Acceptance and use of Video Games for Education by Secondary School Teachers

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Abstract: Video games (VGs) are frequently described as a transformational force within education and the use of video game technology for learning is becoming more common across all education sectors. Despite this, most literature regarding VGs in education focuses on measuring specific learning or engagement outcomes, and there is less of an emphasis on the attitudes of teachers on the uses of VGs in the classroom. A comprehensive understanding of teacher attitudes towards VGs within education is essential for their successful implementation within the classroom. This paper will present the development and progress of a PhD project that aims to explore the factors that influence secondary Australian teachers' attitudes towards, and intentions to use, VGs within their own teaching. An online survey was used to collect data on teacher beliefs about technology and VGs and the factors that influence VG acceptance. A subsample of participants were also interviewed about their experiences and opinions in relation to VGs. This paper focuses on the proposed thematic analysis of semi-structured interviews. Respondents were divided into groups based on their opinions of, and level of experience with, VGs in teaching. The qualitative results provide a detailed and nuanced investigation of teacher attitudes and beliefs in relation to their competencies, obstacles, and facilitators of VGs use for teaching. The findings of this research will assist in building a deep understanding of VG use in secondary classrooms assisting game developers, administrators, teachers, and policy makers in decisions relating to effective and meaningful video game use within education.

Keywords: Video Games, Educational Video Games, Secondary Education

1. Research Background

Research concerning the educational potential of video games (VGs) has dramatically increased in recent years. While research in the early part of this century initially focused on the potential negative effects of VGs on behaviour, such as addiction, violence, or social isolation (Anderson et al., 2010), more recently there has been an increase in research related to the positive effects of playing VGs (Halbrook et al., 2019). Though much of this body of research is speculative about the potential of VGs to improve education through experiential learning, motivation, and engagement (Connolly et al., 2012), there is emerging empirical evidence to support the use of VGs for learning. This includes positive impacts of video game use on knowledge and skill acquisition, behaviour change, and supporting soft skill development, such as collaboration and empathy (Cole et al., 2023; Connolly et al., 2012). While the potential advantages of VGs in education are well established, the actual use of VGs in teacher practice is still relatively low (Pozo et al., 2022). To better understand this, it is essential to consider teacher attitudes towards VGs, as teachers are seen as change agents within schools when it comes to technology adoption (Teo, 2008), and the use of VGs within classrooms is dependent on teacher acceptance (Bourgonjon et al., 2013). There is a small but growing body of research on teacher perceptions and uses of VGs in education (Sánchez-Mena & Martí-Parreño, 2017). Various studies have found that teachers' positive beliefs towards VGs influence their intentions to use them in teaching (Bourgonjon et al., 2013; De Grove et al., 2012; Huizenga et al., 2017), and that other teacher attributes may influence this decision, such as age, gender, personal VG use, and teaching experience.

1.1 Factors Contributing to Teachers' Uptake of Video Games

In the field of VG use in education, studies are primarily qualitative case studies that focus on student outcomes and attitudes (for a review, see Martinez et al., 2022; Nash & Brady, 2021). In addition to this, research that has explored teacher attitudes towards the use of VGs for education are becoming more common. These focus on pre-service teacher attitudes towards VGs (Kaimara et al., 2021; Hu & Sperling, 2022), teachers within specific subject areas (Gutierrez et al., 2023; Bacalja, 2018; An et al., 2016), or using specific games (Liu et al., 2024; Karsenti & Parent, 2020). In addition to case studies, there are several quantitative studies that use structural equation modelling (SEM) to determine the factors that influence teacher attitudes towards VGs (De Grove et al., 2012; Bourgonjon et al., 2013; Hsu et al., 2020). Despite the increasing research being undertaken in the area of teacher perceptions and uses of VGs, there is still a lack of consensus on the factors that influence teacher

attitudes to VGs, the ways VGs are used in teaching, and the supports and barriers to this within a wider school context.

The quantitative studies that have investigated teacher acceptance of VGs suggest that factors that influence teacher acceptance of VGs are unclear. For example, Bourgonjon et al.'s (2013) model found 'usefulness' to be the strongest predictor of teacher behavioural intention to use VGs, and teachers' personal experience using VGs was a weak predictor of intention to use them. This contradicts an earlier study that found that teacher personal experience with VGs was an important factor in classroom VG use (Becker & Jacobsen, 2005). De Grove et al. (2012) found that learning opportunities, curriculum-relatedness, and experience using VGs in the classroom were the most significant predictors of teacher intention to use VGs. Interestingly, factors at a school level, such as perceived support of ICT infrastructure, ease of implementation, usefulness, and cost, were not found to impact individual teachers' adoption intentions. This contradicts other research findings that school level factors, such as IT infrastructure and technical support, are important for individual behavioural intentions to use VGs in their teaching (Sánchez-Mena & Martí-Parreño, 2017). In 2020, Hsu et al. found that teachers with high levels of pedagogical competency were better able to incorporate games into teaching. They found that knowledge of VG content was not a significant influence on teacher ability to use VGs in teaching, which supports the findings of Bourgonjon et al. (2013) and indicates that personal experience or knowledge of VGs is not required for teachers to be able to implement them within teaching. This contradicts the findings of Kenny and McDaniel (2011), who found that teachers who are unfamiliar with VGs were less likely to integrate them into their lessons. De Grove et al. (2012) found that how easily VGs can be integrated into a curriculum influenced teacher attitudes towards them, but has not been tested in any other SEM models. Furthermore, the relationship between ICT acceptance the use of VG in teaching is complex. Hamari and Nousiainen (2015) paradoxically found that that ICT attitudes are not the most relevant factors in the adoption of VGs for teachers. This may indicate that teacher attitudes towards ICT and broader technology use will differ from their attitudes and intentions to use VGs specifically, and this is a significant gap that this research project proposes to investigate.

There are limited studies which use interview data to explore teachers' opinions on VGs and teaching. Steiler-Hunt and Jones (2015) interviewed primary and secondary educators on their uses of VGs in teaching and found that teachers who use VGs in their teaching practice considered themselves specialists, or enthusiasts, and felt they were different to their peers in their passion for using VGs in teaching. Huizenga et al. (2017) interviewed secondary teachers in the Netherlands regarding their perceptions of digital games with respect to engagement, motivation, and cognitive learning outcomes. Teachers reported that student engagement and motivation was increased when using digital games, and student learning was increased due to games providing an authentic context and safe learning environment. Ruggiero (2013) conducted surveys and interviews with pre- and in-service teachers on their perceptions of gaming in the classroom and found that teacher perceptions of VGs were mixed. Teachers felt that games should be used as a reward, or supplementary material, rather than the main instructional activity within a class. Additionally, the teachers noted that game playing within classrooms is distracting, and the balance of instruction to gameplay is often not successfully achieved (Ruggiero, 2013). Despite this, the majority of interview participants also noted that VGs are useful for engaging and motivating students, and that gaming overall is a value-add to classroom practice.

Xie et al. (2021) combined surveys and interviews with students, parents, and teachers about their perceptions of the implementation of a specific game during an experimental case study. The study found that, compared to the positive views of students, teachers and parents held more neutral views of VG use. While teachers agreed that VGs increase student motivation, they also believed that VGs were not appropriate for older students who should be focusing on exams. Huizenga et al. (2017), Xie et al. (2021), and Steiler-Hunt and Jones (2015) sampled from a population of teachers who were already interested, and had used, VGs in their teaching. In addition to this, these studies were atheoretical when analysing the results of the data collected. Bourgonjon et al. (2013) emphasised the need for further qualitative research on teacher experiences with VGs in education, and the specific ways in which teachers planned to use games in their own teaching (rather than behavioural intention, which is what most studies in this area measure). It is essential for research to consider the nuances of teacher uses of VGs, the pedagogy used surrounding VGs, the beliefs around success or failure of VG use, and the ways in which teachers learn about VG use to implement in their own teaching. There are no studies of which we are aware that analyses qualitative interview data from teachers with a wide range of opinions and experiences with VGs through the theoretical lens of the existing frameworks of technology and VG acceptance.

2. Research Approach/Context

This study is part of a broader PhD study using a mixed-methods approach that builds on the existing theoretical models of teacher technology acceptance and applies them specifically to VG use in the classroom. The research's overall theoretical framework is guided by Teo's (2011) model of teacher technology acceptance, and includes additional factors of personal innovativeness (Bourgonjon et al., 2013), personal VG use (Hsu et al., 2020; Bourgonjon et al., 2013), previous VG use (De Grove et al., 2012), and perceptions of pedagogical usefulness of VGs (curriculum relatedness, classroom management, student engagement). These factors, that have previously been found to influence teacher attitudes towards VGs in separate quantitative studies, underpin both the quantitative and qualitative methodologies of this project. For the quantitative survey analysis, SEM will be used to test this theoretical framework by combining factors from multiple models of technology and teacher VG acceptance studies, as well as additional factors from quantitative studies. While the additional factors have been tested separately in research, this project plans to test the interrelationships of these factors in a novel way, and to compare teacher acceptance of broader technology to their acceptance of VG use. The qualitative component of the study uses the aforementioned theoretical frameworks to inform the interview themes and questions, and these will underpin the thematic analysis of the resulting data. We hypothesise that teacher acceptance of VGs will be different to their acceptance of technology more broadly. Therefore, the following research questions were developed to direct the project:

- What are the factors that influence secondary Australian teachers' attitudes towards, and intentions to use, VGs in education?
- How do Australian secondary teachers' beliefs and intentions to use VGs in education differ from their beliefs and intentions to use technology more broadly?
- What are the barriers to, and promoters of, Australian secondary teachers' intentions to use VGs in teaching?
- In what ways are the theoretical frameworks of existing models of teacher VG (Hsu et al., 2020; Bourgonjon et al., 2013; De Grove et al., 2012) and technology (Teo, 2011) reflected or contradicted by teacher attitudes towards, and uses of, VGs in teaching?

The study is being conducted in two phases. Phase one consisted of the development of a measure of teacher acceptance and intention to use VGs, and the testing of this measure with a population of teachers via an online survey. Phase two is testing the refined and improved model with a larger sample of teachers, again via an online survey. There are two versions of the online survey; one that collects data on teacher attitudes and acceptance of technology broadly, and a second that focuses specifically on VG attitudes and acceptance. This part of the research is still underway until participant numbers are sufficient to carry out in depth statistical analysis with the use of SEM and Multiple Indicators Multiple Causes Models (MIMIC Models) for example. Concomitantly during this phase, the collection of qualitative data in the form of teacher interviews is being carried out. This paper focuses on the qualitative data collected in this project. Figure 1 outlines the plan for this research project.

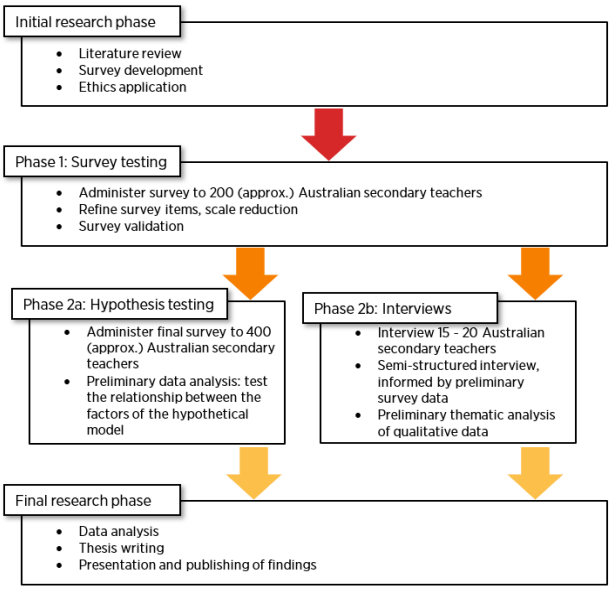

Figure 1: Research project outline

2.1 Methodology

A three-part survey was developed, using items developed from the literature review and previously validated scales from my own Masters thesis, De Grove et al. (2012), Bourgonjon et al. (2013), Teo (2011), and Justice & Ritzhaupt (2015). The survey collected responses related to participant demographic data, as well as experiences, beliefs, pedagogical uses, skills, and external support for either technology broadly, or VGs, depending on the version of the survey they were randomly allocated.

The second phase of the research project included semi-structured interviews with Australian secondary teachers on their attitudes towards, and use of, VGs. The focus of the interviews was on the perceptions of teachers related to the use of VGs in teaching practice. Interview questions were structured around the theoretical framework of technology and VG acceptance models (De Grove et al., 2012; Bourgonjon et al., 2013; Teo, 2011; see Appendix A for interview questions). While the list of questions was pre-planned, the interview was flexible in response to the information shared, so that teacher experiences could be explored (Minichiello et al., 2008). Interviews were conducted to gain a more in-depth perspective that will be combined with the findings and data analysis of the survey. Interviews were planned to take 20 to 30 minutes per participant, although this was up to 60 minutes in some cases. Interview questions are detailed in Appendix B.

2.1.1 Participants

The target population for this study was Australian secondary teachers. The survey was generated using the Qualtrics platform and was distributed to teachers via targeted social media advertising, email, and sharing through professional teacher networks. The study was approved by the Human Research Ethics Committee at the authors' university. Written consent was collected at the beginning of the survey. Survey collection took place from December 2023, currently ongoing (May 2024).

Interview recruitment was completed through an expression of interest after completion of the survey online. Participants were redirected to a separate form after completing the survey and asked if they wished to be contacted for an interview. If participants indicated yes, they were asked one multiple choice question about their level of experience using VGs and to provide their email address. Personal details were not linked to their survey responses. A total of 20 interviews were planned for this project, purposively sampled to gather a wide range of opinions on technology, VGs, and education. The initial multiple-choice question posed to participants when agreeing to an interview was used to ensure that interviews captured teachers with a wide range of VG experience (five multiple choice options, see Appendix B). Determining qualitative sample size a priori is problematic (Sim et al., 2018), and so the proposed sample size of 20 interviews is approximate and aimed at meeting practical demands for the time available, saturation of data, and depth of data to be collected.

Interviews were conducted online via video conferencing and transcribed using the recorded audio data. Written consent was collected prior to the interview, and verbal consent was also asked before the beginning of the interview itself, after the details of the interview process were explained. Transcriptions were emailed to participants for verification and approval for inclusion in the dataset. Interviews took place from April 2024, currently ongoing (May 2024).

2.1.2 Analysis

Analysis of qualitative data from interviews will be completed using thematic analysis. The audio recordings of the interviews were uploaded into transcription software. The resulting transcripts were re-read and checked by the research student, during which any notable or significant quotes were recorded as 'pre-codes' (Saldana, 2021) written down in a research journal as preliminary memos. Interview data was then uploaded to NVivo software. Within the software, transcribed data was initially read for tentative ideas for codes, topics, or noticeable patterns or themes. From this stage, all interview data was split into smaller sections, and assigned codes depending on the content. Deductive coding was used for codes which were related to teacher attributes (i.e., gender, teaching subject, school socioeconomic status, years of teaching experience). Beyond these categories, coding was inductive, with codes being created as data was reviewed. The codes were then grouped into themes, which were then studied for connections within and among them (Seidman, 2019). During the analysis of all qualitative date in this project, concerns, questions, goals, and new thought directions were recorded by the research student in a journal, to allow for the linking of researcher practice, raw data, thematic codes, and the final analysis. Additionally, analytic memos (recorded via cumulative writing while coding was being completed) enabled the synthesis and integration of ideas as they occurred during data collection and

analysis. Data collection is currently ongoing, and full results of the qualitative analysis will be provided at the conference.

3. Significance and Future Directions

Understanding teacher perceptions of video game use within education is essential for their successful implementation within the classroom (Clark et al., 2018). This project has the potential to provide a model that will explain the factors that influence teacher beliefs and intentions to use VGs within their own teaching practice. A detailed understanding of these factors will allow school administrators, policy makers, and teachers themselves to make more informed decisions around increasing the use of VGs within secondary classrooms. Being able to distinguish between teacher attitudes towards technology, and VGs specifically, will enable school administration and policy makers to make nuanced decisions to effectively support and promote teacher VGs use in the classroom in the future.

Furthermore, a greater understanding of the factors that influence teacher acceptance and use of VGs will provide a more balanced view of the future of video game technology in the classroom. There has been considerable optimism surrounding the integration of VGs in the classroom; claims that Pokémon can teach children critical literacy skills (Neiburger, 2011), that VGs can assist teachers with differentiation (Aranas et al., 2021), and that digital play can make children smarter (Toppo, 2015). Research that examines the classroom level implementation of VGs, and the attitudes of teachers towards them, will provide an in-practice view of how these claims translate into classroom use.

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Appendix A: Interview questions

- Demographic questions
  - What KLA/s do you teach in?
  - What year groups do you teach?
- Do you use video games within your teaching?
  - Do you use video games in certain subjects more than others?
  - Do you use video games with certain age groups, or across all age groups?
  - How do you find video games to use in your teaching?
- If you do not use video games in your teaching, why not?
  - Have you tried to use games previously?
  - What have your experiences been with video games? Have you heard or seen examples of game use?

    - Do you think you will use video games to teach in the future?
- Reasons for game use within the classroom
    - What sort of teaching do you use video games for?
    - What, if any, benefits do you perceive by using video games for teaching?
    - Are there any challenges or downsides you have experienced using video games in your teaching?
- What barriers and promoters exist in video game use within the classroom
    - How does your school leadership feel about your use of video games for teaching?
    - How do your colleagues feel about your use of video games?
    - How do your students feel about your use of video games?
    - Have you received any support (professional development, availability of technology, material support) for using video games in your teaching?
    - Are there any barriers within your school to you using video games?
- What strategies, if any, have you used to teach with video games/technology
    - Do you have a planned teaching strategy to use video games in your classroom? If so, where did you learn about this?
    - Where did you source information about using video games to teach?
    - Are there any specific considerations when you choose to use video games? (Classroom management, year group, topic, timing within the school year?)
- Differences in beliefs between video games and technology more broadly
    - How do you feel about using technology in the classroom?
    - Do you consider video games different to using technology more broadly in your teaching? If so, in what ways?
    - Do you consider yourself to be innovative with technology in your teaching in general?
    - Do you consider technology to be useful for education? If so, how?

Appendix B: Interview expression of interest multiple choice question

Thank you for your interest in being interviewed! This question is being asked to categorise our interview participants. While you may have answered this question previously, all of your survey answers are anonymous - so we don't know how you answered! This will be linked with your name, so we can contact you.

How would you describe your use of video games in your own teaching practice?

- I have not used video games in my teaching, and I do not wish to in the future
- I have not used video games in my teaching, but I would like to use them more
- I use video games in my teaching, but I would like to use them more
- I use video games in my teaching, but I would like to use them less
- I am happy with my level of video game use in my teaching