

WHAT PROPERTY STUDENTS MAY LEARN FROM PLAYING GAMES

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ABSTRACT

Learning in property programs may be enhanced through gameplay. Games are, by their nature, fun problem solving activities enabling students to gain skills and build knowledge through participation. With property education the problem with gameplay lies in the lack of alignment between what an individual student may learn from playing a game and the intended learning outcomes of a university program.

This research will investigate the opportunities for enhancing learning through playing content situated property games. As an emergent research field games assessments are predominantly based on anecdotal work, only SimCity has been empirically tested, leaving Monopoly variants and other popular property games free from pedagogical assessment.

This paper presents a review of literature into game enhanced learning as it may apply to property studies, followed by an analysis of existing property games, and observations from situated gameplay. The analysis utilises a rubric to assess the gameplay alignment with the skills and attributes sought after by stakeholders in property education. It identifies gameplay attributes inherent in existing property games which may enhance the learning experience for university students studying property.

Keywords: property education, learning games, gameplay, problem solving, functional knowledge

INTRODUCTION

The research presented in this paper endeavours to surface opportunities for enhancing learning through playing content situated property games. It comprises part of a larger project to design, develop and evaluate a content situated games suite for use in Australian higher education. The project will utilise principles of Design Science, a novel approach in the property discipline, although soundly based on traditional experimental and design approaches to education (Brown 1992) and an established method in Information Technology.

It is not the intention of this paper to compare games with conventional teaching practices but rather identify gameplay attributes inherent, if any, in existing property games which may enhance the learning experience for university students studying property.

This paper presents a review of literature into game enhanced learning as it may apply to property studies, followed by an analysis of existing property games, and the results of observations from situated gameplay. The literature review principally focusses on gameplay alignment with prescribed skills and attributes of Australian property programs and the scope for student functional knowledge construction.

GAMES AND EDUCATION

Games and education have a relationship predating historic records and spanning cultures and species. Gameplay, manifested as play with rules, is evident in the evolutionary journey as children pretend to be parents, or whale calves mimic the breaching dance of their mothers. In discussing schools and games Crawford (1984) sets a position for games in education as:

Games are thus the most ancient and time-honoured vehicle for education... We don't see mother lions lecturing cubs at the chalkboard; we don't see senior lions writing their memoirs for posterity. In light of this, the question, 'Can games have educational value?' becomes absurd. It is not games but schools that are the newfangled notion, the untested fad, the violator of tradition... (Crawford 1984, p.18)

Games and play can be more than process learning tools. Young *et al* (2012) cites Vygotsky (1978) 'highlighting play as the means... to develop abstract imaginative thinking and realise goals that they could not yet achieve in real life'.

With (computer) gamers contributing 3 billion hours, a week, of their 'real life', to playing online games (McGonigal 2010) there is growing interest into how such abstract thinking may be channelled to solve real world problems, or leveraged for personal educational gain. By incorporating a 'fun-for-purpose' game, *Foldit*, Khatib *et al* (2011) demonstrates how problems in science, in particular protein folding, may be solved through gameplay.

In the context of higher education, emerging studies of consumer games have identified the aspects of games that make them engaging learning tools. New Media Consortium (2012) justify the inclusion of game-based learning in their Horizon Report noting:

Early studies of consumer games helped to identify the aspects of games that make them especially engaging and appealing to players of various ages and of both genders: the feeling of working toward a goal; the possibility of attaining spectacular successes; the ability to problem solve, collaborate with others, and socialize; an interesting story line; and other characteristics. (New Media Consortium 2012 p.18).

Although authors propose that students do learn from playing computer games (Egenfeldt-Nielsen 2009 and Wu *et al* 2012), as an emergent research field the body of academic literature, and empirical evidence of learning, is not deep (Gee 2011, Iacovides *et al* 2012). Moreover in a recent meta-analysis Young *et al* (2012) called for the conduct of longitudinal studies noting that there were no studies or projects that examined the long-term effects of game-based learning.

Egenfeldt-Nielsen (2009) and Wu *et al* (2012) criticise the majority of published studies noting they were not based on learning theory or aligned to learning content. Specifically Egenfeldt-Nielsen (2009) speaks of a next generation of educational games needing to be tailored more closely to actual learning content. Similar conclusions, incorporating the act of gaming and skill development are supported by Gee (2011), Klopfer *et al* (2009), Ferdig (2009), and New Media Consortium (2011).

Besides investigations into the *SimCity* game variants, which look into the relationship between town planning education and a simulated city development, there is no substantive support for inclusion of games in teaching property. No studies in Australian universities have addressed the parallels, or alignment between what an individual student may learn from playing a game and the intended learning outcomes of the property program.

Learning enhancing

Klopfer *et al* (2009) and New Media Consortium (2011) identify two separate paths by which gaming may contribute to learning. The first path relates to acquisition of skills and competencies inherent in the playing of an appropriate game. The second path relates to the content taught in a specific game. Both pathways may overlap in some games, such as *SimCity* which provide content specially related to the town planning discipline whilst encouraging problem solving (Klopfer *et al* 2009).

Through describing the impact of gameplay on cognitive development Gee (2003, 2011) identifies 36 principles of learning inherent in good video games. In the context of higher education New Media Consortium (2011) provide a succinct categorisation of the 'proponents' view of games as supporting collaboration, communication, and problem solving.

Collaboration and communication

Massively multiplayer (online) games support collaborative problem solving (Isbister *et al* 2010, Gee 2003, 2011, New Media Consortium 2011, and Klopfer *et al* 2009) with gameplay requiring teamwork, leadership, and discovery (New Media Consortium 2012). Isbister *et al* (2010) speaks of massively multiplayer online games:

... provide[ing] structured experiences in which players take on specialized roles and work together to solve problems, leveraging one another's strengths... (Isbister *et al* 2010, p. 2043).

Specifically the online games, *Minecraft* and *World of Warcraft*, have been integrated into specific course curriculum (New Media Consortium 2012). The take-up of online games in property education does not appear in the literature. However, the practice of collaboration, and collaborative problem solving, engenders the skills sought by the stakeholders of property education. Tu *et al* (2009) identifies, being able to work in teams, leading and managing, and negotiating as highly rated skills and competencies expected of graduates in post graduate real estate programs.

Nearly all the Australian Property Institute program accredited universities support the attainment of collaboration skills although with face-to-face property programs offering group assessments aligned to the respective learning outcomes (Boyd 2011). It is the property programs which offer online and blended learning which may benefit most from incorporating massively multiplayer games into their curriculum.

Problem solving

Games are, by their very nature, problem solving vehicles. Schell (2010) and McGonigal (2010) speak of the transition, or 'blurring' of boundaries, from games to the real world. In particular Schell (2010) discusses how social media and gameplay are invading the real world. McGonigal's (2010) approach is more proactive as she proclaims more people must play online games to make the world a better place.

Khatib *et al* (2011) evidenced the link between games and targeted problem solving through harnessing the problem solving ability of online gamers to decipher the structure of an enzyme of an AIDS like virus that thwarted scientists for a decade. By incorporating a fun-for-purpose game, *Foldit*, Khatib *et al* (2011) demonstrated how problems in science, in particular protein folding, may be solved through gameplay.

Critical thinking, as it relates to problem solving in property, is rated as the most sought after student skill by faculty/admin, alumni and board members in a stakeholder survey for North American graduate real estate schools (Tu *et al* 2009). Australian universities appear to support the assertion with critical thinking or creative and innovative problem solving appearing as prescribed skills or competencies in each of the API accredited programs (Boyd 2011).

Functional knowledge construction

With the property industry (Baxter 2007 and Newell Susilawati and Yam 2010) expecting work ready property graduates Australian university programs need to incorporate more professional or functioning teaching activities, assessment and grading (Boyd 2011). Functioning knowledge deals with executing, applying and making priorities (Leinhardt *et al* 1995 cited Biggs and Tang 2009) which are foundation attributes of games (Gee 2003, Gee 2011, New Media Consortium 2011 and Klopfer 2009).

Gaming related authentically to course content can help a student gain a fresh perspective on the material and potentially engage them in the content in more complex and nuanced ways (New Media Consortium 2011). In discussing engagement in games Mayo (2009) cites rapid feedback and the relationship between reward and self-confidence/self-efficacy, and the translation to greater persistence and thus a higher level of accomplishment.

Winning and losing is one way, though not the only way, that emotion may be intrinsically harnessed in games and gameplay (Gee 2003). With games, learners can take risks, and share the respective despair or euphoria, in a space where real-world consequences are lowered (Gee 2003). Gee (2003) supports other ways to situate emotive learning in games such as though role play as a player may adopt avatars or characters with cultural backgrounds opposed to their own and assume multiple perspectives.

For the property discipline the most recognised content situated games are *Monopoly* (Hasbro 2011) for property investment and *SimCity* (Electronic Arts 2011) for town planning. Both have a popular history of engaged play with 275 million *Monopoly* games sold (Hasbro 2011) and *SimCity* becoming one of the most popular simulation games, originally developed for *Commodore 64* some 22 years ago.

Whilst *SimCity 2000* has, from its release been emphasised as ripe with learning potential (Bectra 2001, McFarlane, Sparrowhawk and Heald 2002, Pahl 1991, and Prensky 2001 cited Egenfeldt-Nielsen 2009) the same may not be said for *Monopoly* variants. By name and theme *Monopoly* variant games may encourage strategies opposed in the socially responsible teaching of property and, if practiced in industry, gain the attention of competition 'watchdog' organisations such as the Australian Competition and Consumer Commission. Regardless of their respective merits the *SimCity* and *Monopoly* property games share a common barrier to adoption in higher education as both games have no time limits and may take multiple sessions and days to gain a deep understanding. According to Young *et al* (2012) there are opportunities, as well as opportunity costs, when playing games for education.

Deep understanding takes time, reflection, and active engagement, which are strengths of video games, but meaningful engagement comes at the cost of efficiency and curriculum coverage. (Young *et al* 2012)

As a further consideration Young *et al* (2012) believe the individualised nature of gameplay, acknowledging the impossibility of the same game being played exactly the same way twice and establishing that gameplay requires consideration and needs to be investigated as situated learning.

Themes and methodology

From the review of research into gameplay and learning it may be proposed that playing the *right* property game will:

1. complement traditional teaching practice and encourage the attainment for skills and attributes;
2. enhance a student's functional knowledge construction; and
3. provide the emotive support to encourage further learning through building self-confidence/self-efficacy.

Conversely:

1. There is no literature identifying the *right* game for property students. Even if the *right* property game is discovered it is unlikely all students will play in a similar manner and therefore the educational gains may differ from student to student;
2. Besides research into *SimCity*, there is limited, if any, research identifying the knowledge skills or attributes that may be gained from playing a property game; and
3. Even with advances in graphics and augmented reality there are no assurances that the underlying assumptions and models forming the games operation are accurate and as such the knowledge gained may be erroneous.

Research approach

This paper investigates game-playing as an emerging learning activity which has no presence in property pedagogy research. As such the research aims to further the literary findings into game-based learning and property education through experiment, reflection and assessment. The practical method seeks to empirically identify links and opportunities between and for game-based learning and the discipline of property education. As part of a larger design science project further experiments will be undertaken, subsequent to this paper, to thoroughly test the effectiveness or otherwise of playing games as part of learning property in higher education.

For this research the author, a student and educator in property studies with ten years' experience in valuation and funds management, plays the games as part of the analysis. The analysis of the property games principally comprises observations and assessment from situated gameplay. Observations and personal reflections are captured through voice recording and the assessment is undertaken utilising a scoring rubric.

In selecting a sample for analysis the internet and application stores were frequented to identify popular mobile and fixed platform games with content situated in the fields of property and real estate. The basket of games, and salient details, are contained in table 1.1.

Assessment rubric

Rubrics are utilised in education to articulate expectations for an assessment (Andrade 2000; Stiggins 2001; Arter and Chappuis 2007 cited in Reddy Y. M. and Andrade 2010) as well as provide a more reliable benchmark for comparison (Biggs and Tang 2009). Annetta, Lamb and Stone (2011) describe the rationale, development and psychometrics of a serious games rubric noting the reliability, or fair agreement amongst assessors. The serious games rubric as developed and tested by Annetta, Lamb and Stone (2011) is generic in nature, not tailored to higher education or the discipline of property.

The rubric applied in this research is intentionally aligned to property and games, being designed to assess the gameplay alignment with the skills and attributes sought after by stakeholders in property education (Boyd 2011). The rubric and summated results are represented in tables 1.2 and 1.3.

Table 1.1 – Game sample

Game	Price \$AU	Release/Updated	Platform	Rating (response)	Developer	Website
Be Rich - HD	Free	26-Oct-11	iPad	4.84 / 5 (185)*	Big Fish Games	http://itunes.apple.com/us/app/be-rich-hd/id457905575?mt=8
Millionaire Tycoon	\$0.99	30-Jan-12	iPad, iPhone and iPod touch	4.00 / 5 (38)*	Savy Soda	www.savysoda.com/MillionairTycoon
Monopoly Hotels	Free	9-May-12	iPad, iPhone and iPod touch	3.91 / 5 (433)*	Hasbro/ Electronic Arts	www.eamobile.com/iphone
Sim City Deluxe for iPad	\$7.49	10-May-11	iPad	3.51 / 5 (170)*	Electronic Arts	www.ea.com/iphone
Build-a-lot 2 Free	Free	1-Oct-10	iPad, iPhone and iPod touch	3.41 / 5 (88)*	HipSoft/Glu	www.glu.com
Investorville	Free	1-Aug-11	PC	295 'likes' on Facebook	Commonwealth Bank of Australia	https://www.investorville.com.au/
Monopoly Streets	\$29.99	14-Jun-11	Xbox, Play Station 3, Wii	273 'likes' on Facebook	Hasbro/ Electronic Arts	http://www.ea.com/monopoly-streets

* Apple App Store ratings

Table 1.2 – Property games assessment rubric

Assessment	3 (Excellent)	2	1	0 (Poor)
Knowledge				
Knowledge of property practice	The model underlying the game validly represents property practice	The model underlying the game represents several elements of property practice	The model underlying the game rarely represents property practice	The model underlying the game is does not represent the property practice
Knowledge of property market	Simulates real property markets	Simulates property markets	Attempts to simulate a market	Does not simulate a market
Skills				
Communication	Necessitates articulation through numerous communication channels	Encourages articulation through communication channels	Provides scope for articulation through communication channels	No communication channels are provided
Numeracy	Requires feasibly and investment analysis	Encourages feasibly and/or investment analysis and necessitates mathematical problem solving	Requires mathematical problem solving	Does not require mathematical problem solving
Interpersonal	Necessitates reflection and sharing of emotions and strategies	Encourages reflection and/or sharing of emotions and/or strategies	Provides scope for reflection and/or sharing	No reflection or sharing options
Attributes				
Creative/critical problem solving	Large number of original ideas and strategies are required	Several original ideas and strategies are required	Original ideas and strategies are rarely required	No original ideas or strategies are required
Team work	Necessitates effective teamwork between small and large cohorts	Encourages effective teamwork and cooperation	Provides scope for cooperative multiple playing	No multiplayer option
Social and environmental awareness	Requires critical reflection on authentic social and ecological environments	Encourages critical reflection on social and ecological environments	Provides scope for critical reflection on social and/or ecological environments	Does not present social or ecological environments.
Motivation	Fully immersive, sustaining continued and repeated playing	Engaging, encouraging continued and repeated playing	Relatively engaging and/or engaging for set periods	Lacking engagement

Table 1.3 – Summative assessment findings

Game	Be Rich - HD	Millionaire Tycoon	Monopoly Hotels	Sim City Deluxe	Build-a-lot 2 Free	Investorville	Monopoly Streets
Knowledge of property practice	2	1	0	2	2	2	2
Knowledge of property market	1	1	1	2	1	2	1
Knowledge	3/6	2/6	1/6	4/6	3/6	4/6	3/6
Communication	1	0	1	0	1	1	1
Numeracy	1	1	1	1	1	1	1
Interpersonal	0	0	0	1	0	1	1
Skills	2/9	1/9	2/9	2/9	2/9	4/9	3/9
Creative/critical problem solving	1	1	1	3	1	2	1
Team work	0	0	0	0	0	0	1
Social and environmental awareness	1	0	0	2	1	0	0
Motivation	2	3	1	2	2	1	2
Attributes	4/12	4/12	2/12	7/12	4/12	3/12	4/12
Total	9/27	7/27	5/27	13/27	9/27	11/27	10/27

Summary from the rubric based assessment. Utilises a scale from 0 (poor) to 3 (excellent).

Findings

Knowledge

With exception of *Monopoly Hotels* and *Millionaire Tycoon* the games present a general understanding of property practice. Buying and selling practices are adequately modelled by most games with *Monopoly Streets* taking the practice a step further with players avatars' freely trading cash, 'properties' and other assets. Playing *Be Rich* and *Build-a lot-2* provides players with exposure to the simplified practices of developing land and refurbishing properties in an aim to raise funds and expand their real estate companies.

Ultimately the games are designed for the amusement of a broad spectrum of users, not specifically for educating property students, and as such they do not reflect the more complex operation of the property profession. For example owning complementary properties, not those that adjoin, but rather those which can offset the financial weaknesses of the portfolio is not adequately rewarded. A further limitation of the games is the focus on financial gain and encouragement of a risk seeking strategy to ultimately 'win' or succeed.

From a town planning perspective *SimCity* presents a rich learning environment with players assuming a mayoral or even god approximating role in the development of a city. The gameplay requires careful balance of services, land uses and governmental policy to develop a functional city with satisfied 'Sims' or residents. It is however pertinent to note, as identified by Adams (1998) *SimCity* is not a scientifically accurate simulation model and therefore the knowledge gained through play should not be assumed to be a true reflection of geographic education but rather as a tool supported by other teaching approaches.

Only *Investorville*, an online simulation tool developed for the Commonwealth Bank of Australia, claims to be educational and '... break down common misconceptions and show the practicalities of property investment' (Commonwealth Bank of Australia 2011). By incorporating *Google Earth* satellite photography and 'market insights' from *RP Data*, a residential market researcher, the game presents as sandpit for aspiring residential property investors.

Playing *Investorville* did lead to personal knowledge construction specifically set in the discipline of property. Though the quality and authenticity of the knowledge gained appears questionable or even misleading at stages. With prescribed growth rates, some 'simulated conditions' and options such as, renovations which drive excessively high financial gains, it would not be prudent to play without acute understanding of the game limitations and inherent bias of the game provider.

Skills

Prima-facie playing of the sampled games for the enhancement of communication, numeracy and interpersonal skill would not be a worthy allocation of time. Traditional learning exercises would appear more effective with set exercises in participatory tutorials and reflective journals providing a sounder base for the respective skills development.

Nevertheless there are commendable sub activities in the *SimCity*, *Investorville* and *Monopoly Streets* games that encourage skill development. The games present numerous problems for solving which are met with immediate or prompt feedback. For example *Investorville* provides a level of formative feedback on your investment performance at the games conclusion whilst providing immediate summative responses, by way of financial position statements, at each time you undertake a financially reflective activity.

SimCity does not necessitate self-reflection although in playing the game you are compelled to consider the appropriateness of our choices. With powers to create devastation and misery for the Sims it is not easy to detach ones emotional responsibility if you were the creator and nurturer.

As the only sampled game with remote multiplayer capability *Monopoly Street* creates channels for communication beyond just a link to a discussion group. These channels may become more useful in competitive gameplay.

Attributes

Developing a city from scratch, as encouraged in *SimCity*, presents the opportunity to apply imaginative thinking to realise goals that could not be readily achieved in real life. The simulation environment is broad with few 'scaffolds', or supports to dictate or control gameplay. Players of *SimCity* have the freedom to create individualised cities and precincts and apply their personal strategies through the planning, development, management and redevelopment phases. As such the created digital artefact is unique and represents the series of choices made by the player. The success or otherwise of their city and choices are measured in real time with financial as well as social and environmental benchmarks.

As games the analysed sample are inherently problem solving vehicles encouraging creative problem solving. The structure and 'scaffolding' of the modelled gameplay for the rest of the sample are more restrictive and supportive than *SimCity* presenting fewer opportunities for creative exploration.

The collaborative opportunities associated with massively multiplayer (online) games are overlooked in the sampled games. Whilst Monopoly Streets allows multiplayer online gaming, the benefits of collaborative problem solving as identified by Isbister *et al* (2010), Gee (2003, 2011), New Media Consortium (2011, 2012), and Klopfer *et al* (2009) are not available with any of the games.

Millionaire Tycoon whilst relatively shallow in its education offer, as measured by the knowledge and skills rating in the rubric, is motivating to the extent of addiction. With its simple gameplay set in a digital board game framework *Millionaire Tycoon* can sustain hours of playing. Additionally the engaged playing of *Millionaire Tycoon* incorporates a level chance through 'rolling' dice, and simple strategy and problem solving. Additionally it features nested games, simple avatars and also allows players to spite others through utilising bombs, traps and financially biased auctions.

Conclusions

Learning in property programs may be enhanced by incorporating the right games into course curriculum. Playing the right kind of property game may: complement traditional teaching practice and encourage the attainment for skills and attributes; enhance a student's functional knowledge construction; and provide the emotive support to encourage further learning. Conversely no existing games could conceivably meet all the learning outcomes sought from a property program. As such no game, or games suite, would provide a standalone pedagogical method for effective property educating. Rather games, forming part of a constructively aligned learning and teaching program, may ensure the elemental development of knowledge, skills and attributes in a subtle and engaging manner.

As an emerging intervention in property education there will be barriers to the widespread adoption of game-based learning. To overcome the barriers and support the first adopters, stakeholders, will need to be actively engaged. In the absence of deep empirical evidence, it may be especially hard to gain the backing program coordinators and faculty. Students may also be reluctant to partake without clear guidance from the lecturer as to how playing will contribute to their pedagogical development and assessment.

In acknowledging the limitations of this study, learning activities based on playing *SimCity* and *Investorville* may enhance the learning experience for students studying early planning and property investment courses respectively. The learning activities would require a level of facilitation and benefit from critical reflection assessment. The supporting assessment may incorporate a reflective journal addressing the perceived authenticity of the gameplay whilst critiquing the behaviour of the self and others.

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