Space for Games

Exploring Acquisition of Space Planning Skills through the Use of Real Time Strategy Games

Tane Moleta

1 Victoria University of Wellington
1 tane.moleta@vuw.ac.nz

Real Time Strategy games enjoy worldwide popularity. Success in this genre of games requires a high degree of skill in spatial and temporal organisation. These skills are typically built upon a foundation characteristic of an iterative workflow. An iterative workflow is also a desirable behaviour in the design studio of architecture students allowing for a greater understanding of parameters embedded within the design and ultimately leading to better learning outcomes. This paper discusses the potential of Real Time Strategy Games and draws connections between successful player attributes found specifically in Tower Defence Games and how these could be used to introduce skills required in the planning of architectural space.

Keywords: First Year Architectural Education, Space Planning, Tower Defence, Real Time Strategy Game

INTRODUCTION

The acquisition of space planning skills seems to be a deceptively simple requirement of an architectural education. One of the hallmarks of architectural design education in the 1960's and 1970's was the use of bubble diagrams and other illustrative approaches. These tools were to allow an abstract environment to enable an iterative testing process. Contemporary education however has seen a shift away from this once dominant functionalist approach. While it is not appropriate to resurrect such methods, it is a concern that a fundamental design skill appears to be off the agenda. This also brings to light how might we rethink the acquisition of space planning skills for students who learnt SketchUp or Rhino3D at high-school and whose understanding of space has been developed within immersive video games. How can we leverage from the skill-set and interests of the digital native to revisit the education of this architectural design skill? This paper explores this situation by bringing together established video game genres to alter the delivery of space planning in the context of a first year architectural education.

Education researcher Nicola Whitton identifies the potential adoption of games as beneficial but a largely untapped within higher learning. In 'Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education' Whitton argues that game based learning presents a unique opportunity for educators (Whitton, 2010). Whitton's research vouches for the productive capacity for games to be used a transformative tool in higher education. Her
thesis 'investigation into the potential of collaborative computer game based learning in Higher Education' argues that the types of learners is changing, and that the current student arrives at university with a different set of capabilities in comparison to historical university intakes (Whitton, 2007). She states contemporary students have a greater understanding of technology and an appreciation or desire to engage in more socially oriented activity. Noting that games offer the potential to transform university education, a new generation of learners can be motivated and engaged in a way that traditional education does not (Whitton, 2007). In architectural education Chieh-Jin Lin investigated the capacity for the use of an 'electronic game like' interface to teach space planning skills (Chieh, 2005). This project reported a greater understanding of architectural space planning principles was achieved by the students, however the author concluded that the application operated more like a functionally oriented CAD tool and lacked the compelling or immersive quality of game play expected within a video game context (Chieh, 2005, 138).

**INTRODUCTION TO GAME MECHANICS**

The findings from SLG (Space Layout Game) revealed an ability to locate functional architectural design principles within a game like interface. Participation was however diminished due to a lack of a genuine game like experience. Many researchers have noted that one of the most compelling aspects observed in participants of electronic games is their capacity to sustain an active engagement (Dalla Vecchia, da Silva, & Pereira, 2009). The capacity of games to engage their participant is largely attributed to the use of game mechanics (Nitsche, 2008). Michael Nitsche describes in his book 'video game spaces' that game mechanics are 'a set of circumstances' and that they are used to encourage players to participate in the activity required of the game' (Nitsche, 2008). Jesse Shell defines these circumstances as primarily a set of challenges that the participant must adhere too, or master as a means to progress within that game (Schell, 2008, p. 177). Schell also articulates two key points. Firstly, that the participants of any game unanimously hold the assumption that the game operates on a fair playing field (Schell, 2008). Secondly, that the participant must be led to believe that they can indeed master the skills required to proceed through the game (Schell, 2008). Another consideration Schell introduces is the notion of an interplay between anxieties versus boredom (Schell, 2008). This condition describes an understanding that the participant engaged in any game activity must operate within a delicate balance between: challenges (difficulty - low to high), and required skill acquisition to surpass those challenges (ease of acquiring skill - low to high). The principles outlined by both Nitsche and Schell help to define the qualities that would help to produce the compelling and immersive qualities expected of a game. This expectation of both progress and the requirement to invest time to master the principles of any given game would appear to offer a range of compatible qualities required of students of architecture. The iterative development of design solutions is one of the more desirable behaviors of successful students. The investment of time by engaging in the iterative process often yields more successful design outcomes, but also allow the student to build a catalog of successful design strategies that might be deployed by the students at a later stage. These combined qualities offer some markers for how a teaching delivery might benefit from an adoption of game mechanics.

**INTRODUCTION TO TOWER DEFENSE**

A survey of game types was undertaken to identify a suitable candidate to trial. Puzzle games with a complex geometrical or spatial understanding were among the first surveyed: World of Goo (2008) and Strata (2013). These were quickly discounted as these games were focused on solving three dimensional puzzles and did not require the organisation of space. Following this the Real Time Strategy Game genre was introduced. This genre requires a range of desirable traits for students engaged in the study of archi-
tecture. Success in this genre encourages an iterative understanding of three dimensional space and the ability to organize how items are placed within this space. Three popular titles were observed Star Craft (2000), Age of Empires (2014) and Total War II (2014). This particular type of Real Time Strategy game requires the building of an empire, defense, and offensive units. The participants begin by positioning attack and defense units that are incrementally tested in waves of attacks. They also typically undertake mobile attack of targets by re positioning and directing attacking units. This game type was deemed as presenting a greater focus on mobile military strategies rather than functional organisation of space. The emphasis on the chasing of a target offers little to help deliver knowledge of space planning. The 'financial empire' themed games were also explored. Popular titles such as Hay Day (2013), FarmVille (2012) and so on are although compelling, and encourage participants to engage in regular iterative amendments appear to require a degree of spatial organisation, do not however require any functional understanding placement of game items. The key consideration in this genre is the management of time and meeting delivery of requested tasks over the space planning of game items.

Following this the Tower Defense genre was identified as a likely candidate. Within the Real Time Strategy Game genre, Tower Defense is unique in that the participant is extremely limited in their engagement with the game items. In Tower Defense the participant may choose what is positioned on the playing field, but the units are typically static and no control is offered as to where or what these units will target. The challenge required of Tower Defense participants is relatively simple; to defend an area from the advances of another team. Tower Defense requires participants to evolve an understanding of space planning within an digital environment. Successful players of Tower Defense are also required to understand the temporal occupation of a site and the sequencing of its habitation. Skilled players learn over time that particular arrangements of functional units will achieve desirable or successful outcomes. Participants of Tower Defense are usually met with one of two types of game space; a defined field, or an open field. The defined field is typically characterized by a maze or path upon which assailants will travel in order to reach the combatants base. Radiant Defense (2014), Bloons (2007) or Plants vs Zombies (2009) characterize this type. The other type of game is characterized by an open field upon which assailants will enter the playing field and approach the base from all possible orientations. Titles such as Clash of Clans (2012), Total Conquest (2013), Kingdom Rush (2011) are popular examples of this type of game. This open field type of game presents participants a more complex challenge and encourages a greater investment of time in order to understand the spatial and temporal problems that will arise as players proceed through levels. The player is encouraged to organize how pursuers enter the scene and how they travel about the scene by building structures. In order to 'beat' the attacking combatants they are best to consider organizing spatial circumstances that might alter how their pursuers advance in their journey across the scene. In order to master a particular stage of the game the player will often focus on a single task within a specific scene, even if this costs the success of the level. Slowly building on initial strategies participants explore more volatile configurations which are deployed and tested until failure or success. Eventually players will develop a deeply personal but highly successful series of functional configurations in response to the range of situations the game exposes them too. Such qualities seem useful indices and could be directly translatable to the procedures identified in successful architectural space planning. From the analysis of a brief through to acknowledgment of a pool of acceptable design solutions the Tower Defense game type and space planning seem to indicate a high degree of commonality.
DELIVERY IN THE STUDIO

A provisional study was initiated in the design studio of a group of first year students. The study sought to understand if an exposure to a Tower Defense game would bear any impact on the ability of students to evolve a greater understanding of space planning in an architectural context. From the group of first year students, 30 volunteered to participate. These student participants were then divided into two teams one of which would engage with Tower Defense and a group that would not. As first year students in the first semester of study they had not yet had exposure to space planning. All students were familiar with use of iPad and also happen to engage in some form of casual game play on smart devices, although not Tower Defense games.

Initially one group of 15 was asked to engage with the popular Tower Defense game, 'Clash of Clans' and achieve success in 15 levels of the game. This was met with a degree of enthusiasm, and potentially an unwanted future distraction to their studies. The students reported a high number of failed iterations in the early stages of learning the game that slowly improved over time. All students managed to reach the required level in 4 to 8 hours of game play. Students reaching this level demonstrated a functional understanding of the various game pieces, an evolved understanding of the assailants that would eventually inhabit the game space, and more importantly students each developed unique strategies to deploy player pieces in functional arrangements to achieve at successful outcomes in the game.

A week later all students were then set a design brief that sought to explore the exploration of space planning through across planing exercise. The brief aimed to develop ability of students to research the requirements of a familiar functional programme and develop a design suitable for habitation by themselves or with their peers. The brief asked students to design within 20m2, and to evolve a space for relaxation and a space for study. The brief asked the students to consider how many inhabitants would be involved in each space at each given time, and how the design might transition from one state to another to better service the required activities. The brief asked the students to evolve a response to the brief through a series of iterative models exploring the spatial consequences of the two potentially conflicting activities. The concepts of 'active' and 'passive' were used as a means to facilitate thinking centered on a form of exchange in the cross programming exercise. The brief requested a set of 18 models to be constructed. One set of 9 physical models to be constructed in plain white card and photographed in a studio context, and one set of 9 digital models to be produced in Rhino3D and clay rendered in 3DSMAX or VRay.

Upon submission of the project a number of conclusions were drawn from discussion with the students. The overwhelming outcome form both the physical and digitalexercises was a propensity to develop highly detailed formal studies. Considerably skilled manipulations of form, space or surface were undertaken by each group. An advance in digital or physical craft was achieved in both cases through the documentation of a range of compelling outcomes. The group of students who engaged in Tower Defense demonstrated a vastly different design behavior than that of their peers. In the study group each of the 18 models presented could be viewed as a considered series of iterations that developed as an extension of each proceeding design. The group that did not engage with the Tower Defense game also produced interesting results but in a much more ‘hit and miss’ manner. Good outcomes in space planning were achieved by each group but the control group outcomes received more corrective guidance from their tutors. While this outcome seems to indicate a degree of correlation between design studio skills and an understanding of Tower Defense game play, the outcome is largely indicating a slight change in the approach of the designer, or the methodologies that they employ.

In relation to the ability of Tower Defense games to impart knowledge in relation to space planning the results were not as clear. If anything the study group produced slightly more measured and or-
orthogonal design works. The projects produced by the study group were, arguably very similar to the projects produced by the control group. Although slightly disappointing, this is to be expected, the logic, proportions and structures learned through engagement with ‘Clash of Clans' responds to the games own internal logic. The game used does not require any bearing to the physical or inhabitable world of architecture. This does however indicate obliquely that learning can be achieved through an engagement with Tower Defense games, but a knowledge that only applies to that specific situation.

CONCLUSION
The study investigated a number of Real Time Strategy Games types to define if any offer an engaging way to deliver skills in architectural space planning to first year architecture students. The Tower Defense type of game above all others looks to provide an analogous learning environment with attributes that could help in introduction of space planning skills in a compelling and engaging package. The conclusion can be drawn that widely available and popular games might offer similarities required of space planning, but that these skills are ultimately tied to the individual game mechanics and are difficult to convert directly into architectural knowledge. This particular situation however may be limited due to the distance of traditional Tower Defense games to adhere to any logic or configurations frequently employed in architectural situations. By leveraging that an influence can occur, the subsequent stage of this study aims to produce a working prototype for delivery in studio. The core logic of the Tower Defense game should be employed, but a challenge lies in aligning logic and requirements of real world space to the competitive world of Real Time Strategy Games.

REFERENCES
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