SERIOUS PLAY

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Abstract

Preliminary results from a planned three year Australian study into the use of computer games in F-12 classrooms. This study is exploring the processes used by schools seeking to use games to improve student outcomes across subject areas, and aims to generate new knowledge about how students and teachers approach computer games, how games foster new literacies, and what happens with curriculum, pedagogy and assessment when computer games are introduced into a school to support teaching and learning. Initial findings show that teachers as a population may have less awareness of computer games than the general population and their students, teachers have a need for a model for the selection of games for use in the classroom, and the reframing of computer games as a genre within digital literacy may be sidelining their place in computer studies.

In 2012 researchers from three universities (Griffith University, Queensland University of Technology and Deakin University) along with researchers at the National Institute of Education in Singapore commenced a three-year study into how schools can and are using computer games to support student learning. Twenty schools and fifty teachers in Queensland and Victoria are involved in the project from all school sectors and levels. This preliminary account details the concepts underlying the research and reports on some initial findings from the early stages of the research process.

The research focused upon computer game play in schools because the great majority of students today are engaged with the playing of computer games in their leisure time with much of their social and cultural experiences increasingly involving the use of computers in their many forms. Digital play and online interaction is their norm and their futures will predominantly involve digital workplaces. Schools have a responsibility to prepare students for this future and to use computer games not only as learning opportunities in themselves, learning with computer games, but to develop the knowledge, skills and dispositions towards digital culture that will enable them to effectively and actively participate in diverse futures, learning through computer games. Student digital experiences (Jenkins, 2006) are a "participatory culture" in which they are producers, not just users, of digital culture. Schools in the main, do not well support students in this and a "new digital divide" (Buckingham, 2007) has emerged between students digital out-of-school and analogue in-school experiences. Over a decade into the 21st century, we can no longer assume that approaches to pedagogy and curriculum designed for the 19th and 20th centuries will meet these challenges.

The capacity of computer games to engage players in challenging and complex ways has been explored by educators in many parts of the world. Many 'serious' games have been developed for educational purposes, and introduced into schools (Davidson, 2008) but are usually designed and introduced with little awareness of the role of context in game play or of links between digital culture, game play and identity in students lives. In particular many games in their design fail to take into account the complex dynamics of the classroom environment. Each such environment represents a unique mix of place, resources, students and teachers, and the process of making an educational technology, games in this case, works to achieve educational outcomes, something that cannot easily be achieved by game developers distanced, in time, space and culture.

Teachers manage student learning and the resources available during a school day to support this learning. While games can and do support a wide range of serendipitous learning out-of-school, the use of games for specific learning in a classroom context is more difficult to achieve. Many game developers opt to create 'teacher-proof' games with little attention to the nuances of how teachers teach, students learn, or of the importance reflection and other higher order learning processes.

Few studies bring situated sociocultural perspectives on literacy, learning and identity to bear on how students and teachers approach learning through games in school. For schools to fully benefit from computer games in the classroom however, it is necessary both to recognise the influence of context on how games are understood and played, and to understand the ways in which game play is linked to issues of identity, performance and sense of self (de Castell & Jensen, 2003; Chee, 2007). This means recognising differences between how players approach games in and out of school, moving from seeing games as simply a way to promote the more efficient transmission of information to exploring how games might promote deep learning in discipline areas, teach critical reflective competence with new literacies, and promote imagination and creativity, through their production, analysis and use.

This research focuses on learning and teaching with computer games in Australian classrooms. It is investigating what happens to literacy and learning, curriculum, pedagogy, and assessment when digital games are introduced into a school. Specifically, the research is considering:

1. the ways in which students with widely different preferences and experience of games and digital culture approach computer game-based teaching in the classroom;

2. the ways in which the experience of play changes in classroom contexts;

3. the ways teachers can work with games most effectively, and the kinds of pedagogical practices and approaches that best capitalise on the capacities of games to teach;

4. the opportunities games provide for creativity, production and innovation;

5. digital literacies and the ways in which learning through games challenge and extend multimodal literacy learning; and

6. an assessment framework which can identify and support the multimodal literacies and e-learning capabilities made possible through the use, analysis and creation of computer games.

To explore the areas outlined, this research is:

1. mapping ways in which student knowledge of and participation in computer games and digital culture in their out of school shape their expectations and orientations to curriculum using

computer games.

2. investigating to what extent, in what ways, and with what consequences pedagogy changes when games are brought into the classroom. What constitutes 'best practice' for games-based pedagogy, across a range of game genres, subject areas and learner orientations and preferences?

3. identifying the kinds of skills, knowledge and understandings that are called upon and developed when students create games and the affordances of games to create multimodal outcomes in subject areas.

4. trialling and extending the model of multimodal and digital literacies developed (Beavis et al. 2009), to explore how literacy is reconfigured in games-based contexts, and to explore the uses of games and games based pedagogies to foster high level critical, cultural and operational competence in print and digital literacies (Durrant & Green, 2000).

5. trialling and extending the assessment framework for using, creating and sharing knowledge online developed (Wyatt-Smith, Levy & Castleton, 2008) in relation to games-based learning and the kinds of literacies and learning promoted by the use, study and creation of games.

The research is significant in four ways:

1. in connecting curriculum, pedagogy and assessment to the digital experience and expectations students engage with in out of school. The research critiques over-generalised assumptions about students as 'digital natives' and brings informed and nuanced perspectives on students knowledge of and engagement with digital culture to the development of curriculum, pedagogy and assessment approaches that maximise student learning with computer games;

2. in directly addressing the aim of the Digital Education Revolution, to use ICT to 'contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education, training and to live and work in a digital world. (DEEWR, 2008);

3. in exploring ways in which computer games can be used to enhance learning: deepening curriculum knowledge, fostering the Australian Curriculum and Assessment Reporting Authority (ACARA, 2010) ICT general capabilities - investigating, operating, creating, communicating - and promoting high level literacy and multi-literacies through curriculum, pedagogy and assessment frameworks and resources and requirements most conducive to doing so; and

4. in recognising and supporting the learning needs of teachers in developing pedagogy and curriculum.

The research is innovative in five ways:

1. in bringing sociocultural and new literacies research on students out-of-school engagement with computer games and digital culture to bear on the study of games-based learning in school;

2. in exploring the use of games to support learning across a range of curriculum areas, and with diverse groups of teachers, students and schools. Where studies of the use of individual

areas exist, this is the first Australian research to look at a range of uses of games across the curriculum from sociocultural perspectives;

3. in providing the opportunity for Australian schools to benefit from access to state of the art international games currently under development under the leadership of Associate Professor Yam San Chee of the National Institute of Education, Singapore;

4. in providing three parallel games-based strands (game use, game analysis, and game making) within schools for researching changes to pedagogy, literacy, learning and assessment: the use of 'serious' and commercial games to support learning in the discipline areas; the critical analysis of games as text; the making of games and the uses of games to promote creativity; and

5. in undertaking multi-age cross-disciplinary research on best practice approaches to the use, analysis and making of games across the primary and secondary schools.

The research aims to study the existing use of games in schools and the changes, challenges and benefits that teachers and students experience through the introduction and use of games. Researchers are working with teachers to set specific goals and provide support as they develop, teach and reflect on the use of games in schools. The aim is to support learning of how best to use games in classroom contexts while providing researchers with a greater understanding of the processes involved. Research focus is on a range of implementations from individual lessons through to units of several weeks, and includes developing assessment models that link games, assessment and learning. There are three main areas being explored with teachers developing action learning projects in one, two or all of these areas to improve the understanding of games for serious play in the classroom:

Using Games

- How are games used in conjunction with other forms of pedagogy and other resources?
- What can games teach well in relation to the specific curriculum area?
- Are there qualities that make some games more successful than others?
- How can you choose the right game?
- What is easy and what is hard about teaching with games?
- What do students need to know and be able to do to play games effectively?
- How do you help them get to this point?
- What happens if/when some students are not interested or confident in playing games?
- How is equity amongst students assured?
- What forms of classroom organization best support the use of games?
- How can learning with games be assessed?
- How do you manage reflection around the games?

Analysing Games

- How can the study of games as texts support student learning?
- What is similar and what different in teaching games as texts?
- What games teach well and not so well when used as texts?
- What ways can narrative be constructed in games?
- The role of characters and their representation in games?
- The use and combination of multimodal elements in games?
- The ways in which readers/players are positioned when playing games?

- Intertextuality and convergence with related narratives/the same narrative/related genres themes or tropes?
- How to ensure all students are involved?
- How to manage equity?
- What forms of assessment work best when using games as text?
- How using games in this way affects pedagogy, curriculum, and the teachers' sense of self?

Making Games

- What students can learn through making games?
- How to support creativity and imagination through making games?
- What forms of assessment would best support creativity in the making of games?
- How using games in this way affects pedagogy, curriculum, and the teachers' sense of self?
- How is making games used in conjunction with other forms of pedagogy and other resources?
- What is easy and what is hard about teaching students to make games?
- The qualities that make games making software more successful than others?
- What do students need to know and be able to do to make good games?
- How do you help them get to this point?
- What happens if/when some students are not interested or confident in creating games?
- How is equity amongst students assured?
- How can you help students to exercise creativity and imagination through making games?
- How can creativity and imagination in making games be assessed?
- How do you manage reflection around game making?

Action Learning Projects

Teachers in the project are undertaking an Action Learning Process, working with project researchers to develop learning episodes for students using the model of Initial idea / Reconnaissance / Plan-Act-Observe-Reflect. Teachers will then use the 3D literacy model, Media Education "key concepts" framework, the ICTs TPACK framework, the games-as-text/games-as-action model, or literary/narrative theory to assist their planning to develop students' operational, cultural and critical knowledge.

Researchers are focusing on questions about: pedagogy, classroom organisation, teacher professional development, developing and assessing creativity, student equity, the nature of curriculum, the nature and appropriateness of software, imagination, the ways in which students call on their out of school experiences of games and game play, player positioning, paratexts, intertextuality, contemporary forms of narrative, response to games, multiliteracies and models of assessment.

Using Games: Learning and Computer Games

This strand of the research is looking at the use of purpose-built, commercially available or free to download games to support learning across a range of curriculum areas. The focus is on teaching, learning and curriculum.

Using games in the curriculum teacher action learning projects will typically have the following structure:

Investigation phase: Playing, analysing and researching games – what is available and what can be learnt using various games. How do games support or change existing curriculum and

what counts as knowledge? What aspects of the curriculum are games best suited to teach? What happens to students who don't like/don't know how to play games?

Implementation phase: Game use in the classroom, how this is managed and organised, how games fit in with other teaching and learning processes, what pedagogical processes support and are supported by various games, how students engage with games used for learning. Do games change learning?

Assessment: How can student learning be verified, game play experience influence on assessment, how has teacher pedagogy changed when using games, what makes some games more successful than others.

Analysing Games: Critical analysis of games

This strand of the research explores approaches to discussing and analysing games as part of the spectrum of texts in English and Media. The focus is on literature and literacy in the digital context.

Analysing games teacher action learning projects will typically have the following structure:

Investigation phase: Playing, reading about and exploring one or more specific games.

Analysis phase: Considering games as specific cultural forms, with particular reference to narrative and aesthetic features, and the ways stories are told in games. Games as exemplars of multimodal texts, intertextuality and convergence, the ways in which narratives cross platforms, and an analysis of games as action and games as text.

Reflection and production phase: Creative and/or analytic responses to the game(s) and a range of responses and presentation.

Making Games: Media Literacy and Creativity

This strand of the research explores game making using commercial and free-to-download software. The focus is on creativity, using games genre conventions and construction using skills.

Games design and production teacher action learning projects will typically have the following structure:

Pre-production phase: playing, analysing and researching games – what goes into making a good game? Designing games narrative, characters, levels, play.

Production phase: games production using appropriate games production software, game testing and feedback and final changes to games.

Post-production / distribution: Presenting and playing the game. Reflection on the game and how it could be further improved – what should come next.

Initial Findings

While formal research in the project is still in preparation with contracts, ethical clearances, software and hardware deployments, and the establishment of game servers and websites being finalised, three insights can be shared at this stage:

1. the readiness of teachers to engage with computer gaming in schools;

2. a process for selection of computer games for use in schools; and

3. a warning to computing educators over the reframing of computer games in schools.

Teacher Readiness

Many assumptions are made with regard to the introduction of any educational technology into a school environment. The first lies around teacher readiness and preparedness to engage with the technology. In this case the technology is a broad spectrum of software defined by their categorisation as computer games.

One measure of teacher readiness is their awareness of the range of computer games available and their own experiences in the various genres of computer games. To gauge this aspect a survey was prepared that would enable comparison with national benchmarks of computer games use (Brand, 2007) by the general population. As ethical clearance for the schools involved in the Serious Play project was still being finalised, a separate school involved in a similar research project was used to test the survey and gain an appreciation of how teachers as a population compared to the general population (GP) with respect to their experiences with computer games. As the national survey had identified significant gender differences in game play, this was included in the teacher survey of 46 primary school teachers in a designated 'technology focus' school that had made a collective decision to introduce computer gaming as a major school wide reform and could thus be considered at the high end of the teaching population with respect to engagement with computer games.

Table 1. Survey of gameplay

Genre	Total GP	Female GP	Male GP	Female Teacher	Male Teacher
Platform	6.29%	5.23%	7.35%	5.08%	6.05%
Classic	6.35%	6.72%	5.98%	4.22%	4.99%
MMORPG	8.53%	2.99%	14.07%	2.21%	8.56%
Fighting	11.96%	3.86%	20.05%	2.16%	15.32%
Party	14.20%	21.05%	7.35%	16.21%	6.45%
Simulation	16.00%	12.33%	19.68%	3.54%	4.66%
Sports	18.62%	3.86%	33.37%	4.41%	31.33%
FPS	21.48%	3.24%	39.73%	3.99%	34.21%
Role-Play	21.48%	15.07%	27.90%	12.66%	24.34%
Adventure	25.97%	22.29%	29.64%	20.87%	22.11%
Racing	28.02%	11.21%	44.83%	9.50%	35.30%
Action	28.14%	8.84%	47.45%	6.30%	35.40%
Board/Card	28.70%	37.98%	19.43%	23.45%	18.10%
Puzzle	33.81%	48.07%	19.55%	33.65%	24.87%
Strategy	36.74%	28.89%	44.58%	13.50%	18.20%

The results however indicated that despite this population being leaders in the introduction of computer games into schools, their awareness and engagement with computer games was well below that measured (Table 1.) for the Australian population in both genders. This has implications for how well teachers in general can relate their computer game use and understanding with their students' out-of-school gaming experiences. Teachers as a general population may not have the same perspective and experiences with computer games as the general population and with students engaging even more with computer games than this, a distinct gap exists between teacher experiences with games and their students experiences.

Table 2. Ranked female gameplay

Genre	Female (GP)	Genre	Female Teacher
MMORPG	2.99%	Fighting	2.16%
FPS	3.24%	MMORPG	2.21%
Fighting	3.86%	Simulation	3.54%
Sports	3.86%	FPS	3.99%
Platform	5.23%	Classic	4.22%
Classic	6.72%	Sports	4.41%
Action	8.84%	Platform	5.08%
Racing	11.21%	Action	6.30%
Simulation	12.33%	Racing	9.50%
Role-Play	15.07%	Role-Play	12.66%
Party	21.05%	Strategy	13.50%
Adventure	22.29%	Party	16.21%
Strategy	28.89%	Adventure	20.87%
Board/Card	37.98%	Board/Card	23.45%
Puzzle	48.07%	Puzzle	33.65%

Table 3. Ranked male gameplay

Genre	Male (GP)	Genre	Male Teacher
Classic	5.98%	Simulation	4.66%
Platform	7.35%	Classic	4.99%
Party	7.35%	Platform	6.05%
MMORPG	14.07%	Party	6.45%
Board/Card	19.43%	MMORPG	8.56%
Puzzle	19.55%	Fighting	15.32%
Simulation	19.68%	Board/Card	18.10%
Fighting	20.05%	Strategy	18.20%
Role-Play	27.90%	Adventure	22.11%
Adventure	29.64%	Role-Play	24.34%
Sports	33.37%	Puzzle	24.87%
FPS	39.73%	Sports	31.33%
Strategy	44.58%	FPS	34.21%
Racing	44.83%	Racing	35.30%
Action	47.45%	Action	35.40%

In breaking down game experience and interest by gender, it first becomes clear that certain game genres are more appealing to different genders. While many social and cultural influences contribute to these differences, they represent another significant difference between teacher experiences and their students of the opposite gender. Within teachers, gender differences (Table 2. & Table 3.) were noted in terms of gaming experiences with female interest most strongly in puzzle, board or card, adventure and party games, while male teacher interest was stronger in action, racing, first-person-shooter (FPS), and sports games. Teachers as a population had less interest in strategy games and much less interest in simulation games than the general population. A significant concern given the prevalence of simulation based 'serious games'.

While this survey implementation was a trial, wider administration of the survey to a larger population of teachers, coupled with similar surveys of students and parents should cast further light on differences between teachers and students in their game play and highlight areas for focused research during the research study.

Selection of Games

Initial professional development with the teachers involved in the research study highlighted a concern teachers have over the process of game selection for introduction into the classroom.

A popular method of evaluating which ICT to use in a particular educational context is the TPACK model. Developed by Mishra and Koehler (2006) out of the work of Shulman (1986) the model creates intersections with choices of particular Technologies and Pedagogies, Technologies and Content, and Pedagogies and Content, suggesting that when each of these is deemed appropriate, the most effective learning should occur. This works well in encouraging teachers to consider these three factors and how they interrelate when determining if an educational technology is a good fit for how and what they intend to teach.

In the research study the same approach can be used to evaluate computer games, as a specific instance of a technology. A GPACK model creates intersections with choices of particular Games and Pedagogies, Games and Content, and Pedagogies and Content, suggesting that when each of these is deemed appropriate, the most effective learning should occur. Study will be made into how well this

works in encouraging teachers to consider these factors and how they interrelate when determining if a game is a good fit for how and what they intend to teach.
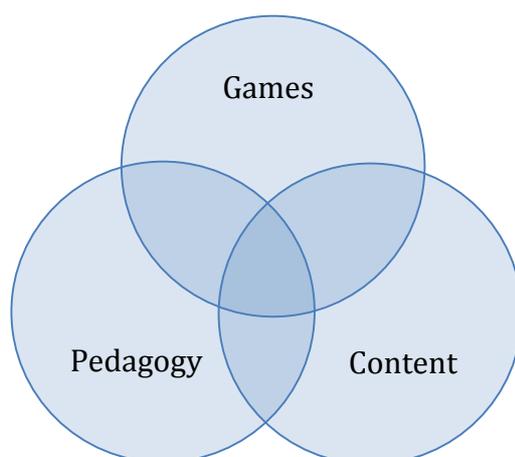

Figure 1. GPACK model diagram

An approach used in the Teaching Teachers for the Future (TTF) project (Zagami, 2012) to model a means of better preparing teacher educators to incorporate the TTF model in preparing teachers to integrate ICT into their teaching is being applied. A variation of the Social Ecological Model (SEM), this approach identifies the factors most likely to influence teachers to successfully integrate gameplay, game building or game analysis into their teaching. Specific approaches to support teachers will be tailored depending on which of five factors is identified as most influential for the teacher: the teacher's personal engagement with computer games (Microsystems), school engagement with the use of computer games (Mesosystems), their disciplines engagement with computer games (Exosystems), student and societal engagement with computer gaming (Macrosystems), and the influence of timing in terms of their age, career stage and willingness to engagement with new initiatives (Chronosystems).

Reframing a computer games in schools

Finally, an outcome of researching in a large group of interdisciplinary researchers is the various perspectives that disparate disciplines bring to the process. One aspect of note to computer educators is that computer gaming is no longer the sole province of computer studies. Indeed computer educators may need to reassert the place of computing in educational gaming, as researchers from other disciplines are largely unaware of the linkages between computer education and computer gaming.

There is however a long history of computer gaming developing from advances in hardware, software and computer networks. The very first computer games, Tic-Tac-Toe and Pong, came from manipulating cathode ray tube displays (History of computer games, 2012). Games then developed as hardware and software permitted, with close interaction between innovations in game design and technological advances in computing. Graphical display resolution, memory capacity, processing speed, storage media, colour displays, HCI interfaces such as joysticks, mice, game controllers, and touch screens, and more recently mobile devices, haptic feedback, motion sensing, and digital cameras have strongly influenced how games are designed and used. Networks and in particular the internet also influenced the development of multiplayer games, online gaming communities of practice, permit Massively Multiplayer Online (MMO) games and support independent (Indi) game development, and the modifying (moding) existing games.

Within these developments there has long been opportunities for amateurs to develop their own games. In the 70's and 80's game programming books and magazines proliferated, encouraging a generation of computer programmers and game developers. It is argued (Naughton, 2012) that as less focus was placed on the hardware, software and networking aspects of computing towards the use of

software applications (ICT), a generation of students in the 90's and 00's has at most focused on moding without a deeper understanding of game development. In schools this likewise has led to a focus on student learning how to integrate computer use into all subject areas (ICT) with a diminishing focus on programming, game development, and the study of computing as students are well practiced in independently learning how to use software applications and see little value in formal study of ICT if it is more of the same.

Into this space, where once computer game development was strongly promoted in schools because of the programming context, digital literacy studies is emerging from the English curriculum and leading a resurgence of interest in computer gaming (Gee, 2003). The colonisation of gaming by literacy education pays scant attention to the historic occupation of this space by computer education. Digital literacy with an emphasis on extending multimodal literacy education to include gameplay has caught the attention of many English teachers and literacy researchers who are increasingly working with researchers exploring the social impact of new media. Through this approach, the technical aspects of computer gaming are in danger of being sidelined as study is focused on the playing of games with a decreasing interest on how and why games are developed.

In many ways this mirrors the transformation in education from computing to ICT studies, with curriculum aspects of computer games moving from the building to the consuming of games for a wide variety of curriculum applications. This is not in itself something to be discouraged, but a danger exists that the computing aspects will be increasingly marginalised and one of the few remaining popular contexts of computer education, developing computer games, may be lost to computing as has occurred with so many contexts: word processing, desktop publishing, computer graphics, digital photography, video editing, etc.

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