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Dunwell, I; Lamerias, P; de Freitas, S; Petridis, P; Hendrix, M; Arnab, S. and Star, K.

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Chapter 100

Providing Career Guidance to Adolescents through Digital Games: A Case Study

Ian Dunwell

Coventry University Coventry, UK

Petros Lamerias

Coventry University Coventry, UK

Sara de Freitas

Coventry University Coventry, UK

Panos Petridis

Coventry University Coventry, UK

Maurice Hendrix

Coventry University Coventry, UK

Sylvester Arnab

Coventry University Coventry, UK

Kam Star

PlayGen, UK

ABSTRACT

In an evolving global workplace, it is increasingly important for graduates and school-leavers to possess an understanding of the job market, their relevant skills, and career progression paths. However, both the marketplace and career paths are becoming increasingly dynamic, with employees more frequently moving between sectors and positions than was the case for previous generations. The concept of a “job for life” at a single organization is becoming less prevalent across sectors and cultures. In such a context, traditional approaches to career guidance, which often focused upon identifying a suitable occupation for adolescents at an early stage and establishing a route towards it, are being challenged with the need to communicate the value of transferrable skills and non-linear progression paths. This article explores the role digital games might play in allowing learners to develop these skills as part of a wider careers guidance programme. Through a case study of the “MeTycoon” serious game, the potential reach of such games is discussed, with 38,097 visits to the game’s website, and 408,247 views of embedded educational videos. An online survey of players (n=97) gives some insight into their opinions of the game’s impact and appeal, with positive comments regarding the design of the game and its emphasis on creating an enjoyable gaming experience whilst providing educational content.

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INTRODUCTION

Career guidance is an essential component of school and university-level education when seeking to ensure leavers effectively translate academic qualifications to solid job prospects and opportunities (Hughes & Gration, 2009). With the rapidly evolving and increasingly globalised job market, demands are also being placed on the nature of this guidance and its need to support the development of a wide range of career skills and capabilities. Simplistic guidance often consists of simply presenting a prospective graduate or school-leaver with a range of professions to which they might be suited, though this fails to address their longer term career success: Will they be able to identify opportunities for non-linear progression? Can they recognise and react to changes in their profession? How will they respond to redundancy? Embedding these skills into a young audience can be challenging, as it requires a high degree of forward thinking, and often must be delivered before the individual experiences problems and opportunities first-hand.

In the background section of the article, we describe how digital technologies, and specifically games, might be applied to allow for some degree of experiential learning (Kolb, 1984) in advance. Furthermore, we consider how these games may prove capable of stimulating a higher degree of engagement than more static educational resources such as textbooks or websites, in turn generating intrinsic motivation amongst players to learn career skills. We present the MeTycoon serious game and its design principles: the game creates a role-playing environment in which the player must offset their lifestyle choices against income requirements and job preferences, whilst unlocking skills and professions by experiencing more formal learning resources. The research method adopted to examine the game considers both the statistics derived from online deployment and usage, and a voluntary, non-incentivised survey of the player base, to ascertain opinions and self-

reported metrics of impact amongst players. High usage of the game without a required investment in direct marketing or promotion shows sound reach potential for such interventions, and in our results and discussion we explore how the findings might translate to future career guidance solutions, or to the wider field of game-based learning.

BACKGROUND

The 2013 NMC Horizon Report (Johnson, 2013) asserts the perspective that games are effective tools for increasing student's motivation and engagement by involving them in a memorable learning experience. A serious game can be defined as "a game in which education (in its various forms) is the primary goal, rather than entertainment" (Michael, 2006). Concept scaffolding and simulation of real world experiences may allow the a student to solve problems and enhance their subsequent performance (Ferreira, Palhares, & Silva, 2013). As an example, a survey of 264 students playing an online educational game (Huang, Huang, & Tschopp, 2010) found a relationship between reward and motive. Further studies (Schaffer, 2004) have shown that games can support novel approaches to learning by scaffolding players' experiences in new worlds, allowing them to learn by trying to solve loosely defined problems inside the game. This brings to the fore the notion of 'learning by doing'. Other authors (Hwang, 2012) have argued that pedagogically-driven games reflect strong commitment to educational values and have great potential to drive students in achieving intended learning outcomes.

As part of the European Commission's Digital Agenda strategy, and policies to support pathways to employment, the potential of digital games is demonstrated by the widespread adoption and use in the 21st century. Digital game audiences are expanding rapidly, and games thus have the potential to engage hard-to-reach groups. A 2013 report commissioned by the EC reported that

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game-based approaches offer a particular opportunity to reach young people, with gaming almost ubiquitous among this population. Social, casual and intense forms of gaming are increasingly shown to appeal to both genders and diverse age ranges (JRC, 2013). These practices are reported to open up opportunities for a range of groups of people at risk of exclusion though means such as building confidence and motivation, developing skills, building social capital and increasing awareness of pathways to employment. Existing initiatives that utilise a game-based approach as reported by the JRC report include:

- LABlearning at Aarhus College (DK and EU), a redesign of vocational training in health and social care around game making to prevent dropout from vocational education. This initiative is however aimed at youths who are already engaging with education;
- Nottingham e-Games League (UK), aimed at attracting young people (14-19) into a learning environment using digital games as an 'eSport';
- LearnPlay Foundation (UK) supporting engagement into vocational education, using games and games-based technologies, based on 10 years of game-based employability training. The specific niche is in bridging the digital game industry and the education system;
- Back 2 Your Future (NL) game environment aims to help school dropouts back into education.

These initiatives are, however, focusing on encouraging school dropouts to get back into education and to attract disfranchised youths into training and employment. To avoid stigma attached to attending formal training or education, a game-based intervention may prove more persuasive and comprehensive, addressing the

various spectra within the pathway to employment, as well as during employment and in response to other circumstances affecting it.

The emergence of digital games for learning has given rise to a range of academic and industrial perspectives of their design and implementation. These range from the straightforward principles of Zyda to make a game "fun" first and foremost (Zyda, 2005), to more complex frameworks such as the four-dimensional approach (de Freitas & Oliver, 2005). Both authors would doubtless agree that the balance between fun and education is mandated by the context in which a game is deployed; the four-dimensional framework identifies the context as one of its dimensions. When replacing an educational resource for a "captive" classroom audience, entertainment aspects may prove less critical, however, when seeking to compete for entertainment gaming screen-time, failure to engage and entertain will result in limited reach regardless of educational potential (Dunwell, Christmas, & de Freitas, 2011). An assertion here is that in contexts where research into efficacy is needed, developing entertainment aspects to attract and retain a player-base can have substantial value in providing a sample to perform this research upon, and expand and refine educational elements in response to findings. This contrasts with the alternate approach of attempting to translate an educational resource with demonstrated value into a game: the challenge in such a case can be attracting the number of users required to validate that the educational value is not lost in translation.

The movement towards the use of serious games as learning tools in education settings is delineated by the perceived ability of such games to create a memorable and engaging learning experience. Various commentators and practitioners alike argue that serious games may develop and reinforce 21st century skills such as collaboration, problem solving and communication (Galarneau & Zibit, 2011). While in the past, teachers have been reluctant in using serious games for improving their

teaching practice, there is an increasing interest, especially in science disciplines, to explore how serious games could be used to improve lesson planning and classroom management (Schrier, 2006). The overarching assumption made is that serious games are built on sound learning principles encompassing teaching approaches that support the design of authentic and situated learning activities in an engaging and immersive way. Developing serious games based on student-centred pedagogies that enable students to engage actively with questions and problems associated with their subject or discipline is an empowering approach with benefits for subject learning as well as for developing a wide range of important high-order intellectual attributes including the notion of transferability.

In the careers guidance context, one starting point for the MeTycoon game detailed in the following section was a set of existing educational videos, each providing information on a given career from an experienced professional in the field. It was considered that a game may prove a means to increase the number of times these videos were accessed and viewed, and that it might also add value in terms of allowing other concepts such as the identification of transferrable skills to be taught in an innovative fashion. These concepts were supported by a number of examples of games used in other areas to communicate a wide range of learning outcomes based on existing material in a novel way (Annetta, Murray, Laird, Bohr, & Park, 2006; Baranowski et al., 2003; Chittaro & Ranon, 2009). Developing a design in this context requires careful consideration of the nature of the supporting educational material, and how it might be accessed through the game or translated into game elements.

More widely, this consideration must draw upon an understanding of factors such as the audience, the technology platforms available, links that might be provided to other resources, and the

context of use, seeking to link game attributes to targeted learning outcomes (Wilson, 2009). Game-based enhancements to existing learning environments are often best deployed through a blended learning approach (Conolly, 2007). A more engaging platform/environment such as computer games will be able to complement existing services and support personally prompted transitions (for instance the evolution of personal circumstances represented by a role-play game). Such innovations are essential to support the emergence of a new generation for whom technology is often an integral part of their day-to-day activities (Jones, 2010), able to migrate between existing and new technologies, building socially driven communities, and with high expectations of fidelity and dynamics from Virtual Learning Environments (VLEs).

A frequent question in serious games design is how to best embed pedagogically-driven learning activities and learning content. A common argument is that this content integration must not obstruct the engaging aspects of the game, though in areas where the subject matter does not immediately lend itself to an entertainment gaming analogy, this may prove challenging. One solution might be to exploit a blended approach to apply extrinsic motivation on learners to play, though this can be at-odds to the frequently cited benefits of game-based approaches in stimulating intrinsic motivation. The aforementioned approach of isolating individual pedagogical elements and examining their relationship to game design is an obvious route (Wilson, 2009), though one complicated by the reliance of these elements on other factors such as learner demographic, representational medium or learning context. The method reported in this article sought to apply an approach utilising established learning objects such as videos, yet rather than add them as supplemental or external components, are incorporated as integral parts of game mechan-

ics encompassing existing principles (Minovic, 2010). As such the game could be expressed as a learning content management approach, which applies rules and rewards for content access to form the game dynamic.

A recent state of the art review (Anderson et al., 2010) identified some key strengths of serious games in the areas of communication, visual expression of information, collaboration mechanisms, interactivity and entertainment. There is little question a game can provide an engaging experience; however, in the case of a serious game, this must be coupled against delivery of learning outcomes or objectives. Achieving this in a way which does not compromise the engagement and entertainment offered by a game is a central design challenge, and one which typically requires careful consideration of how game elements synergise with pedagogical models. With respect to the review of Anderson et al. (2010), the visual nature of gaming also allows for ideas to be presented in novel and abstract ways. As detailed in subsequent sections of this article, this formed a basis for the abstraction in MeTycoon which allowed the player to live a game-based “life”, drawing on common entertainment game elements such as character development and skill acquisition to scaffold a learning process centered on understanding the value of transferrable skills and diverse career paths, with income offset against lifestyle choices and purchases.

This notion of game as learning content management system (LCMS) has been explored in other projects, such as the European Framework 7 project ALICE (Adaptive Learning via Intuitive/ Collaborative and Emotional Systems), which sought to fully integrate a serious game into an LCMS (Caballe, Ganan, Dunwell, Pierri, & Daradoumis, 2012). A consideration here is the capacity of a game to act as a means for content management, providing formal education resources in a controlled and gamified fashion that seeks to ensure a flow experience (Cziksentmi-

halyi, 1990), whereby trivial or tedious tasks are complicated or augmented to make them more engaging, whilst daunting and complex tasks are supported by positive feedback and material supporting the user and reinforcing high levels of perceived ability. The goal of such an approach is to ensure the player does not disconnect due to a task being too tedious, or seemingly impossible. This is a goal successful entertainment games often realise through rapid positive feedback on repetitive tasks, for example via scores, experience points, or coins awarded every few seconds, and careful balance of challenging tasks such that the user is left with the feeling that they can overcome an obstacle in “just one more go”. The subsequent section details the design of the “MeTycoon” serious game, which built upon notions of roleplaying and experiential learning to allow players to live a virtual life, gaining skills, qualifications, and jobs, and dealing with events as they occurred.

METYCOON

Building on the understanding of the need to make careers guidance engaging and entertaining, as well as conveying key learning outcomes around the current and future job market, MeTycoon was created as an online, browser-based serious game. Within the game, the player assumes the role of their character from birth, progressively learning various skills, attending courses, and working in various professions. The choices they make regarding their lifestyle, including factors such as hobbies and accommodation, influence the amount of money they are required to earn to support themselves and, in later years, their family. Figure 1 shows screenshots from within the game, illustrating the late game progression of a player who has earned sufficient income to support a large family and expensive costs of living, and an in-game store with a selection of items the player can buy for their character and home.

Figure 1. Game screenshots showing a player's accumulated family and housing (left), and an in-game store with options purchased from the player's salary (right)



Career videos were embedded within the game as shown in Figure 2. As players progressively viewed a video, they unlocked skills for their character, useful when seeking to enroll in courses for further and higher education, or to apply for jobs. Elements such as transferability of these skills was emphasized through their use for multiple courses of study or jobs, seeking to allow players to gain an understanding of how skills may be taken in a broader context and used for a variety of career

paths and options. Figure 2 also shows the various sectors, grouped into technical, creative, environment, people, and commercial professions. This reflected the diverse nature of the careers videos within the game, and the desire to support as wide a range of potential professions as possible to reflect the diverse audience for the game. The game also introduced events at points during a players lifetime, to represent the unpredictability of the events they might face, and allow them to

Figure 2. Images from the game showing the various sectors included (left), and a viewing of an informational video from an expert in a given profession (right)



develop their experience in handling these events. A typical example would be the loss of employment due to circumstances beyond their control, such as a reducing market for a company's products. In such an event, the player has to consider how their skills might transfer to alternate professions, and the strategic merit of forgoing the short term income of immediate transfer to another job with longer term benefits of further educational qualifications or training. This would also be affected by their previous strategy in terms of savings and extent to which they had planned for such contingencies. As a result, the game sought to use experiential learning to convey the need for such skills alongside the ability to plan for, and react to, events impacting an individual's life.

In addition to deployment in an online, free-to-play context, additional materials were also provided alongside the game for download and use by teachers and career guidance professionals. This included lesson plans for teachers, suggesting how to integrate the game into classroom exercises. As games have been shown to benefit from blended learning approaches (Dunwell et al., 2011; Marsh, Nickole, Klopfer, & Haas, 2012), a goal here was to maximise the potential use of the game beyond a standalone, online context, providing a resource for educators as well as end-users. As such, these materials sought to illustrate how play-sessions might be used alongside didactic methods of teaching, with game play allowing for an experiential element (Kolb, 1984), and the educator scaffolding the reflective and knowledge acquisition processes to accommodate the more abstract nature of the game.

Given the online deployment of the game and supplemental resources, the next section outlines the research method adopted to gain insight into its efficacy. Both uptake and self-reporting of end users, including some careers guidance professionals, were viewed as important components of this method.

METHODOLOGY

Games can prove useful research instruments (Calvillo Gamez, Cairns, Gow, Back, & Capstick, 2010), providing a depth of information on user interaction through the game engine itself, as well as through direct reporting from players. A mixed-methods evaluation approach was adopted to assess the impact and benefit of the game, combining quantitative data on players, captured through the game itself, with subjective reporting of users' experiences via online survey. One of the key quantitative criteria assessed by analysis of data captured automatically through the deployment of the game was the number of users attracted, their typical playtime, and how many informational videos they chose to view, as these represented a proven pedagogical means to convey knowledge. Subjective reporting looked at both Likert-based assessment of learners' knowledge of careers advice, perceptions regarding the current career market, influenced by the game, and how useful they found the game to be. Open questions also sought to elicit insight into more general perceptions of the game amongst users, for example the success of "fun" elements.

With respect to the design of the survey, the objectives were to assess whether the game had impact on players' perceptions of career progression, as well as gain an understanding of their previous and current access to guidance and support. To this end, a question was posed around their perception, "Do you think it's likely to have one job for the whole of one's life?", as well as direct questions on the benefit they perceived from the game, for example "Did playing MeTycoon help you find out about what skills are important for getting a good job". A natural limitation of such a survey-based approach is it assess perceptions and current or planned behaviour based on self-reporting, though this is reflective of the difficulty in assessing the impact of careers guidance in

concrete terms, for example its impact on actual career progression over a lifetime. Furthermore, this approach sought to explore whether players perceived the game as more or less useful than their current guidance, to indicate whether game-based solutions such as MeTycoon have greater future potential. A number of open questions also offered players the opportunity to express their thoughts on the game and its value. Players registered an email address on signing up to play the game, and the subsequent mailing list was contacted to invite players to complete an online survey allowing them to self-report their views. This email included information on informed consent and participation in the research process, with data being anonymised on point of collection. The following section discusses the results obtained.

The limitations of this approach in gaining understanding are addressed in-part through the other components of the study. The large-scale analytics allowed for access to a far larger sample size, though in the absence of concrete metrics of impact or self-reporting. Hence, following deployment of the game, data on web usage was monitored via Google Analytics. Nonetheless, whether serious games can attract users, and the best methods for doing so, is often as relevant a question as the efficacy by which it achieves its outcomes - without users, the value of any approach is clearly diminished. A question here is whether games which are overtly “serious” are viewed in a more negative light than games which are purely recreational. Several examples of entertainment games which purport to have serious benefits, though with limited research evidence showing efficacy, such as brain “training”, have reached large commercial audiences. Furthermore, larger-scale surveys of player’s perceptions have shown strong disagreement that a game being serious intrinsically makes it “boring” (Dunwell, Christmas, et al., 2011). The principal goal of monitoring usage therefore was to assess whether with only web-based promotion, and no direct investment in advertising, a career guidance

game could expect to attract a substantial audience. A secondary goal was to assess, through metrics of contact time and interactions with content, whether educational components such as videos were accessed and viewed.

The method chosen reflects a common challenge faced when assessing serious games. Commonly, they are selected due to their potential to address forms of learning at higher levels of Bloom’s established taxonomy (Bloom, Englehart, Furst, Hill, & Krathwohl, 1957), such as creativity and understanding. However, as well as being substantially more difficult to convey than simple knowledge based levels, they are equally difficult to assess. Consider for example, the difficulty in addressing subjectivity when assessing creativity, compared to the relative simplicity of summative knowledge-based assessment. Hence, evaluations of games must often seek to demonstrate impact through a combination of readily available measures of reach, for example number of downloads, with limited measures of efficacy, for example self-reported behaviour or understanding as a proxy for actual values.

RESULTS AND DISCUSSION

Survey results shown in Figure 3 demonstrated a positive reception amongst players. Figure 4 then shows the age distribution of the respondents. Though almost half (47%, n=91) of players stated they knew what career they were intending to follow before playing, 87% stated that playing the game had given them new ideas. The role of the game as a supplement, rather than alternative to existing careers guidance methods was reinforced by the fact that 93% of players has experienced prior guidance, although only 17% reported having “a lot of” prior guidance, and of the players, and of the players that has received prior guidance, 25% described it as not “very helpful”. 78% of players agreed that playing MeTycoon had helped them learned about which jobs might be available in the

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Figure 3. Responses to survey questions

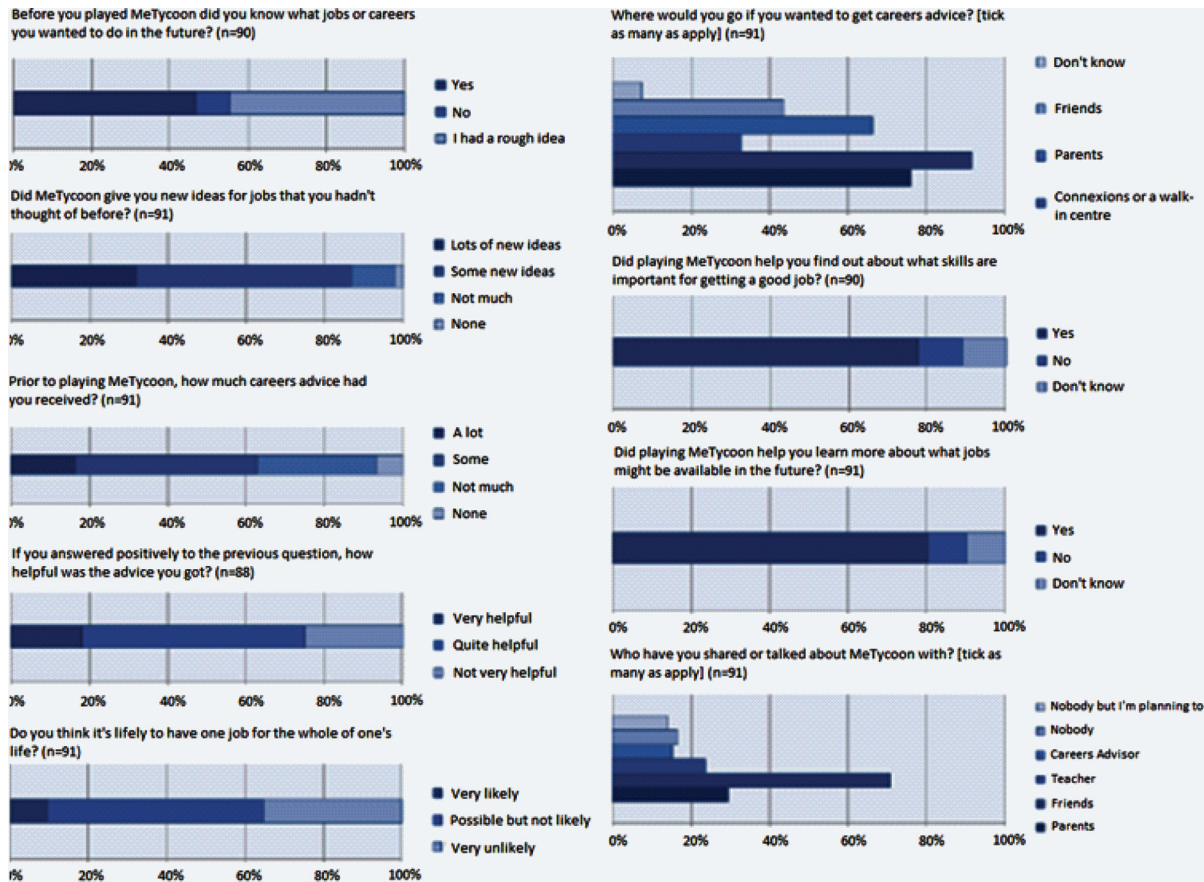
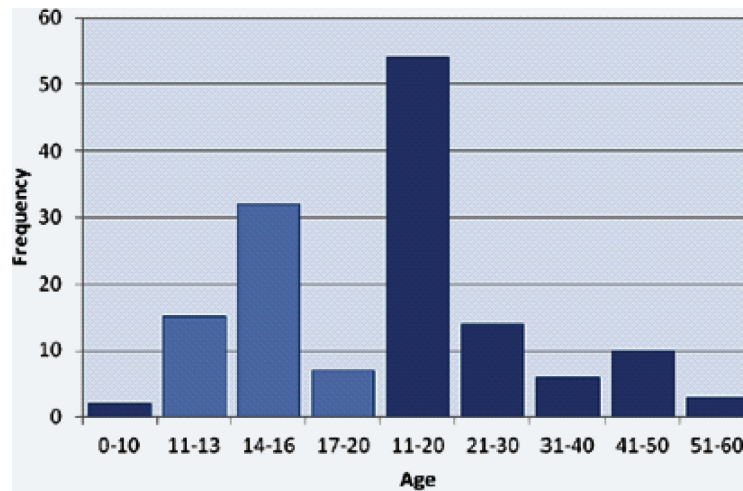


Figure 4. Age distribution of respondents (n=91)



future. A further positive finding was that 66% of players purported to have shared or talked about the game with friends, suggesting the game-based approach might have added value in stimulating peer discussions. The data also gave some insight into their current sources of guidance. 18% of respondents (n=91) said they had received “a lot” of guidance previously, with the remainder reporting between “some” and “none” (see Figure 3). Coupled with a question on perception of how useful this advice was, the evidence supports larger-scale evidence, including that behind the MeTycoon project, that current guidance can be improved. Within the limitations of self-selection and self-reporting, there is an early indicator across the questions in Figure 3 suggesting a positive reception and high perceived value for the game. A more compelling quantitative indicator, however, was the level of uptake and usage when deployed online, with 81,341 visits to the MeTycoon site. Geographic information obtained via IP address geo-location demonstrated 75.2% of 38,097 visitors to be from the UK, 18.4% from the US and 6.4% from elsewhere. Since the game itself is embedded into the web page, it can be assumed that players geographic spread was similarly distributed. An event trigger was embedded into the game to monitor their number of views through Google Analytics.

The average visit duration was 14 minutes 43 seconds, demonstrating the added value of the serious game in creating web content which is capable of retaining users beyond durations that might be expected of more static content. Similarly, the 38,097 unique visits were generated from a total of 81,341 suggesting a significant proportion of players were returning to the game for a second play-through. As the game was embedded into the web page and designed to load immediately on a site visit, these figures are equivalent to the duration of play for the game itself. Event markers were embedded into educational videos within the

game, in which professionals describe careers in live-action interviews, to establish some understanding of how frequently these core pedagogic elements were accessed. In total 408,247 video playbacks were triggered, demonstrating that this content was accessed and viewed extensively. This is an encouraging indication of how embedding pedagogic content in an interactive game might encourage and motivate users to view more conventional components such as instructional videos as part of the wider gaming experience.

Players’ individual comments were reflected upon in light of these quantitative findings, allowing for some qualitative insight into individual perspectives. The assertion that the overall approach proved effective in creating a gameplay model which was unhindered by the instructional content was supported by a number of positive responses from players on the nature of the game itself:

The game is fun as a game.

I loved this game and it’s not as if it’s like [sic] all boring and its fun and interactive.

The first of the above quotes is a commonly cited requirement of serious games (Zyda, 2005), and that players independently noted this trait appears encouraging. Players also praised the interactive elements:

The interactivity! Instead of searching around looking at skills needed for this and this, not only did I have a clear list [of]pf the types of skills needed for particular jobs, but also a video of a person in that type of job. That for me was very valuable and exactly what I was really looking for – an insight into jobs on a deeper level. The basic gameplay was fun and enjoyable, and it really opened my eyes to the wealth of jobs available out there.

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However, engagement must be coupled with learning transfer to ensure efficacy. Comments from players suggested that embedded videos were considered by many to be the key method of such transfer:

Its' when I watched a video that helped me and showed me that I jave [have] something [I] am talented at.

Given the high viewing rate the videos attracted, as noted in the previous section, this was again a positive response. The role of the game could be seen as providing an incentivized approach to content-management for these videos, as well as transferring information around themes such as required qualification and skills through the game-play model. In particular the videos were praised for the perspective they allowed viewers to gain into professions when compared with a more conventional instructor-led approach to career guidance:

The idea of people talking about their own jobs and experiences, not advisors talking about someone else's career.

I liked the fact that you had to get the right qualifications for a certain job. I thought that was quite helpful so I know what sort of path I need to talk in real life I want to have a job in a certain career area.

Whilst other games have been developed and deployed into schools or colleges for career support (Chiang, 2011), these are dissimilar to MeTycoon in their more limited use and integration of pedagogically-defined multimedia elements. The results of the study show that video content was well used, and the ability of using the game

to visualize future effects of jobs was notable. One user suggested showing more videos of people interviews at work, which would be an interesting addition to the game:

Informative and fun! I would like to see more videos of people at work, that is not just interviews, but a glimpse of their work situation and the achievements they make.

On a more critical note, some players did dispute the game mechanics and some of their implied choices. For these players, the gameplay mechanics and defeating the game appeared more important than the underlying pedagogic goals:

[...] the choice whether you woud[sic] like a family or not. I found I was losing money of keeping my family when, for the circumstances of this game, I didn't want one.

As a game, MeTycoon has a solid foundation and, at least initially, has engaging game play that made me want to finish the game.

In Table 1 we see a possible categorization of players into two types: the first group are searching principally for careers guidance and the second for an entertaining game. Such a distinction is evidenced through how the first group provided broadly positive comments and feedback, tending to focus on pedagogic elements such as the videos, whilst the second tended to focus more critically on game dynamics. Both these audiences are relevant to the game's objectives, though the latter may prove harder to reach in a meaningful fashion. Table 1 shows the categories most preferred by the respondents and how often the categories occurred in the answers. The feedback shows that in the majority of cases, the game was

Table 1. Categorisation of qualitative responses

Instances	Category
15	Choosing jobs & seeing the future effects
13	Careers advice & showing what qualifications are needed for what jobs
6	Comments on fun / engaging nature of the game
5	Generic praise
3	Life-action career videos
2	In-game graphics
2	Handling finances
2	Interactivity

perceived as fun and engaging. The two most popular categories related to careers advice, with these responses commenting positively on the game as a career advice tool.

CONCLUSION

Early stage design of a serious game can be a challenging process, as a result of both the wide range of potential designs, and lack of empirical evidence linking specific learning and pedagogical objectives to game elements. In the deployment and development of MeTycoon, this article has demonstrated the potential for serious games to reach sizable (n=38,097) audiences, without the need for direct investment in promotion. This is not necessarily to say games cannot benefit from such investment, for example Code of Everand achieved an audience of over 100,000 players through investment in online and television marketing (Dunwell, Christmas, et al., 2011), though in the case of Code of Everand online marketing was a route in for as sizable an audience as more costly television promotion. This contributes to a growing evidence base that serious games are capable of large-scale reach due to their intrinsic appeal and the ready availability of games deployed as web-based content. Furthermore, with more

detailed analysis of the usage statistics showing substantial average usage time (14 minutes 43 seconds), and 408,247 views of the embedded videos (an average of 10.7 views per user, or 0.74 views per minute). Considering the game as a vehicle to deliver these validated means of information transfer, efficacy was demonstrated in converting site visits to engaged users experiencing the targeted learning content.

Hence, a principal contribution of this study is a further demonstration that a serious game can reach a large audience without requiring investment in marketing, and stimulate a contact time beyond that which would be expected for static web pages. This is not ubiquitously true, with many examples of online serious games having user bases in the hundreds rather than tens of thousands. The focus on engaging gameplay and user experience adopted by MeTycoon is, based on users' self-reporting, a likely key contributor to this, as was the use of freely-available gaming repositories, blogs, and other social media to promote the game. Future research should address further this understanding, as for games which seek to capitalise on engagement and appeal to users, attracting and retaining these user bases is key. In particular, gaining an understanding of contact time required for educational outcomes, and offsetting this against evidence of time spent playing a game is of interest. Whilst evidence on efficacy and user's perceptions is positive, it must be taken within the limitations of the study, and the general difficulty in assessing the impact of careers guidance in concrete terms.

Hence, and as noted previously, gaining deeper insight into the users of serious games and the impact of game-based learning interventions remains a key goal for future work. Whilst studies such as that reported by this article are forming an evidence base suggesting games can work as means to convey learning content, measuring the impact of this content on ultimate behavioural goals remains a significant research challenge.

Towards this end, future interventions may be developed with deeper data capture methods embedded into the game to capture user information in a more fine-grained manner, whilst still adhering to ethical principles such as informed consent. The resultant data then has high value in informing both future interventions, in terms of linking learning objectives to game design decisions, and the continued, iterative development of the game itself. Such methods, as demonstrated by the reach of MeTycoon, have the promise of capturing substantial audiences as an innovative and engaging medium through which to achieve learning objectives.

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