Staff perspectives about gamefully designing Charles Darwin University

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Abstract

This paper reports on the initial outcomes of the 'Game On: Exploring Innovative Pedagogies: *Using Game Design to Enhance Online Learning* Symposium' (*Game On Symposium*) hosted by Charles Darwin University (CDU) in September 2013. Strategic and effective implementation of game design principles potentially provides CDU with an opportunity to exploit its strengths as a multi-sector institution delivering programs in multiple locations via a range of modalities, pedagogies and technologies that will increase engagement, progression and retention of its students. Whilst games have been acknowledged as effective learning tools (Johnson et al., 2013), there is further need to consider their application and implementation in VET and HE institutions. Whitton (2012), identified that digital games have the potential to support learning in a variety of contexts. However, whilst many institutions have adopted game-based learning strategies, there is a dearth of evidence of moving from small scale pilots to systemic implementation.

A mixed methods approach was used to obtain data about attendees pre and post-attendance knowledge of games/gamification and game-like learning and their potential application for teaching and learning at CDU. Quantitative data was collected using anonymous online surveys whilst qualitative data was collated from hand-written 'Post-it' notes and un/de-identified participant observation/conversation notes. Survey results demonstrated support for a range of initiatives including; the use of simulations, the inclusion of missions and quests for learning and/or assessment, the development of professional development courses for staff, the creation of a Community of Practice and the offering of innovation grants for the development of games and/or the gamification of units or courses.

This paper presents findings from the *Game On Symposium* and considers their implications for developing institution-wide strategies for gamefully designing CDU.

Introduction

Hosting the *Game On Symposium* was part of a larger Structural Adjustment Fund (SAF) project that has as its mandate, the establishment of an Innovative Media Production Studio (IMPS) for the specialist design and development of interactive online resources. The studio will utilise a range of contemporary technologies and approaches to create rich, innovative and engaging online learning materials. One of the agreed approaches will be the application of game theory and game design to underpin innovative pedagogies and resource development for online learning at CDU. Data was collected from CDU staff pre, during and post attendance at the *Game On Symposium*, an internal event held 2nd and 4th September 2013.

Whilst many institutions have haphazardly adopted game-based learning strategies, moving from small scale pilots to systemic implementation requires different planning and support structures. In developing an institution wide strategy, decision-makers need to think for the long term and commit resources within that time frame, recognising inevitable challenges

will be encountered along the way. Staff from Charles Darwin University, together with international and national authorities, explored game-based learning and the elements within an 'institutional game-based learning ecosystem' (Derryberry, 2012) during the *Game On Symposium.*

The Symposium aimed to raise awareness of game-based learning approaches and opportunities. Information gained from staff attending the *Game On Symposium* will be used to inform the development of online resources at CDU generally, and more specifically in relation to the potential for the incorporation of game design, game-based learning and/or gamification elements. It is assisting the identification of specific resources and support tools needed for successful implementation. This information has also helped to identify real and potential barriers that will need to be addressed by CDU in order to realise the benefits and potential for teaching and learning.

Literature review

Digital games, although often perceived as only useful for recreational purposes, have a largely unrealised potential to provide exciting and creative learning environments (O'Rourke, 2013). Figures recently released in Digital Australia 14 (Bond University, 2014) show that 65% of Australians play video games - 47% being female, and that 76% of all gamers are older than 18 and 19% are over 51- with an average age of 32; with the average adult gamer playing for 11 years and with 91% of gamers saying games are mentally stimulating and 83% saying that games are educational suggest that games are uniquely placed to support post-compulsory teaching and learning. Today, formal education systems are under increasing pressure to respond and adapt to rapid technological innovation and associated changes in the way we work and live. In addition to accommodating the proliferation of technology, there is a fundamental need to enhance learning processes through evolution in pedagogical approaches, so as to make learning in formal education more engaging and, hopefully, more effective.

Whitton (2012), provides further evidence from the literature that digital games have the potential to support learning in a variety of contexts – from primary and secondary schools, to universities, adult education and workplace contexts. Her article confirms that many authors have reported on the ability of digital games to create interactive, experiential, constructivist learning environments that simultaneously support problem solving and collaboration. Digital games can scaffold learning through levels of increasing difficulty, facilitate learning through trial and error, provide immediate contextualised feedback that gives the learner control of the learning process whilst providing the necessary supports to move from novice to master. Games can engage different users in different ways, using a range of mechanics such as compelling challenges and rewards that demand puzzle-solving or creation of artefacts, competition, stories, working with others, and supporting the human urge to complete sets (Whitton, 2009). O'Rourke and Custance (2009) in the analysis of learning outcomes from their study of VET learners using an interactive game and a multiple-choice quiz found that by making computer based training tools more dynamic and narrative-driven, that the learning process was enhanced and that the interactive game was a more effective educational tool than the quiz.

Karl Kapp author of the book 'The Gamification of Learning and Instruction', says that learning professionals will be called upon to match different game strategies with different types of learning content to create the right learning outcome. He states that 'understanding how

games work and influence learners will help professionals understand how to create future learning experiences that are engaging, motivational, and lead to increased retention and application of knowledge' (Kapp, 2012 p.18). Modern theories of effective learning all suggest that learning is most effective when it is active, experiential, situated, problem-based and provides immediate feedback. And, in a recent review Perrotta, Featherstone, Aston, and Houghton (2013) suggest we need to open up the 'black box' of video games to enable researchers to focus on specific principles or mechanisms and that a more analytic approach that considers how the different elements that operate within video games – motivation, engagement, adaptivity, simulation, collaboration and data collection - impact in an educational setting. In 2013 game play in education was viewed by the NMC Horizon Report through a new lens (Johnson et al., 2013). Now called *Games and Gamification* (the integration of game elements, mechanics and frameworks into non-game situations and scenarios), it reflects the perspective that whilst it is acknowledged that games are effective tools for scaffolding concepts and simulating real world experiences, that there is also a wide spectrum of how games and game design can be used for learning.

However, a number of authors have called for more rigorous evidence to quantify how much and in which ways video games facilitate learning (de Freitas, 2006; Egenfeldt-Nielsen, 2006), but to date, they appear to have gone unheeded. Connolly, Boyle, MacArthur, Hainey, and Boyle (2012), in their systematic literature review of empirical evidence on computer games and serious games highlighted both the persistent difficulties associated with classifying learning outcomes and the associated need for more rigorous evidence of the effectiveness of games-based learning. And in their summary of the review of the literature about gaming in education, McClarty et al. (2012) p. 21, state that:

> *Despite the strong debate on how games can improve education and how useful they can be for teaching complex concepts and skills, very little research has been performed on the relationship between games and academic performance…… In rare occasions when researchers have attempted to investigate the relationship between learning within digital games and academic performance, the results are mixed because of differences in definitions and methodologies (Ke, 2009).*

Kennedy, Jones, Chambers, and Peacock (2011) in their review of the drivers of technology use in higher education highlighted the work of Shannon and Doube (2003) at the University of Adelaide who summarised the key issues that impact on the uptake of technology as; workload and time; knowledge and skills; staff development and training; tools and infrastructure; recognition and rewards; conceptions of teaching and learning; and, institutional support. JISC (2007) similarly noted in their briefing paper that while the benefits of learning with games have been demonstrated in recent studies, the challenges for providing a sufficient level of institutional support, both technical and pedagogic, are not insignificant, and the emphasis upon 'early adopters' leading the way reflects that of other areas of e-learning. Epper, Derryberry, and Jackson (2012), present several significant factors continuing to inhibit rapid, widespread adoption including that; combining engaging game design and storytelling with learning objectives is challenging; game development requires multiple competencies, not just content and teaching expertise; and, cultural barriers still remain in some institutions.

Whitton (2012), also reminds us that practitioners, researchers and policy makers in the field of digital game-based learning need to re-think the true value of games and that they need to focus on instances where they add significant value to the learning experience. O'Rourke and Custance (2007), believe more research is needed to determine the optimal levels of

interactivity and complexity of game moves to ensure satisfactory learning. However, they believe that the use of game-based multimedia in VET should prove particularly effective for industries where workers deal with sophisticated machinery or hazardous environments and to groups who are familiar with game play but have low English literacy skill levels. The language of new media, however, is global.

So, whilst the idea of using game-based learning is not new, there remains a lack of game-based learning as an integrated part of formal education. True adaptation and institutional implementation of games is still, very much, at an early experimental stage. Digital game-based learning is not a simple solution that is going to revolutionise teaching and learning in VET and HE. It is important that digital games and gamification are simply seen as tools available to teachers, which, when considered within the wider constraints of the system in which they are to be made available, together with appropriate pedagogic models, can provide for engaging and effective learning.

Research method

The *Game On Symposium* was an event open only to CDU staff. Invitations to attend were sent by email to all teaching, research and teaching and learning support staff – both HE and VET and the opportunity to attend also posted on the Facebook page of The Northern Institute. Fifty-five staff accepted the invitation and attended on Monday 2nd September, forty-five on Wednesday 4th September, thirty-nine of whom at also attended on Monday. Across the three sessions, approximately 38% of attendees were teaching/research staff from HE and 25% from VET, whilst 37% were from areas providing staff and student support for teaching and learning.

Both days of the *Game On Symposium* included presentations by renowned games-based learning/gamification authors and scholars – the majority presenting via a Blackboard Collaborate classroom. Presentations were followed by workshop activities to reinforce learning and embed ideas in a CDU perspective.

In addition, a *Games-Based Learning Ecosystem for CDU Workshop* facilitated by a leading US academic in the topic was held on Tuesday 3rd September. This was an invitation-only workshop for key staff from the Office of Teaching and Learning and key academics with teaching and learning leadership roles at the university. Of these twenty-three, twenty-one attended the *Game On Symposium* on Monday 2nd September and twenty attended Wednesday 4th September.

A mixed methods approach was used to collect data about attendees pre and post-attendance knowledge of games/gamification and game-like learning and their potential application for teaching and learning at CDU. Quantitative data was collected using anonymous pre and post attendance 2nd September and post attendance 4th September online Survey Monkey surveys. Qualitative data included hand-written 'Post-it' notes and un/de-identified participant observation/conversation notes. SPSS statistical software was used to calculate mean responses for both level of knowledge and experience pre and post the *Game On Symposium*. Microsoft Excel was used to generate graphical representations. A limitation to the data collected via the online surveys was the fact that we could not follow the responses of an individual staff member over the two or three surveys offered. However, 83.3% of respondents to the pre-Symposium survey (n=35) attended on the 2nd September, 100% of respondents (n=20) attended the *Games-Based Learning Ecosystem for CDU Workshop* on

the 3rd September and 94.4% of respondents (n=20) to the survey post 4th September attended both on the 2nd and 4th of September. A further limitation was the fact that staff attending did not represent all Schools/disciplines, nor were all Schools/disciplines evenly represented, which places limits on the extent to which results can be generalized.

Findings

Mean responses calculated for both level of knowledge and experience with electronic games, electronic games design, game based/like learning and gamification reported in both the pre-*Game On Symposium* survey 2nd September and the post-*Game On Symposium* survey 4th September reflect respondent's average scores ranging between 0 (minimum) and 5 (maximum). Figures 1 and 2 below show that whilst staff knowledge of and experience with electronic games was higher than of other game-related components prior to the *Game On Symposium*, higher levels of knowledge of and experience with game-based/like learning and gamification were gained as a result of their participation in the Symposium.
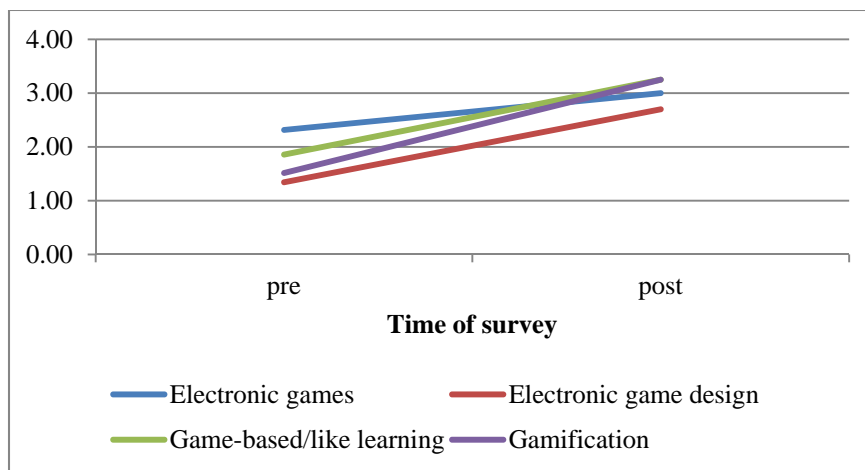

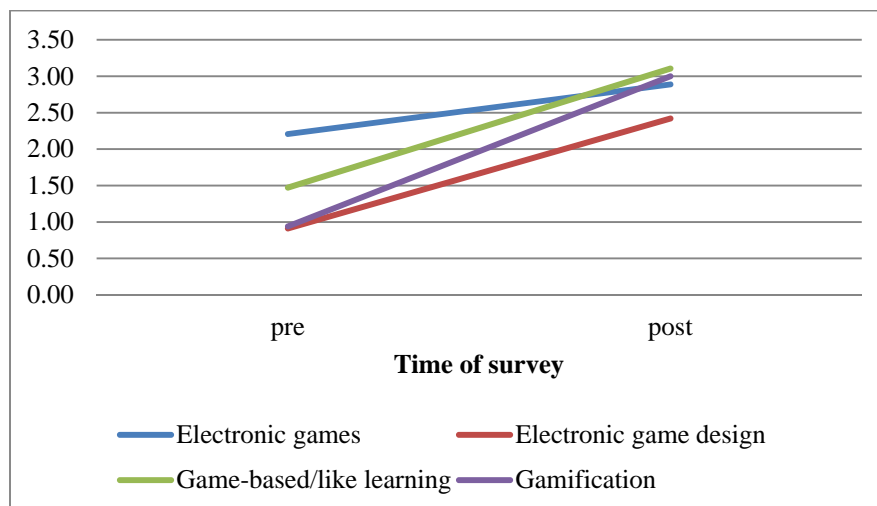**Figure 1: Knowledge scores for game-related components**

Figure 2: Experience scores for game-related components

Survey results demonstrate clear and consistent support (over 45% of responses) for the following uses/applications of games-based/like/gamified learning/design at CDU. From a

teaching perspective most interest was shown for the use of simulations with game elements followed by the inclusion of missions and quests for learning and/or assessment. From an employee perspective, 59% of respondents showed most interest in the development of a course to assist them to understand and use gameful design and, in the creation of a Community of Practice and associated knowledge repository. Staff also reported high levels of interest in the offering of innovation grants for the development of games and/or the gamification of their unit or course within the Blackboard LMS. There was also support for the gamification of aspects of the staff performance development review system (PDRS).

Staff were asked to identify what they perceived was the level of importance (from 1 to 5) of a range of given challenges to realising the possibilities for games-based/like/gamified learning/design that they had previously identified. From a total of 20 responses, the item 'lack of time, given current workloads, to introduce game-based/like teaching, learning and design' was reported at the highest level of importance by 53% of respondents, 'lack of teacher knowledge' and 'lack of technology support staff' were ranked as most important by 41% of respondents. To discern the relative importance of those challenges, respondents were requested to rank their top three challenges to furthering the possibilities for games-based/like/gamified learning/design in their course. Figure 3 below displays that staff's lack of appropriate skills and knowledge, lack of time and lack of access to resources – skilled staff and necessary technology were of most concern.

Discussion about the utilisation of electronic games, games-based/like learning or gamification in their units/courses during brainstorming sessions held during the *Game On Symposium* identified possibilities for game development for specific units/courses in both HE and VET, a range of non-unit/course specific game development opportunities and staff related game-based applications.
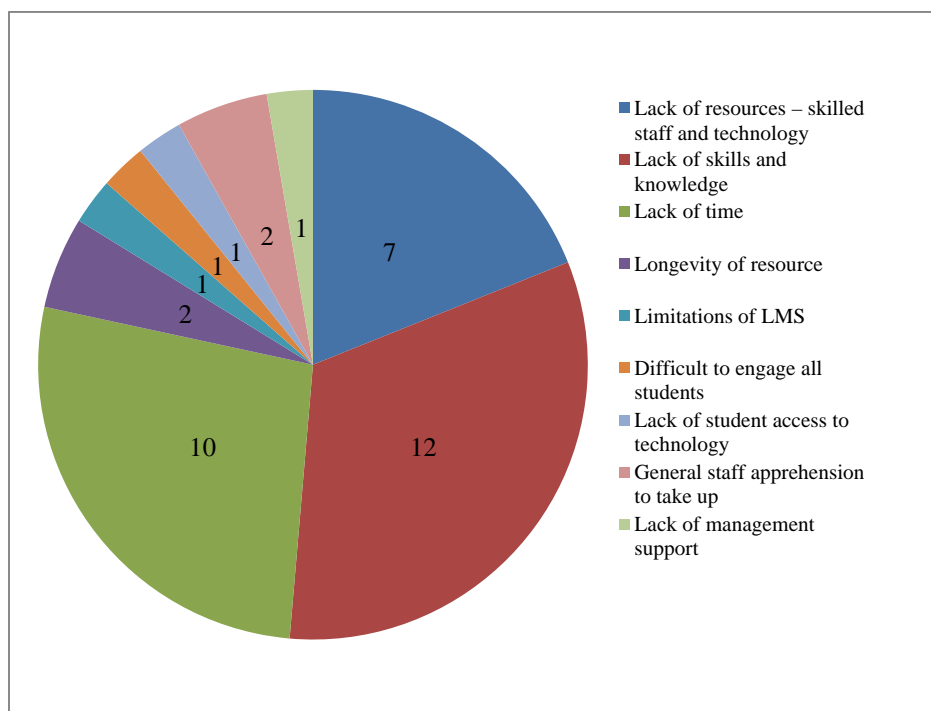

Figure 3: Total of top three challenges to realising the possibilities for games-based/like/gamified learning/design (n=14)

Discussion

Five key themes emerged when staff were asked to write down their ambitions about the potential use/applications of gameful design at CDU. These were pedagogy, resources and support, student outcomes, reusable and world leader.

Pedagogy
Staff believe that content could be more engaging and more fun for students if game design principles were applied to their units/courses, that they could facilitate greater interaction with and between their students, that it could be more responsive to the needs of the diverse student population and engender a local flavour into the CDU course offerings. For VET students it was suggested that games could be used to stimulate hands on activities, promote literacy and numeracy of participants, encourage critical thinking and problem solving for higher level students, enable diagnostic assessment at the start of a program and act as 'ice-breakers' for group work. O'Rourke's work with VET students also supports the use of games that enable virtual learning of those skills that could otherwise be unsafe to learn without appropriate on-the-job supervision (O'Rourke, 2013). For HE students, the opportunity to use simulation games for science, accounting and emergency and disaster management was raised as was virtual practicum games for preparing students for placement and the creation of a virtual school and associated scenarios. Kapp, Blair, and Mesch (2014), would support this, suggesting that that simulations are most effective for application of knowledge rather than primary learning and that simulations can help learners turn knowledge into action. Staff and students at the University of Glasgow in a study by Barr (2013) described a number of incidental benefits from gaming including the experience of working as part of a team and creative problem solving – important graduate attributes and skills for workplace success. However, Whitton (2009) reminds us that educational games for students in higher education need to be thoughtfully designed, with sound pedagogic principles at their heart, have very specific and clearly communicated learning outcomes and obvious benefits over other methods of learning. If a game is perceived by the students as being a valuable way to learn then it is likely that they will be motivated to use it to enhance their learning experience, not simply because it is a game.

Resources and support
The application of gameful design was seen as a chance to bring new learning opportunities for staff, to increase skill sets within teaching teams, improve staff relationships and sustainably develop and retain the Structural Adjustment Fund project team in the Innovative Media Production Studio at CDU. Examples of such application included peer rewards to complement performance reviews, gamification of staff professional development, gamification of how to prepare a quality unit for the Blackboard Learning Management System (LMS), a navigation game to learn about the Blackboard LMS and preparing for emergencies on campus. Systemic implementation requires institutional planning, commitment and support, underpinned by a driving pedagogical rationale and professional development is critical to the success of any new instructional strategy (Epper et al., 2012).

Student outcomes
Symposium attendees thought that the application of gameful design would improve the student experience, build student confidence and assist the retention and completion of students. Granic, Lobel, and Engels (2014) propose that the immediate and concrete feedback provided by games services to reward continual effort and keep players motivated, and that it

is probable that this motivational style will translate, although differentially, to education and work contexts. Modern theories of learning suggest that it is most effective when it is active, experiential, situated, problem-based and provides immediate feedback (Boyle, Connolly, & Hainey, 2011) and games do appear to support interactions that offer these features.

Reusable
Staff believe that there is the potential to build platform agnostic, accessible, reusable/adaptable games/game features that can seamlessly integrate with the CDU Blackboard (LMS), for both VET and HE courses and that there are opportunities to research the outcomes from these applications. Reusable game suggestions included campus and library orientations, learning about the Harvard referencing style and another to support learning about copyright, creative commons and intellectual property. Kapp et al. (2014), agree that one of the most obvious opportunities for the integration of games is at induction. Games can be used to encourage early socialisation and be provided at varying levels of difficulty so that everyone can participate on the first day.

World leader
Some staff want CDU to be the first to systemically apply gameful design, to become masters of good gamification and to create lasting value. With the majority of literature to date about the use of games for learning focussed on school-age children, CDU could potentially lead systematic, evidence-based research on game-based learning in post-compulsory education.

However, a range of issues were raised related to technology that included the fact that sometimes games might not be appropriate – for the material, or for particular learners, that there is potential inflexibility of the Blackboard LMS to incorporate game-based learning approaches, that if poorly implemented could increase complexity and confusion, that not all students may have the appropriate devices to use and that bandwidth in remote areas may not allow equity of access. In regard to social acceptance, there was still the notion that some employers may be concerned that their employees (students) are using games for learning and that games could have the potential to trivialise the content/process, and, that it could promote inappropriate competition between students.

Whitton (2012) identified similar issues and that despite the many pedagogic and motivational benefits of using computer games in teaching and learning, their use is problematic. She also identified similar barriers – cost in terms of the monetary expense associated with software and hardware purchase, but also in terms of time for educators to develop the skills to evaluate or create games and the activities to support them. She raises the issue of the acceptability of games in formal educational contexts and notes that typically, excellent examples of educational game developments are the projects of individual teaching staff.

There is no doubt that the post-compulsory education sector in Australia is under increasing pressure to adapt to rapid technological innovation and the opportunities that it presents for teaching and learning. However, guidelines for the incorporation of games in formal education practice have yet to be presented by researchers (Arnab et al., 2012) let alone adoption frameworks or models for gamefully designing institutions that ensure a smooth continuum from theory/planning to deployment and evaluation. Overall, the decision to adapt an innovation is a cost-benefit analysis and (from a K-12 perspective) almost all the attributes for game-based learning are not aligned very well with the attributes characteristic for diffusion of innovation (Egenfeldt-Nielsen, 2010). There is much more to be done to identify

clear relative advantages, increase competency/curriculum compatibility, support and inform the design, conduct and evaluation of trials and create and showcase exemplars of successful applications of relevance to all aspects of gameful design from primary to VET and Higher Education.

Conclusions

So, what should CDU do? Given that the Digital Australia 14 gamer profile (Bond University, 2014) equates well with a large percentage of the student cohort at CDU and that more than 75% of students are accessing some or all of their learning online, it is timely that the institution considers the potential of this pedagogical approach to better engage and retain its students. The pro-active approach taken to capture the voices of staff through the *Game On Symposium* and the *Games-Based Learning Ecosystem for CDU Workshop* begins to clarify both the opportunities and challenges ahead. But with no 'yellow brick road', high staff turnover and limited resources, it will be critical that a considered investment is made at a number of levels – including providing opportunities for all interested staff to have access to information and professional development whilst simultaneously providing appropriate support to those early adopters who are ready to develop and showcase those elusive exemplars. It will mean considering whether expertise is sourced and developed internally or whether it is sourced or complemented from outside the institution and the associated short and long term business models that would need to be put in place for the relationship to be effective. Given the geographic spread of the institution, its staff and its students coupled with constant and rapidly changing technologies means that ICT considerations cannot be ignored. It will mean both creating and supporting opportunities for staff and their teams whilst simultaneously considering institutional commitment to and development of a gamefully designed CDU. By further developing our understanding of the influence of games we may be able to harness their reported potential to motivate, engage and promote collaborative practice, and in so doing, increase the engagement, retention and progression of our students.

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