or piece of software designed for a particular purpose that you can download onto a mobile phone or other mobile device"*	Cambridge Dictionary https://dictionary.cambridge.org/dictionary/english/app

Appendix Two: The UK Government's Core Three Chapters of the Video Game Research Framework (2023)

Core research priorities and topics **- to set out and develop a shared understanding of priority research areas across different research interests and disciplines.** This includes the fundamental question of how and why people interact with video games. We have identified shared priorities with Research Councils and their funding streams.
Research standards and methodologies **- to promote and share best practice of methodologies, research standards and open science principles**. This includes setting standards for ethical research, best practice approaches to research and using open research principles throughout the research lifecycle.
Data ethics, data privacy and data sharing **- to highlight how ethical data capture and data sharing shall increase transparency in research, and follow open research principles to support best research practices.** This includes demonstrating data ethics and data protections compliance and practices, and best practice data sharing standards for academics, players, and the video games industry.

Taken from:

Department for Digital, Culture, Media & Sport (DCMS). (2024a). Video Games Research Framework*. GOV.UK. Retrieved from* https://www.gov.uk/government/publications/video-games-research-framework/video-games-research-framework

Appendix Three: Excerpt of Research Questions relating to Education, from Section 1.2 of The UK Government's Video Game Research Framework (2023)

"Education and Learning *We are interested in how video games have shaped how different individuals and groups learn, where games may have influenced and shaped education, and any positive, negative or any or no impacts on learning.* *Games as supportive tools for learning* *How can games be designed for use as education tools and tools supporting learning. You could consider how games can be used for teaching and learning, and their value in supporting learning.* *Whether, and if so how and to what extent, behaviour or engagement with different social, political or economic issues can be fostered or promoted through game play.* *Games' impacts on learning and development* *Whether there are direct and indirect impacts of video games on cognitive development and, if so, what they are.* *Whether, and if so to what extent, there are direct and indirect impacts of learning through video games across different groups.* *To what extent does time spent playing video games interact with other uses of time (e.g. extracurricular activities, homework etc)."*

Taken from:

Department for Digital, Culture, Media & Sport (DCMS). (2024a). Video Games Research Framework*. GOV.UK. Retrieved from* https://www.gov.uk/government/publications/video-games-research-framework/video-games-research-framework

Appendix Four: Relevant BPS and HCPC Guidelines

BPS 1.7	*It is important for members to be aware of research developments and developments in the field of ethics that have implications for ethical decision-making, as reflected in the current BPS policies and guidance.*
BPS 1.8	*Behaving ethically requires ethical awareness – noticing what ethical issues are raised by a course of action makes it more likely that ethical practice will follow.*
BPS 3.2	*Members value the continuing development and maintenance of high standards of competence in their professional work and the importance of working within the recognised limits of their knowledge, skill, training, education and experience. & "advances in evidence base.*

BPS 3.3	*Members value their responsibilities to persons and peoples, to the general public, and to the profession and science of psychology, including the avoidance of harm and the prevention of misuse or abuse of their contribution to society.*
BPS 3.4	*Members value honesty, probity, accuracy, clarity and fairness in their interactions with all persons and peoples and seek to promote integrity in all facets of their scientific and professional endeavours.*
HCPC 1.2	*You must work in partnership with service users and carers, involving them, where appropriate, in decisions about the care, treatment or other services to be provided.*
HCPC 1.4	*You must make sure that you have consent from service users or other appropriate authority before you provide care, treatment or other services.*
HCPC 3.3	*You must keep your knowledge and skills up to date and relevant to your scope of practice through continuing professional development.*

Appendix Five: Example Invitation Email

Dear [INSERT NAME]

I would like to invite you and your school to participate in an upcoming research project I am carrying out as part of my training for the doctoral course. I have decided to investigate: *How digital games-based learning (DGBL) techniques are being used as educational tools in primary school classrooms to support learning and what impact do they have on students' academic outcomes?*

I understand that your school already implements Digital Game Based Learning (DGBL) within your classrooms. I am aiming to investigate staff and students' views about this method of learning. I will be collecting my data via focus groups. It would be very helpful if we could organise an afternoon for me to come into school and carry out focus group sessions, but participation is completely optional. If you choose to participate, the focus group will take between 30-60 minutes to complete. I am looking for between 4 and 6 staff to participate in one focus group, and between 4 and 6 students to participate in another. If you feel your school can only participate in one of the two groups, this is okay too. If you decide to participate in the student focus group, I will need additional consent from the students' parents. Participation in the focus group will be anonymous at publication (meaning no one who reads my thesis will be able to know it was your school that participated); any identifying information will be removed from the focus group transcripts and individuals will not be identified in the write up. Attached is a participant information sheet should you have any further questions about the participation process. Thank you in advance. You can register interest by replying to this email. If you would not like to participate, please ignore this email.

Kind Regards, [MY NAME]

Appendix Six: Participant Information Sheet and Consent Form

Miss Evie Young
Trainee Educational Psychologist

Faculty of Social Sciences

School of Education and Lifelong Learning

University of East Anglia

Norwich Research Park

06 January 2025

How are DGBL techniques being used as educational tools in primary school classrooms to support engagement and learning and what impact do they have on student outcomes

PARTICIPANT INFORMATION SHEET

(1) What is this study about?

You are invited to take part in a research study about Digital Games Based Learning (DGBL) and how they are being used within the classroom. You have been invited to participate in this study because you are part of the teaching staff within a school who uses DGBL within your classrooms already. This Participant Information Sheet tells you about the research study. Knowing what is involved will help you decide if you want to take part in the study. Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

Participation in this research study is voluntary. By giving consent to take part in this study you are telling us that you:

- ✓ Understand what you have read.
- ✓ Agree to take part in the research study as outlined below.
- ✓ Agree to the use of your personal information as described.
- ✓ You have received a copy of this Participant Information Sheet to keep.

(2) Who is running the study?

The study is being carried out by the following researcher: Evie Young who is conducting this study as a requirement for completing a doctorate of Educational Psychology at the University of East Anglia.

This will take place under the supervision of Chris Clarke (christopher.d.clarke@uea.ac.uk), Assistant Director of the Educational Psychology Doctorate course.

There is a potential conflict of interest as I could possibly be allocated to work with your school already. If you choose to participate, any current or future work will not be impacted. If you choose not to participate, you will not be impacted in any way.

(3) What will the study involve for me?

You will be invited to participate in a focus group with 4-6 participants, who will all be teaching staff from your school. The focus group will happen in school, at a convenient time. The focus group is expected to last between 30-45 minutes.

Questions will be open-ended and aim to stimulate conversations and discussion between participants and encourage you to share your experiences and find commonalities.

An audio recording will be taken.

You will not have the opportunity to review information generated about you prior to publication. Any data gathered will be completely anonymous, and only short quotes will be included in the final research document.

(4) How much of my time will the study take?
Around 30-45 minutes for the focus group participation.

(5) Do I have to be in the study? Can I withdraw from the study once I have started?

Being in this study is completely voluntary and you do not have to take part.

Your decision whether to participate will not affect your current or future relationship with the headteacher of your school, the researchers, anyone else at the University of East Anglia or The Child and Educational Psychology Practice (CEPP) now or in the future.

If you decide to take part in the study, you can withdraw your consent up to the point that the focus group starts. You can do this by telling the researcher before the focus group. You are free to stop participating at any stage during the focus group or to refuse to answer any of the questions. However, it will not be possible to withdraw your individual comments from before you withdrew as it is a group discussion.

(6) What are the consequences if I withdraw from the study?

Your decision to withdraw will not affect your current or future relationship with the researchers, anyone at the University of East Anglia, The Child and Educational Psychology Practice (CEPP) or within your school now or in the future.

It will not be possible to withdraw your individual comments from our records once the group has started, as it is a group discussion.

(7) Are there any risks or costs associated with being in the study?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

(8) Are there any benefits associated with being in the study?

You will contribute to understanding how DGBL is used within the classroom and help to grow the research base.

This research will encourage Educational Psychologists (EPs) to consider DGBL as a method of differentiated teaching which they can suggest to schools. Additionally, this project will help EPs to understand how DGBL is being used within the classroom, and the perspectives of those who use DGBL. This will inform EPs, professionals and policymakers whether DGBL is an effective teaching tool within the classroom.

(9) What will happen to information provided by me and data collected during the study? During the project, the data will be stored on a password-protected device in a password protected folder in which the researcher is the only person who knows the password. The device will be stored in a safe location with no public access. Once the data has been transcribed, the data will be destroyed (e.g. voice recordings) and only the transcribed data will exist.

Your personal data and information will only be used as outlined in this Participant Information Sheet, unless you consent otherwise. Data management will follow the Data Protection Act 2018 (DPA 2018) and UK General Data Protection Regulation (UK GDPR), and the University of East Anglia's Research Data Management Policy.

The information you provide will be stored securely and your identity will be kept strictly confidential, except as required by law. Study findings may be published and may also be used for other scholarly and educational purposes such as in teaching, but you will not be identified if you decide to participate in this study. The data will be kept for at least 10 years beyond the last date the data were used. The deposited data will not include your name or any identifiable information about you.

(10) What if I would like further information about the study?

When you have read this information, Evie Young (evie.young@uea.ac.uk) will be available to discuss it with you further and answer any questions you may have.

(11) Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study.

You can tell us that you wish to receive feedback by ticking the box on the consent form and providing contact details to register interest of feedback. A summary of results will then be provided.

(12) What if I have a complaint or any concerns about the study?

If there is a problem please let me know. You can contact me via the University of East Anglia at the following address:

Miss Evie Young

School of Education and Lifelong Learning

University of East Anglia

NORWICH NR4 7TJ

evie.young@uea.ac.uk

If you would like to speak to someone else, you can contact my supervisor: Chris Clarke (Christopher.d.clarke@uea.ac.uk).

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the Head of School of Education and Lifelong Learning: (Yann Lebeau, Y.Lebeau@uea.ac.uk).

(13) How do I know that this study has been approved to take place?

To protect your safety, rights, wellbeing and dignity, all research in the University of East Anglia is reviewed by a Research Ethics Body. This research was approved by the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee).

(14) What is the general data protection information I need to be informed about?

According to data protection legislation, we are required to inform you that the legal basis for processing your data as listed in Article 6(1) of the UK GDPR is because this allows us to process personal data when it is necessary to perform our public tasks as a University.

In addition to the specific information provided above about why your personal data is required and how it will be used, there is also some general information which needs to be provided for you:

- The data controller is the University of East Anglia.

- For further information, you can contact the University's Data Protection Officer at dataprotection@uea.ac.uk
- You can also find out more about your data protection rights at the Information Commissioner's Office (ICO).
- If you are unhappy with how your personal data has been used, please contact the University's Data Protection Officer at dataprotection@uea.ac.uk in the first instance.

(15) OK, I want to take part – what do I do next?

You need to fill in one copy of the consent form and return it to the researcher to express your interest as a participant. Please keep the letter, information sheet and the second copy of the consent form for your information. If you return the consent form after the participant group has been filled, the researcher will email you and give you the option to join the focus group if another participant withdraws beforehand.

(16) Further information

This information was last updated on 05 October 2024. If there are changes to the information provided, you will be notified by email.

This information sheet is for you to keep

PARTICIPANT CONSENT FORM (First Copy to Researcher)

I, ... [PRINT NAME], **am** willing to participate in this research study.

In giving my consent I state that:

- I understand the purpose of the study, what I will be asked to do, and any risks/benefits involved.
- I have read the Participant Information Sheet, which I may keep, for my records, and have been able to discuss my involvement in the study with the researchers if I wished to do so.
- The researchers have answered any questions that I had about the study and I am happy with the answers.
- I understand that being in this study is completely voluntary and I do not have to take part. My decision whether to be in the study will not affect my relationship with the researchers or anyone else at the University of East Anglia (or The Child and Educational Psychology Practice) now or in the future.
- I understand that I may leave the focus group at any time if I do not wish to continue. I also understand that it will not be possible to withdraw my comments once the group has started, as it is a group discussion.
- I understand that the results of this study will be used in the way described in the information sheet.
- I understand that personal information about me that is collected over the course of this project will be stored securely and will only be used for purposes that I have agreed to. I understand that information about me will only be told to others with my permission, except as required by law.

I consent to:

Audio-recording YES ☐ NO ☐

Would you like to receive feedback about the overall results of this study?

YES ☐ NO ☐

If YES, please provide either address (for postal feedback) or email (for digital feedback):

Address: .....

Email: .....

.....

Signature

.....

PRINT name

.....

Date

Appendix Seven: Parent Information Sheet and Consent Form

Miss Evie Young
Trainee Educational Psychologist

Faculty of Social Sciences

School of Education and Lifelong Learning

University of East Anglia

Norwich Research Park

Norwich NR4 7TJ

6th January 2025

How are DGBL techniques being used as educational tools in primary school classrooms to support engagement and learning and what perceived impact do they have on student outcomes?

PARENT/CARER INFORMATION SHEET

(1) What is this study about?

Your child is invited to take part in a research study about Digital Games Based Learning (DGBL) and how they are being used within the classroom. Your child has been invited to participate in this study because your child attends a school who uses DGBL within classrooms already. This Participant Information Sheet tells you about the research study. Knowing what is involved will help you decide if you want to let your child take part in the study. Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

Participation in this research study is voluntary. By giving consent for your child to take part in this study you are telling us that you:

- ✓ Understand what you have read.
- ✓ Agree for your child to take part in the research study as outlined below.
- ✓ Agree to the use of your child's personal information as described.
- ✓ You have received a copy of this Participant Information Sheet to keep.

(2) Who is running the study?

The study is being carried out by the following researcher: Evie Young who is conducting this study as a requirement for completing a doctorate of Educational Psychology at the University of East Anglia.

This will take place under the supervision of Chris Clarke (christopher.d.clarke@uea.ac.uk), Assistant Director of the Educational Psychology Doctorate course.

(3) What will the study involve for my child?

The School's Headteacher was provided with an information sheet and they identified your child as being a potential candidate for participation in this study.

Your child will be invited to participate in a focus group with 4-6 other students, who will all be from their school. The focus group will happen in school, at a convenient time. The focus group is expected to last between 30-45 minutes.

Questions will be open-ended and aim to stimulate conversations and discussion between participants and encourage your child to share their experiences and find commonalities.

An audio recording will be taken.

You nor your child will have the opportunity to review information generated about your child prior to publication. Any data gathered will be completely anonymous, and only short quotes will be included in the final research document.

(4) How much of my child's time will the study take?
Around 30-45 minutes for the focus group participation.

(5) Does my child have to be in the study? Can my child withdraw from the study once they have started?

Being in this study is completely voluntary and your child does not have to take part.

Your decision whether to allow your child to participate will not affect your current or future relationship with the researchers, anyone at the University of East Anglia, The Child and Educational Psychology Practice (CEPP) or within your school now or in the future.

If you decide to let your child take part in the study and then change your mind later (or they no longer wish to take part), they are free to withdraw from the study at any time and you can withdraw your or their consent up to the point that the focus group has started. You or your child can do this by telling the researcher before the focus group. Your child is free to stop participating at any stage during the focus group or to refuse to answer any of the questions. However, it will not be possible to withdraw your child's individual comments from before they withdrew as it is a group discussion.

(6) What are the consequences if my child withdraws from the study?

If your child takes part in a focus group, they are free to stop participating at any stage or to refuse to answer any of the questions. However, it will not be possible to withdraw their individual comments from our records once the group has started, as it is a group discussion.

(7) Are there any risks or costs associated with my child being in the study?

Aside from giving up their time, we do not expect that there will be any risks or costs associated with taking part in this study for your child.

(8) Are there any benefits associated with my child being in the study?

Your child will contribute to understanding how DGBL is used within the classroom and help to grow the research base.

This research will encourage Educational Psychologists (EPs) to consider DGBL as a method of differentiated teaching which they can suggest to schools. Additionally, this project will help EPs to understand how DGBL is being used within the classroom, and the perspectives of those who use DGBL. This will inform EPs, professionals and policymakers whether DGBL is an effective teaching tool within the classroom.

(9) What will happen to information provided by my child and data collected during the study?

During the project, the data will be stored on a password-protected device in a password protected folder in which the researcher is the only person who knows the password. The device will be stored in a safe location with no public access. Once the data has been transcribed, the data will be destroyed (e.g. voice recordings) and only the transcribed data will exist.

Your child's personal data and information will only be used as outlined in this Participant Information Sheet, unless you consent otherwise. Data management will follow the Data Protection Act 2018 (DPA 2018) and UK General Data Protection Regulation (UK GDPR), and the University of East Anglia's Research Data Management Policy.

The information your child will provide will be stored securely and your child's identity will be kept strictly confidential, except as required by law. Study findings may be published and may also be used for other scholarly and educational purposes such as in teaching, but your child will not be identified if you decide to participate in this study. The data will be kept for at least 10 years beyond the last date the data were used. The deposited data will not include your child's name or any identifiable information about your child.

(10) What if we would like further information about the study?

When you have read this information, Evie Young (evie.young@uea.ac.uk) will be available to discuss it with you further and answer any questions you may have about the study.

(11) Will my child be told the results of the study?

You and your child have a right to receive feedback about the overall results of this study.

You can tell us that you wish to receive feedback by ticking the box on the consent form and providing contact details to register interest of feedback. A summary of results will be provided.

(12) What if I have a complaint or any concerns about the study?

If there is a problem please let me know. You can contact me via the University of East Anglia at the following address:

Miss Evie Young

School of Education and Lifelong Learning

University of East Anglia

NORWICH NR4 7TJ

evie.young@uea.ac.uk

If you would like to speak to someone else, you can contact my supervisor: Chris Clarke (Christopher.d.clarke@uea.ac.uk).

If you (or your child) are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the Head of School of Education and Lifelong Learning: (Yann Lebeau, Y.Lebeau@uea.ac.uk).

(13) How do we know that this study has been approved to take place?

To protect your safety, rights, wellbeing and dignity, all research in the University of East Anglia is reviewed by a Research Ethics Body. This research was approved by the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee).

(14) What is the general data protection information my child needs to be informed about?

According to data protection legislation, we are required to inform you that the legal basis for processing your data as listed in Article 6(1) of the UK GDPR is because this allows us to process personal data when it is necessary to perform our public tasks as a University.

In addition to the specific information provided above about why your child's personal data is required and how it will be used, there is also some general information which needs to be provided for you:

- The data controller is the University of East Anglia.
- For further information, you can contact the University's Data Protection Officer at dataprotection@uea.ac.uk
- You can also find out more about your child's data protection rights at the Information Commissioner's Office (ICO).
- If you are unhappy with how your child's personal data has been used, please contact the University's Data Protection Officer at dataprotection@uea.ac.uk in the first instance.

(15) OK, I am happy for my child to take part – what do I do next?

You need to fill in one copy of the consent form and return it to the researcher to express your interest as the parent/carer of a participant. Please keep the information sheet and the second copy of the consent form for your information. If you return the consent form after the participant group has been filled, the researcher will email you and give you the option to let your child join the focus group if another participant withdraws beforehand.

(16) Further information

This information was last updated on 06 January 2025. If there are changes to the information provided, you will be notified by email.

This information sheet is for you to keep

PARENT/CARER CONSENT FORM (First Copy to Researcher)

I, ...[PRINT PARENT'S/CARER'S NAME], consent to my child ..... [PRINT CHILD'S NAME] participating in this research study.

In giving my consent I state that:

- I understand the purpose of the study, what my child will be asked to do, and any risks/benefits involved.
- I have read the Parental/Guardian Information Sheet and have been able to discuss my child's involvement in the study with the researchers if I wished to do so.
- The researchers have answered any questions that I had about the study and I am happy with the answers.
- I understand that being in this study is completely voluntary and my child does not have to take part. My decision whether to let them take part in the study will not affect our relationship with the researchers or anyone else at the University of East Anglia (or The Child and Educational Psychology Practice) now or in the future.
- I understand that my child can withdraw from the study at any time.
- I understand that my child may leave the focus group at any time if they do not wish to continue. I also understand that it will not be possible to withdraw their comments once the group has started, as it is a group discussion.
- I understand that the results of this study will be used in the way described in the information sheet.
- I understand that personal information about my child that is collected over the course of this project will be stored securely and will only be used for purposes that I have agreed to. I understand that information about my child will only be told to others with my permission, except as required by law.

I consent to:

Audio-recording of my child YES ☐ NO ☐

Would you like to receive feedback about the overall results of this study?

YES ☐ NO ☐

If YES, please provide either address (for postal feedback) or email (for digital feedback):

Address: .....

Email: .....

Signature

.....

PRINT name

.....

Date

PARENT/CARER CONSENT FORM (Second Copy for Parent/Carer to keep)

I, ...[PRINT PARENT'S/CARER'S NAME], consent to my child

..... [PRINT CHILD'S NAME] participating in this research study.

In giving my consent I state that:

- I understand the purpose of the study, what my child will be asked to do, and any risks/benefits involved.
- I have read the Parental/Guardian Information Sheet and have been able to discuss my child's involvement in the study with the researchers if I wished to do so.
- The researchers have answered any questions that I had about the study and I am happy with the answers.
- I understand that being in this study is completely voluntary and my child does not have to take part. My decision whether to let them take part in the study will not affect our relationship with the researchers or anyone else at the University of East Anglia (or The Child and Educational Psychology Practice) now or in the future.
- I understand that my child can withdraw from the study at any time.
- I understand that my child may leave the focus group at any time if they do not wish to continue. I also understand that it will not be possible to withdraw their comments once the group has started, as it is a group discussion.
- I understand that the results of this study will be used in the way described in the information sheet.
- I understand that personal information about my child that is collected over the course of this project will be stored securely and will only be used for purposes that I have agreed to. I understand that information about my child will only be told to others with my permission, except as required by law.

I consent to:

Audio-recording of my child YES ☐ NO ☐

Would you like to receive feedback about the overall results of this study?

YES ☐ NO ☐

If YES, please provide either address (for postal feedback) or email (for digital feedback):

Address: .....

Email: .....

.....

Signature

.....

PRINT name

.....

Date

Appendix Eight: Child Information Sheet and Consent Form

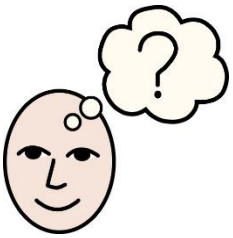
University of East Anglia
Norwich Research Park
Norwich. NR4 7TJ

Email:

05 October 2024

How are DGBL techniques being used as educational tools in primary school classrooms to support engagement and learning and what perceived impact do they have on student outcomes?

Study Information Sheet



Hello. My name is Evie Young, and I am a Student at the University of East Anglia.

I am doing a study to find out more about how digital games are used in your class.

I am asking you to be in my study because you already know about games being used in the classroom because your classroom already uses them.

You can decide if you want to take part in the study or not, it's up to you.

This sheet tells you what I will ask you to do if you decide to take part in this study. Please read it carefully.

If you decide you want to be in the study and then you change your mind later, that's ok. All you need to do is tell me that you don't want to be in the study anymore. You can stop participating at any time during the focus group or you can choose not to answer any of the questions. However, I can't take out your comments once you've made them.

If you have any questions you can speak to me during the study or your class teacher or someone who looks after you.

What will happen if I say that I want to be in the study?

You will join in an activity called a "focus group". This is a small group where an adult will ask you questions about a topic. For this "focus group", the questions will be about how digital games are used in your class.

If you say it's ok, an audio recording will be taken. This means I will be able to hear your voice and listen back to it. I won't be able to see you in the recording, and when I use it for my study, I will make sure no one else will be able to recognise that it's you.

When you talk with me and other people in a group, I won't be able to take out the things you say after you have said them. This is because you will be talking in a group and my notes will have all the things that everyone else said as well. You can choose which questions you want to answer. If you don't want to talk about something that's ok.

Will anyone else know what I say in the study?

I won't tell anyone else what you say to me, except if you talk about someone hurting you or about you hurting yourself or someone else. Then I might need to tell someone outside of the study to keep you and other people safe.

All the information that I have about you from the study will be stored in a safe place and I will look after it very carefully. I will write a report about the study and show it to other people, but I won't put your name in the report, and no one will know that you're in the study. I may also share your information with other researchers and use it for teaching and outreach purposes, but I will take out your name.

How long will the study take?

The focus group activity will take around 1 hour, this is a similar time to 1 or 2 lessons in school.

Are there any good things about being in the study?

You won't get anything for being in the study, but you will be helping me do my research.

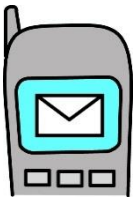
Are there any bad things about being in the study?

This study will take up some of your time, but I am not expecting it to be bad for you or cost you anything.

Will you tell me what you learned in the study at the end?

Yes, I will if you want me to. There is a question on the next page that asks you if you want me to tell you what I learned in the study. If you circle Yes, when I finish the study, I will tell you what I learned.

What if I am not happy with the study or the people doing the study?



If you are not happy with how I am doing the study or how I treat you, then you or someone who looks after you can:

- Tell me during the study.
- Email me on evie.young@uea.ac.uk
- Contact my supervisor Chris Clarke (Christopher.d.clarke@uea.ac.uk).
- Email my Head of School (Yann Lebeau, Y.Lebeau@uea.ac.uk).

How do I know that this study is ok to take part in?

All research I undertake is checked and approved by an Ethics Committee at the University of East Anglia before I can start it.

What if I want to know more about the information collected on me in the study?

When we talk in the study, I will collect some information which is unique to you. I can only collect this information if I have a reason to do so. My reason to do so for this study is because the study is in the public interest.

This information is stored by me within the University of East Anglia. They help me protect your information and look after it.

If you want to know more about the information collected about you, you can email me on evie.young@uea.ac.uk or you can email the University's Data Protection Officer (dataprotection@uea.ac.uk) who helps to protect your information. The Information Commissioner's Office (ICO) helps to protect everyone's information. If you are unhappy with mine or the University Data Protection Officer's responses about your information, you can speak to the ICO.

Further information

This sheet was last updated on 05 Oct. 24. I will update you if I make any changes to this sheet.

This information sheet is for you to keep.

Participant Consent Form (*First Copy to participant*)

If you are happy to be in the study, please:

- **write** your **name** in the space below.
- **sign** your **name** at the bottom of the next page.
- put the **date** at the bottom of the next page.

You should only say 'yes' to being in the study if you know what it is about, and you want to be in it. If you don't want to be in the study, don't sign the form.

I, ... [PRINT NAME], am happy to be in this research study.

In saying yes to being in the study, I am saying that:

- ✓ I know what the study is about.
- ✓ I know what I will be asked to do.
- ✓ Someone has talked to me about the study.
- ✓ My questions have been answered.
- ✓ I know that I don't have to be in the study if I don't want to.
- ✓ I know that I can pull out of the study at any time if I don't want to do it anymore will not be possible to remove any information I have already provided.
- ✓ I know that I don't have to answer any questions that I don't want to answer.
- ✓ I know that the researchers won't tell anyone what I say when I talk to them unless I talk about being hurt by someone or hurting myself or someone else.

Now I am going to ask you circle 'Yes' or 'No' to tell me what you are happy to do or not do in the study.

Are you happy to come along to **a group and talk with other people and me**? **Yes** **No**

Are you happy for me to **audio record** your voice? **Yes** **No**

Do you want me to tell you what I **learned** in the study? **Yes** **No**

....

Signature **Date**

Participant Consent Form (*Second Copy to Researcher)*

If you are happy to be in the study, please:

- **write** your **name** in the space below.
- **sign** your **name** at the bottom of the next page.
- put the **date** at the bottom of the next page.

You should only say 'yes' to being in the study if you know what it is about, and you want to be in it. If you don't want to be in the study, don't sign the form.

I, ... [PRINT NAME], am happy to be in this research study.

In saying yes to being in the study, I am saying that:

- ✓ I know what the study is about.
- ✓ I know what I will be asked to do.
- ✓ Someone has talked to me about the study.
- ✓ My questions have been answered.
- ✓ I know that I don't have to be in the study if I don't want to.
- ✓ I know that I can pull out of the study at any time if I don't want to do it anymore will not be possible to remove any information I have already provided.
- ✓ I know that I don't have to answer any questions that I don't want to answer.
- ✓ I know that the researchers won't tell anyone what I say when I talk to them unless I talk about being hurt by someone or hurting myself or someone else.

Now I am going to ask you circle 'Yes' or 'No' to tell me what you are happy to do or not do in the study.

Are you happy to come along to **a group and talk with other people and me**? **Yes** **No**

Are you happy for me to **audio record** your voice? **Yes** **No**

Do you want me to tell you what I **learned** in the study? **Yes** **No**

....

Signature **Date**

Appendix Nine: Example Focus Group Schedule Questions

For school staff:

Q1	Can you tell me what digital GBL your school currently uses?
Q2	How long have you been using GBL in school? How frequently are these techniques used?
Q3	What are your general thoughts on integrating DGBL into the curriculum?
Q4	Do you believe DGBL is an effective teaching method for primary school students? Why or why not?
Q5	What challenges, if any, have you encountered when implementing DGBL in the classroom?
Q6	In your experience, how do students respond to DGBL as a learning tool?
Q7	Have you observed any differences in student engagement or learning outcomes when using DGBL compared to traditional teaching methods?

For students:

Q1	Can you tell me what DGBL your school currently uses? (Provide examples to clarify what DGBL is).
Q2	What do you think about playing games to learn in school?
Q3	Do you think [answer to Q1] can help you learn better? Why or why not?
Q4	Do your teachers teach you how to use educational games? Do your teachers teach you how to use technology?
Q5	How do your teachers check if you've learned something from playing games?
Q6	Do all students in your class have the same opportunities to play educational games?
Q7	What do you think the future of learning through games will be like?

Appendix Ten: Definitions, Subthemes and Themes for Initial Codes

Code	Definition	Subtheme	Main Theme
Games as a reward	DGBL used as incentives or rewards (e.g., use at the end of a math lesson due to the student completing the work early) rather than as a core teaching tool.	Balance	Balance
Games for fun	DGBL and SGs being described as recreational activities, use of games for pure entertainment, social connectedness, or enjoyment.	Balance	Balance
Games for learning	DGBL being used for the achievement of curriculum-based goals and participants perceiving them as useful tools for acquiring skills or knowledge.	Balance	Balance
Student preference for games	Participant perceptions that students would prefer to use games within the classroom as opposed to traditional teaching methods. Perceptions that games can produce better academic	Balance	Balance

	outcomes than traditional teaching methods. “Games” in this context does not equate to DGBL specifically.		
Other learning over games	Participant preference for traditional teaching (which largely does not include digital methods) over digital games.	Traditional teaching preferences	Balance
Dislike of DGBL	Explicit rejection of digital learning games as ineffective or undesirable.	Traditional teaching preferences	Balance
Repetition	Game tasks or formats experienced as repetitive and tasks were described as having “sameness”.	Mechanisms for learning	Cognitive and Individual Mechanisms
Independence in learning	Students learning autonomously and taking ownership over their learning, having preferences on how they would like to learn.	Self-directed and conscious learning	Cognitive and Individual Mechanisms
Falsifying data	Participants described instances where student ability was not accurately recorded by DGBL. External factors, such as parents, other students or manipulating the DGBL systems.	Falsifying ability	Cognitive and Individual Mechanisms
Student skill	References to students’ competence, adaptability, and capacity which enabled them to learn effectively.	Ability	Cognitive and Individual Mechanisms
Tactile learning	References to sensory or hands-on learning compared with digital approaches. Participants described the effectiveness of both methods for teaching and learning.	Tactile vs Digital	Cognitive and Individual Mechanisms
Socialisation	Using digital games to interact or compete with peers, teachers, or family.	Social Aspects of DGBL	Social and Contextual Mechanisms
Competition	Mentions of leaderboards, scores, or peer comparison mainly in digital learning but also present occasionally in traditional teaching approaches.	Social Aspects of DGBL	Social and Contextual Mechanisms
Connection	Participants described connecting with others as being important to successful learning, whether this be in digital relationships, real-life contexts, or wider classroom practices.	Social Aspects of DGBL	Social and Contextual Mechanisms
Personalisation (avatars, cosmetics, points etc.)	Features allowing customisation or gamified incentives (e.g., cosmetic rewards, in-game currency or points which contributed to leaderboards).	Social Aspects of DGBL	Social and Contextual Mechanisms
Emotions	Positive or negative feelings evoked by DGBL.	Emotions	Social and Contextual Mechanisms

Student Frustration	Frustration was expressed in the context of experiencing challenges or failure in DGBL.	Emotions	Social and Contextual Mechanisms
Attention of students	Instances where DGBL either capture or fail to capture students' attention compared with traditional teaching methods.	Engagement	Social and Contextual Mechanisms
Boredom	Expressions of disengagement, monotony, or lack of stimulation when engaging with DGBL.	Engagement	Social and Contextual Mechanisms
Staff knowledge	Staff's confidence, familiarity, understanding and competence with utilising different teaching approaches.	Staff competence	Social and Contextual Mechanisms
Teacher support	The role of teachers in scaffolding, explaining, or supplementing learning.	Staff competence	Social and Contextual Mechanisms
Inclusion and differentiation	How DGBL caters (or fails to cater) to diverse learner needs, including SEND.	Implementation	Implementation
The future	Predictions about how technology will be integrated in future classrooms and what the future classroom might look like.	Implementation	Implementation
Curriculum	References to how DGBL aligns or conflicts with national curriculum goals and subject teaching.	Curriculum objectives	Implementation
Desire for variety	Calls for less repetition and more diverse or creative learning experiences.	Curriculum objectives	Implementation
Laptop use	References to laptops/Chromebooks as the main platform for DGBL.	Logistics	Implementation
Time used	How long students spend on DGBL, and perceptions of it being "wasted" or "productive" time.	Logistics	Implementation
Tracking Progress	How student progress is monitored through game data or teacher oversight.	Logistics	Implementation
Cost	Financial considerations regarding subscriptions, funding, or free vs. paid access to DGBL.	Logistics	Implementation
Glitches or technical difficulties	References to software or access problems that disrupt learning or use of DGBL.	Logistics	Implementation
TTRS (Times Table Rock Stars)	Mentions of TTRS multiplication practice game.	DGBL pre-made packages	Implementation
Twinkl	Mentions of Twinkl platform and resources.	DGBL pre-made packages	Implementation
Widget	Mentions of Widget resource for classroom support.	DGBL pre-made packages	Implementation
Rhino Readers	Mentions of Rhino Readers literacy programme.	DGBL pre-made packages	Implementation
Scratch	Mentions of Scratch or Scratch Junior coding/game-making tool.	DGBL pre-made packages	Implementation
Purple Mash	Mentions of Purple Mash creative learning platform.	DGBL pre-made packages	Implementation

Oxford Owls	Mentions of Oxford Owls e-reading platform.	DGBL pre-made packages	Implementation
Lightning Squad	Mentions of Lightning Squad reading programme.	DGBL pre-made packages	Implementation
Mathletics	Mentions of Mathletics programme.	DGBL pre-made packages	Implementation
Maths Whizz	Mentions of the Maths Whizz platform.	DGBL pre-made packages	Implementation
Nessy	Mentions of Nessy literacy programme,	DGBL pre-made packages	Implementation
Numbots	Mentions of the Numbots programme for maths practice.	DGBL pre-made packages	Implementation
Desty	Mentions of the Desty online programme for emotional literacy development.	DGBL pre-made packages	Implementation
Clicker	Mentions of the Clicker software, typically as a digital intervention for writing support or SEND needs.	DGBL pre-made packages	Implementation

Appendix Eleven: List of Subthemes and refinements

- Combine Curriculum and Desire for variety into “Curriculum Objectives”
- Combine Dislike of DGBL and Other learning over games into “Traditional Teaching Preferences”
- Combine Tracking progress, Time used, Glitches or technical difficulties, laptop use and cost into “Logistics”
- Combine Competition, Connection, Personalisation and Socialisation into “Social Aspects of DGBL”
- Combine Emotions and student frustration into “Emotions”
- Combine Staff knowledge and Teacher Support into “Staff competence”
- Combine Clicker, Desty, Improvemenory.com, Lightning Squad, Mathletics, Maths Whizz, Nessy, Numbots, Oxford Owls, Purple Mash, Rhino Readers, Scratch, Scratch Junior, Times Table Rock Stars (TTRS), Twinkl and Widget into “DGBL pre-made packages”
- Combine Attention and Boredom into “Engagement”

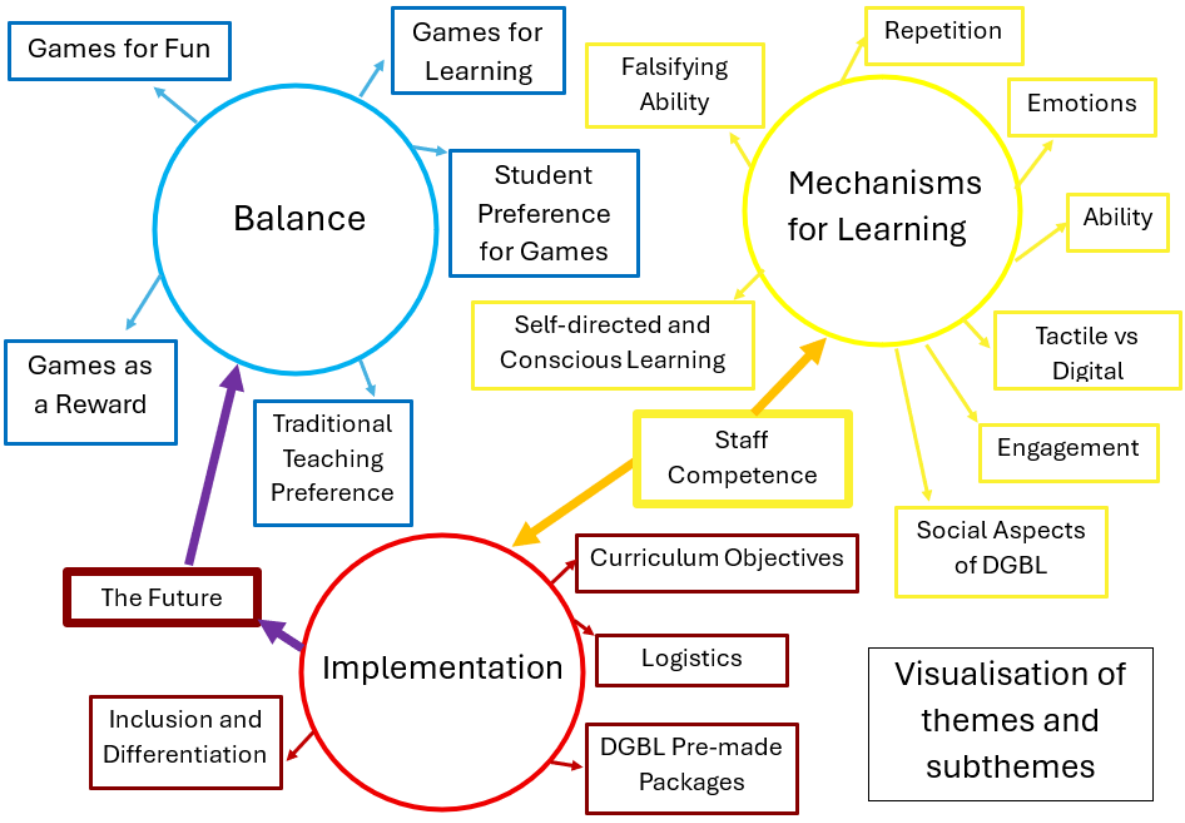
I renamed 4 codes to reflect them more accurately:

- Change Independence in learning to "Self-directed and conscious learning"
- Change Student Skill into "Ability"
- Change Tactile Learning into "Tactile vs Digital"
- Change Falsifying data into "Falsifying Ability"

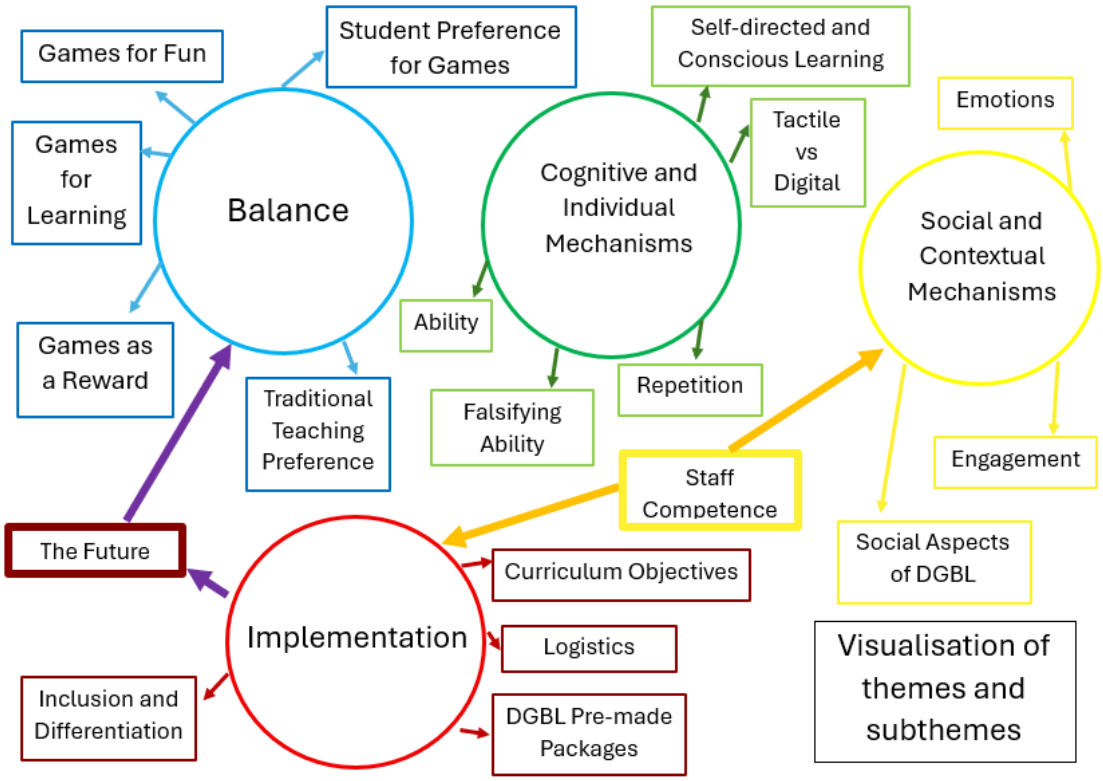
There were 7 initial codes which remained unchanged due to their uniqueness and high level of quotes throughout the data set. They are as follows:

- Games as a reward
- Games for fun
- Games to learn
- Inclusion or differentiation
- Student preference for games
- Repetition
- The future

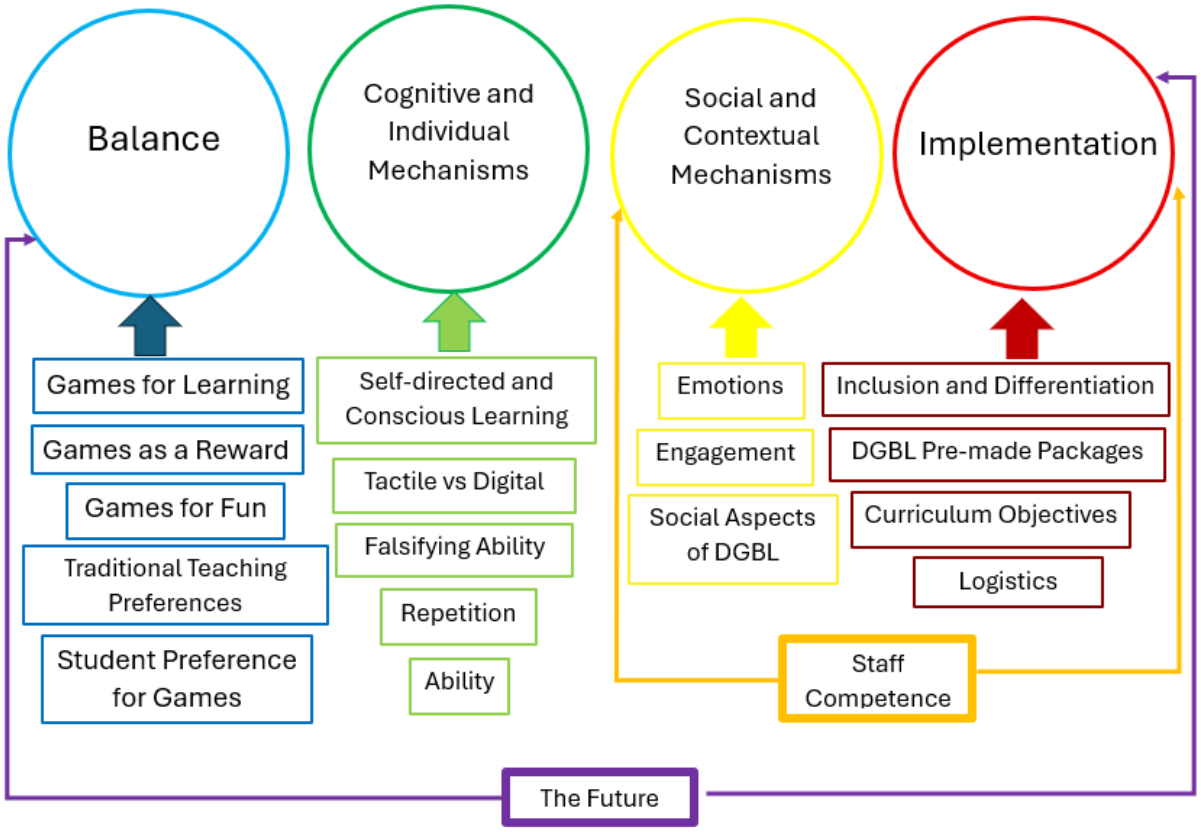
Appendix Twelve: Initial visualisation of themes



Appendix Thirteen: Second visualisation of themes (after splitting Mechanisms for Learning)



Appendix Fourteen: Third visualisation of themes (more organised visual presentation)



Appendix Fifteen: Refined theme titles

- "Balance" was intended to capture the advantages and pitfalls of using different teaching methods to achieve academic outcomes, therefore the title was changed to "Striking the Teaching–Technology Equilibrium" to capture the two aspects of the "equilibrium".
- "Social and Contextual Mechanisms" was changed to "Social, Emotional and Contextual Mechanisms" to capture and include the emotional aspects DGBL brought up for participants.
- "Implementation" was intended to capture the dynamic process of how DGBL is logistically implemented and adapted and what barriers staff and students faced. Therefore, the title was changed to "Implementing DGBL in Educational Practice"

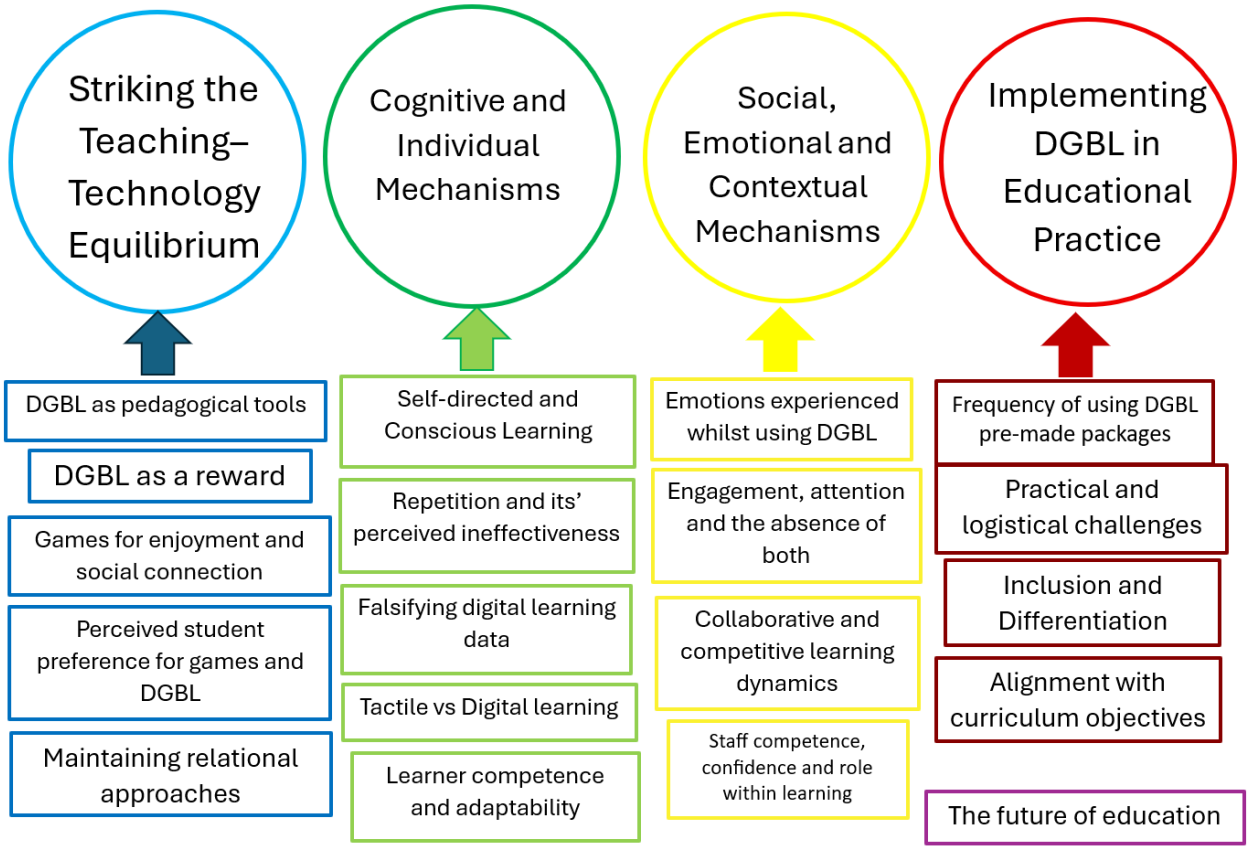
Finally, I spent some time reflecting on the subtheme titles to ensure that they accurately represented the content of the subthemes. I made the following revisions:

- "Games for learning" was changed to "DGBL as pedagogical tools" which made the shift from the broad term "learning" to focus on the utilisation of games as a "tool" within teaching. It also includes a shift from "games" to "DGBL" to signify the specific type of game which can be used as a pedagogical tool.
- "Games for fun" was changed to "Games for enjoyment and social connection" to emphasise the social aspect which was present when participants spoke about games for entertainment.
- "Student preference for games" was changed to "Perceived student preference of games or DGBL" to capture that this was based on participant observations that students preferred games, and to include DGBL as part of this explicitly.
- "Traditional Teaching Approaches" was changed to "Maintaining Relational Approaches" to reflect the relational aspect of human-teaching as being a key difference between other approaches (i.e., DGBL).

- “Repetition” was changed to “Repetition and its’ perceived ineffectiveness” to also include the participant’s perceptions that repetitive learning was not effective or engaging.
- “Falsifying ability” was changed to “Falsifying digital learning data” to signify a that the data – specifically when using digital learning tools – could be falsified, rather than indicating that a student’s ability could be falsified.
- “Tactile vs Digital” was changed to “Tactile vs digital learning” to specify that it was learning styles.
- “Ability” was changed to “Learner competence and adaptability” to include the concepts of student’s skills, competence and flexibility in learning.
- “Emotions” was changed to “Emotions experienced whilst using DGBL” to specifically refer to emotions when using DGBL.
- “Engagement” was changed to “engagement, attention and the absence of both”. This was so that participant’s perceptions of being “bored” and “disengaged” whilst using DGBL was also captured. Attention is also mentioned as it is an important mechanism for engagement.
- “Social Aspects of DGBL” was changed to "Collaborative and competitive learning dynamics” to capture participant’s focus on co-operation, collaboration and competition. The “DGBL” was also removed from the title to broaden it into learning dynamics, both digital and within the “live” classroom.
- “Staff competence” was changed to “Staff competence, confidence and role within learning” to reflect participant’s internalised perceptions of their ability to use DGBL which was expressed as competence and confidence, and to incorporate how they viewed themselves and their role within DGBL implementation and learning.
- “Using DGBL Pre-made packages” was changed to “Frequency of using DGBL pre-made packages” to include the frequency participants reported.

- “Logistics” was changed to “Practical and logistical challenges” to convey the concept that there were challenges around implementation of DGBL and to encompass the multiple dimensions of these challenges.
- “Curriculum Objectives” was changed to "Alignment with curriculum objectives” to clarify participant’s desire for DGBL to align with the curriculum.
- “The future” was changed to “the future of education” to bring specificity and clarity to the subtheme title.
-

Appendix Sixteen: final visualisation with revised titles



Appendix Seventeen: Final Main Themes, Subthemes and definitions

Theme/Subtheme Number	Theme/Subtheme Title	Definition
Theme One	**Striking the Teaching–Technology Equilibrium**	Participant perceptions that there is a fine balance to be struck between using "traditional" teaching methods (e.g., face-to-face) and DGBL approaches. Both offer advantages and pitfalls for achieving academic outcomes. A comprehensive teaching approach leads to a complimentary and thorough curriculum.
Subtheme One	DGBL as pedagogical tools	DGBL being used for the achievement of curriculum-based goals and participants perceiving them as useful tools for acquiring skills or knowledge. Participants also describe that using DGBL has a "passive" or "unconscious" aspect as a pedagogical tool; learners might not realise they are being taught using this tool.
Subtheme Two	DGBL as a reward	DGBL are valued in classrooms as incentives or rewards (e.g., use at the end of a maths lesson due to the student completing the work early) sometimes more so than as a core teaching tool.
Subtheme Three	Games for enjoyment and social connection	DGBL, SGs and video games were described as distinctly different experiences for participants. Video games were mentioned and described as enjoyable recreational activities outside of classroom contexts which provided enjoyment and social connection. Conversely, DGBL had a clear link to learning and had a place only within the classroom setting.
Subtheme Four	Perceived student preference for games and DGBL	Participant perceptions that students prefer to use DGBL within the classroom as opposed to "traditional" teaching methods. There were perceptions that DGBL can at times produce better academic outcomes than "traditional" teaching methods.
Subtheme Five	Maintaining relational approaches	Participant perceptions that students would prefer to use

		traditional teaching methods within the classroom as opposed DGBL. Perceptions that teachers provide better educational utility than DGBL.
Theme Two	**Cognitive and Individual Mechanisms**	Participants highlighted mechanisms and processes specific to each learner and reflected on how these enable effective learning. This theme reflects how different teaching approaches support and/or constrain students' acquisition of knowledge and skills at an individual level.
Subtheme Six	Self-directed and conscious learning	Participants described self-directed and conscious learning as important to success in learning. Students in particular felt ownership and a sense of understanding what works best for them to learn successfully, whether this be DGBL or not.
Subtheme Seven	Repetition and its' perceived ineffectiveness	Tasks (generally within DGBL) which use repetition were experienced as being an undesirable learning mechanism and as having "sameness".
Subtheme Eight	Falsifying digital learning data	Participants described instances where student ability was not accurately recorded by DGBL. External factors, such as parents, other students or manipulating the DGBL systems.
Subtheme Nine	Tactile vs Digital learning	References to practical or hands-on learning being preferred compared with digital approaches. Participants described the effectiveness and barriers of both methods for teaching and learning.
Subtheme Ten	Learner competence and adaptability	References to students' competence, adaptability, and capacity which enabled them to use DGBL.
Theme Three	**Social, Emotional and Contextual Mechanisms**	Participants experienced a range of emotions whilst using DGBL which related to both their own experiences and their experiences involving others. Participants emphasised the importance of interpersonal and environmental factors which shaped learning. They expressed a wider social and

		connected aspect of learning which makes for an effective teaching approach.
Subtheme Eleven	Emotions experienced whilst using DGBL	Participants described a range of emotions (e.g., frustration, boredom, enjoyment) linked to DGBL and other teaching approaches.
Subtheme Twelve	Engagement, attention and the absence of both	Participants described instances both where DGBL captured the attention and engagement of students and times where students were bored and disengaged.
Subtheme Thirteen	Collaborative and competitive learning dynamics	Participants described social aspects of using DGBL to be important for effective learning. Participants valued healthy competition, collaboration, and mutual understanding.
Subtheme Fourteen	Staff competence, confidence and role within learning	Staff's confidence, familiarity, understanding and competence with utilising DGBL approaches increases their use of DGBL. Participants feel that staff have a vital role in student's learning, and using DGBL can sometimes make this difficult to carry out
Theme Four	**Implementing DGBL in Educational Practice**	How DGBL is implemented within the UK national curriculum and within primary schools, both mainstream and specialist. Participants described practicalities and more nuanced experiences which led to successful and not successful implementation.
Subtheme Fifteen	Frequency of using DGBL pre-made packages	Participants mentioned how often they use DGBL and what ways they use it most. Participants described using several pre-made packages which offer DGBL activities across a range of subjects and were most widely used within classrooms.
Subtheme Sixteen	Practical and logistical challenges	The practicalities of implementing DGBL in classrooms and the barriers such as glitches which make implementation difficult at times.
Subtheme Seventeen	Inclusion and Differentiation	How DGBL caters (or fails to cater) to diverse learner needs, including SEND.
Subtheme Eighteen	Aligning with curriculum objectives	How DGBL aligns or conflicts with national curriculum goals, and how

		to best create a diverse and engaging curriculum using different teaching approaches including DGBL.
Subtheme Nineteen	The future of education	Predictions about how technology will be integrated in future classrooms and what the future classroom might look like.

Appendix Eighteen: Email of ethical approval

Decision - Ethics ETH2425-0130 : Miss Evie Young

From Ethics Monitor <no-reply@ethicsreview.uea.ac.uk>
Date Thu 23/01/2025 14:10
To Evie Young (EDU - Postgraduate Researcher) <Evie.Young@uea.ac.uk>

University of East Anglia

Study title: How are Digital Games Based Learning (DGBL) techniques being used as educational tools in primary school classrooms to support engagement and learning and what perceived impact do they have on student outcomes?

Application ID: ETH2425-0130

Dear Evie,

Your application was considered on 23rd January 2025 by the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee).

The decision is: **approved**.

You are therefore able to start your project subject to any other necessary approvals being given.

This approval will expire on **31st December 2025**.

Please note that your project is granted ethics approval only for the length of time identified above. Any extension to a project must obtain ethics approval by the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee) before continuing.

It is a requirement of this ethics approval that you should report any adverse events which occur during your project to the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee) as soon as possible. An adverse event is one which was not anticipated in the research design, and which could potentially cause risk or harm to the participants or the researcher, or which reveals potential risks in the treatment under evaluation. For research involving animals, it may be the unintended death of an animal after trapping or carrying out a procedure.

Any amendments to your submitted project in terms of design, sample, data collection, focus etc. should be notified to the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee) in advance to ensure ethical compliance. If the amendments are substantial a new application may be required.

Approval by the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee) should not be taken as evidence that your study is compliant with the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act 2018. If you need guidance on how to make your study UK GDPR compliant, please contact the UEA Data Protection Officer (dataprotection@uea.ac.uk).

I would like to wish you every success with your project.

On behalf of the EDU S-REC (School of Education and Lifelong Learning Research Ethics Subcommittee)

Yours sincerely,

Dawn Corby

Ethics ETH2425-0130 : Miss Evie Young