

PLAYTAX: 'GAMIFYING' INTERNATIONAL TAX TEACHING

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ABSTRACT

This paper reports on the development and implementation of an online computer game, *PlayTax*, which was used in the University of New South Wales (UNSW) Business School course International Business Taxation (TABL2756 and TABL5583) for the first time in Session 1 2016 as a means of teaching general principles of outbound international tax planning. The idea for developing *PlayTax* was the product of several factors: general awareness by course staff of the pedagogic value of interactive and problem-based approaches to learning; survey data of employers that indicated a clear preference for students with 'soft skills'; a UNSW Business School policy of promoting teaching approaches that encourage critical thinking and analysis and utilise digital technology; and the positive experience and expertise of the School of Economics in the UNSW Business School in developing and using an online computer game in teaching first-year microeconomics.

PlayTax provides an applied learning experience for students, who are made responsible for determining international business decisions. These decisions enable students to establish operations across multiple jurisdictions, make capital funding decisions, and determine sales and pricing strategy – including the possibility of developing an e-commerce presence. Importantly, international tax rules overlay these business decisions, and act as decision-making parameters. The overall aims of *PlayTax* are to raise student awareness of some outbound international planning principles and to have students think critically about the structuring issues involved in international tax planning.

This paper begins by outlining the background context in which the game was developed and reviews the existing academic literature on the use of gamification in teaching. The paper then provides an in-depth discussion of the game itself: the process of developing and implementing *PlayTax*; lessons learned from the pilot testing; and the effect of the game on student performance in an assessment task. The paper concludes with an overall evaluation of the game, which found that *PlayTax* did not achieve the positive results in assessment that were expected. As such, plans for adjusting the game and proposed future developments are explored.

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I INTRODUCTION

This paper reports on the development and implementation of an online computer game, *PlayTax*, which was used in the University of New South Wales (UNSW) Business School course International Business Taxation (TABL2756 and TABL5583) for the first time in Session 1 2016 as a means of teaching general principles of outbound international tax planning. The motivation for developing *PlayTax* was the product of several factors: general awareness by course staff of the pedagogic value of interactive and problem-based approaches to learning; a UNSW Business School policy of promoting teaching approaches that encourage critical thinking and analysis and utilise digital technology; survey data of employers that indicated a clear preference for students with 'soft skills'; and the positive experience and expertise of the School of Economics in the UNSW Business School in developing and using an online computer game in teaching first-year microeconomics.

This paper begins by outlining the background context in which the game was developed. It discusses the existing academic literature on the use of gamification in teaching, where it notes a gap in the current research on the issue of whether student responses to gamification are related to their learning styles. Empirical studies examining whether gamification improves learning outcomes are also relatively limited, and have produced mixed results. The paper then provides an in-depth discussion of the game itself: the process of developing and implementing *PlayTax*; lessons learned from the pilot testing; and the effect of the game on student performance in an assessment task. The student response to *PlayTax* appears to be consistent with the current existing literature – that is, it yielded mixed results. While it appears to have improved student performance in some areas of the course, it did not yield as positive a response as was originally anticipated. By acknowledging the shortcomings of *PlayTax*, this paper adds to the existing literature, which is thought by some to have downplayed the weaknesses of gamification as a learning tool.¹ Additionally, proposed future developments and adjustments to *PlayTax* to overcome these shortcomings are discussed.

II BACKGROUND

The course International Business Taxation is a one-semester course taught by the School of Taxation and Business Law in the UNSW Business School as part of an undergraduate major in Taxation in the Bachelor of Commerce degree and as part of the Master of Commerce and Master of Professional Accounting (Extension) degrees.

For several years, one of the assessment tasks in the course has been an 'Outbound International Tax Planning' assignment. The assignment requires students to advise an Australian company that is seeking to make a direct investment in a foreign jurisdiction, which the student selects. Students are required to explain details of the client's business and of the investment proposal. The investment proposal must raise issues in two or

¹ K Seaborn and D Fels, 'Gamification in Theory and Action: A Survey' (2015) 74 *International Journal of Computer Studies* 14, 28.

more specified areas relevant to international taxation. Students are required to state whether their company is closely held or widely held and the composition of shareholding in the company. In particular, students are required to state whether or not a majority shareholding is or is not held by Australian resident entities. Students are required to advise the client as to how the investment proposal should be structured, to achieve the best overall tax result given the company's overall tax objectives and the wishes of significant shareholders. Students are advised that their research into the tax laws of the foreign jurisdiction need not go beyond the information contained in the CCH International Tax Planning Manual or country tax summaries contained on the IBFD Tax Research Platform. In addition, students are required to indicate to the client the areas in which taxation and legal advice should be obtained by a practitioner in the foreign jurisdiction.

Prior to 2016 students were advised of possible tax planning strategies for outbound international tax planning by in-class presentations, either by UNSW lecturers or guest presenters (typically international tax partners in Big Four Professional Services firms). Whilst students appreciated the 'real world' perspective of the guest lecturers, they were not always available during lecture time. The content of the lectures would also vary from semester to semester.

Over a period of years, academics from the School of Economics at UNSW Business School developed an online computer game called *Playconomics*, which they used to teach first-year microeconomics. This approach proved to be very successful and popular with students, and won awards for the School of Economics team. Following discussions with these academics and their program designers we decided to collaborate with them to develop an online computer game, to be called *PlayTax*, which we hoped to use to teach general principles of outbound international tax planning.

Developing *PlayTax* involved multiple meetings with the academics from the School of Economics and with programmers and game designers. Time constraints and the difficulty of explaining concepts to people from a non-tax background meant that the initial scenario we had planned had to be simplified. Moreover, we found that we had to make several simplifying assumptions that did not reflect reality. These simplifying assumptions are detailed in section four.

III GAMIFICATION LITERATURE

The literature on gamification as a method of teaching and learning is relatively young, with few well-established theoretical frameworks currently available.² This section first outlines the existing theoretical literature on gamification, then explores two key issues examined in this literature: whether gamification enhances learning outcomes and academic performance; and whether students perceive gamification favourably.

² J Hamari, J Koivisto and H Sarsa, 'Does Gamification Work? – A Literature Review of Empirical Studies on Gamification' (Paper presented at the 47th Hawaii International Conference on System Sciences, Hawaii, 6–9 January 2014) 6.

A The Theoretical Literature on Gamification

While the use of games for serious purposes has been applied in military, educational and business settings for millennia,³ the term 'gamification' is a relatively new one,⁴ and refers to the emerging trend to use consumer software that takes inspiration from video games in sectors spanning business, organisational management, in-service training, health, social policy and education.⁵

This paper is most relevant to the 'game-based learning' and the 'serious games' branches of the gamification of education.⁶ In this context, the term 'gamification' is used to mean 'the use of game design elements in non-game contexts',⁷ and 'the phenomenon of creating gameful experiences'.⁸ It facilitates 'a serious approach to accelerating the experience curve of the learning, teaching complex subjects and systems thinking'.⁹

As such, in a learning and teaching setting, gamification and simulation games aim to create an immersive world and an engaging journey to make the players feel like the activity has direction and meaning.¹⁰ This immersive world enables students to be the decision-makers in an artificial environment, and helps them to learn the consequences of these decisions.¹¹ This underlies the emerging popularity of gamification in education:¹² it supports and motivates students, which can in turn lead to enhanced learning processes and outcomes.¹³

The theoretical literature emphasises that gamification is supposed to be challenging, and focused on problem-solving rather than on the mechanics of the game.¹⁴ This element of problem-solving is a key part of these games.¹⁵ However, the theoretical literature on

³ E Halter, *From Sun Tzu to Xbox: War and Videogames* (Thunder's Mouth Press, 2006).

⁴ The term 'gamification' was used in 2003 by Nick Pelling, a game developer: A Marczewski, *Gamification: A Simple Introduction* (Andrzej Marczewski, 2013) 3; but likely coined in 2008 by Rajat Paharia: S Deterding, D Dixon, R Khaled and L Nacke, 'From Game Design Elements to Gamefulness: Defining Gamification' (Paper presented at the 15th International Academic MindTrek Conference: *Envisioning Future Media Environments*, Tampere, 28–30 September 2011) 9.

⁵ I Caponetto, J Earp and M Ott, 'Gamification and Education: A Literature Review' (Paper presented at the 8th European Conference on Games Based Learning, Berlin, 9–10 October 2014) 50.

⁶ Deterding, Dixon, Khaled and Nacke, above n 4, 10.

⁷ Ibid 10.

⁸ J Koivisto and J Hamari, 'Demographic Differences in Perceived Benefits from Gamification' (2014) 35 *Computers in Human Behavior* 179.

⁹ K M Kapp, *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education* (John Wiley & Sons, 2012) 13.

¹⁰ W Greijdanus, *Gamification and Literature: A Study of the Motivational Impact of Gamification as a Method of Teaching English Literature* (Master's Thesis, Linnaeus University, 2015) 26.

¹¹ T Sitzmann, 'A Meta-Analytic Examination of the Instructional Effectiveness of Computer-Based Simulation Games' (2011) 64(2) *Personnel Psychology* 489; L I Dobrescu, B Greiner and A Motta, 'Learning Economics Concepts through Game-Play: An Experiment' (2015) 69 *International Journal of Educational Research* 23, 26.

¹² See, for example, A Domínguez, J Saenz-de-Navarrete, L De-Marcos, L Fernández-Sanz, C Pagés and J J Martínez-Herráiz, 'Gamifying Learning Experiences: Practical Implications and Outcomes' (2013) 63 *Computers & Education* 380.

¹³ Kapp, above n 9.

¹⁴ Greijdanus, above n 10, 28.

¹⁵ Ibid 27.

motivation highlights two key features:¹⁶ first, a task must not be too hard or too simple to properly engage players;¹⁷ and second, rewards can have the opposite effect on the motivation of players if they are not perfectly tuned to the actual activity.¹⁸ Accordingly, a deeper analysis of the impact of gamification is needed because the perceived effectiveness of gamification may not translate into enhanced learning outcomes.¹⁹

B Does Gamification Enhance Learning Outcomes?

The guiding question in the gamification literature is: ‘does gamification work?’²⁰ This is generally measured by reference to behaviour-related outcomes, with studies yielding both positive and negative results.²¹

Even though there is an extensive base of publications evaluating the effectiveness of simulation games,²² and there are several theories that could help with this task,²³ there is not enough empirical evidence to confirm the impact of gamification on learning outcomes.²⁴ Rather, existing research finds that the educational impact of simulations is subjective at best and has no correlation at worst.²⁵

There is little empirical support for the proposition that simulation games are a suitable proxy for learning.²⁶ There is some research suggesting that simulation games are more effective in engaging students’ interest,²⁷ while others find that there is no statistically significant difference in the effectiveness of simulation games compared with the traditional mode of class delivery.²⁸ Accordingly, more evidence on the effectiveness of gamification in the education sector is needed, because while simulation games may

¹⁶ For a detailed theoretical framework on motivation, see *ibid* 10–21, and references cited therein.

¹⁷ *Ibid* 27.

¹⁸ *Ibid* 36.

¹⁹ ‘The simulation algorithms are opaque, thus the outcomes of the simulation are not easy to understand and interpret by the players’: F Bellotti, R Berta, A De Gloria, E Lavagnino, A Antonaci, F M Dagnino and M Ott, ‘A Gamified Short Course for Promoting Entrepreneurship among ICT Engineering Students’ (Paper presented at the 13th International Conference on Advanced Learning Technologies, Beijing, 15–18 July 2013) 32; see also, Caponetto, Earp and Ott, *above n* 5, 50.

²⁰ Hamari, Koivisto and Sarsa, *above n* 2, 3.

²¹ *Ibid* 3.

²² Dobrescu, Greiner and Motta, *above n* 11, 27, and references cited therein.

²³ See further: R D Tennyson and R L Jorczak, ‘A Conceptual Framework for the Empirical Study of Instructional Games’ in H F O’Neil and R S Perez (eds), *Computer Games and Team and Individual Learning* (Elsevier, 2008) 39.

²⁴ Sitzmann, *above n* 11; J Gosen and J Washbush, ‘A Review of Scholarship on Assessing Experiential Learning Effectiveness’ (2004) 35(2) *Simulation Gaming* 270; Dobrescu, Greiner and Motta, *above n* 11, 27.

²⁵ Gosen and Washbush, *above n* 24; Dobrescu, Greiner and Motta, *above n* 11, 24.

²⁶ Gosen and Washbush, *above n* 24, 272.

²⁷ B Manero, J Torrente, Á Serrano, I Martínez-Ortiz and B Fernández-Manjón, ‘Can Educational Video Games Increase High School Students’ Interest in Theatre?’ (2015) 87 *Computers & Education* 182. However, Manero et al also find that a guest speaker is more effective at engaging students’ interest than simulation games.

²⁸ M Wrzesien and M Alcañiz Raya, ‘Learning in Serious Virtual Worlds: Evaluation of Learning Effectiveness and Appeal to Students in the E-Junior Project’ (2010) 55(1) *Computers & Education* 178.

present a cost-effective alternative,²⁹ it remains unclear whether these games are appropriate substitutes for traditional lectures from a pedagogical perspective.³⁰

Further, the development process of simulation games has two key drawbacks.³¹ First, the preparation of simulation games requires a substantial time commitment for the final product to be effective.³² This presents the most significant barrier to using simulation games.³³ As outlined by Kapp, creating a simulation game that is both engaging and educational requires a substantial time commitment to develop, from the overall theme, to the story narrative and the scoring method.³⁴

Second, the literature suggests that business simulations are less efficient at teaching terminology, basic concepts and principles compared to traditional face-to-face lectures,³⁵ suggesting that gamification may be better suited to enhancing – rather than replacing – lectures.³⁶ This highlights that gamification may only be a complementary learning tool, preferred by some students,³⁷ rather than presenting a ‘silver bullet’ to enhance learning outcomes. Nonetheless, the theoretical literature suggests that, by enhancing motivation, gamification has the potential to outperform more traditional instructional methods.³⁸

Accordingly, the motivational potential of these ‘serious games’ is a key component in determining whether they are effective. Relevantly, modern motivational theory places part of the responsibility for motivation on the person tasked with the activity, ie the

²⁹ Dobrescu, Greiner and Motta, above n 11, 24.

³⁰ Ibid 24.

³¹ For completeness, there is some – albeit dated – literature suggesting that gender bias may exist in that male students may be more interested in digital games, see: K Lucas and J L Sherry, ‘Sex Differences in Video Game Play: A Communication-Based Explanation’ (2004) 31(5) *Communication Research* 499; V Venkatesh and M G Morris, ‘Why Don’t Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behaviour’ (2000) 24(1) *Management Information Systems Quarterly* 115. However, this literature is over a decade old and this position is likely no longer the case, as suggested by more recent studies: Dobrescu, Greiner and Motta, above n 11, 26.

³² J Lean, J Moizer, M Towler and C Abbey, ‘Simulations and Games: Use and Barriers in Higher Education’ (2006) 7(3) *Active Learning in Higher Education* 227, 231; Greijdanus, above n 10, 29.

³³ Lean, Moizer, Towler and Abbey, above n 32, 231; J Chang, ‘The Use of Business Gaming in Hong Kong Academic Institutions’ in J Butler and N Leonard (eds), *Developments in Business Simulation and Experiential Exercises* (Georgia Southern University Press, 1997) 218.

³⁴ Kapp, above n 9, cited in Greijdanus, above n 10, 29.

³⁵ A J Faria and W J Wellington, ‘A Survey of Simulation Game Users, Former-Users, and Never-Users’ (2004) 35(2) *Simulation and Gaming* 178, 191; Lean, Moizer, Towler and Abbey, above n 32, 227 and references cited therein; E Clarke, ‘Learning Outcomes from Business Simulation Exercises: Challenges for the Implementation of Learning Technologies’ (2009) 51(5/6) *Education & Training* 448, 450, and references cited therein.

³⁶ ‘Clearly cases, games, and simulations offer learners a richer and more robust view of the workplace environment than the traditional lecture, but it is also clear that even the lecture has a place in the learning cycle’: P M Saunders, ‘Experiential Learning, Cases, and Simulations in Business Communication’ (1997) 60(1) *Business and Professional Communication Quarterly* 97, 110.

³⁷ Dobrescu, Greiner and Motta, above n 11, 26.

³⁸ Sitzmann, above n 11, 510.

student. This brings to the fore the importance of active engagement,³⁹ and motivation originating from the students themselves.⁴⁰

C Do Students Perceive Gamification Favourably?

In general, students' perception of gamification is found to be a positive one, with increased motivation, engagement and enjoyment.⁴¹ Studies making these empirical claims are often gauging students' experiences of, and perceptions towards, various learning tools within a single course.⁴² However, academics such as Anderson and Lawton note that the existing anecdotal evidence and observational studies provide weak evidence for the relative efficacy of alternative pedagogies, so more rigorous experimental design is required.⁴³ However, few studies satisfy this criterion.⁴⁴

Emerging from the literature are three key considerations: first, different player types experience the same affordances differently; second, the novelty effect; and third, an immersive world is only possible with longer usage length. Each are dealt with below.

First, as observed throughout the literature, 'user qualities' tend to have an effect on attitudes towards gamification. In some instances, one player's behavioural response to a motivational affordance may be the opposite of another player's.⁴⁵ Different player types may experience and react to the motivational affordance of encouraging competition in opposite ways. For example, in a study by Hanus and Fox, the authors found that students taking part in the gamified course had lower motivation, which resulted in poorer academic performance.⁴⁶ This is in line with cognitive evaluation theory, which predicts that tangible rewards undermine intrinsic motivation, whereas praise enhances it.⁴⁷ Despite a plethora of studies noting 'user qualities', the gamification literature currently lacks a detailed analysis of how different learning styles – namely 'deep', 'surface' and 'strategic'⁴⁸ – are associated with varying student behavioural

³⁹ Sitzmann found that users in the simulation game group outperformed the comparison group, especially when they had unlimited access to the simulation game: Sitzmann, above n 11, 510.

⁴⁰ Greijdanus, above n 10, 17.

⁴¹ Hamari, Koivisto and Sarsa, above n 2, 4.

⁴² Dobrescu, Greiner and Motta, above n 11, 24, and references cited therein.

⁴³ P H Anderson and L Lawton, 'Business Simulations and Cognitive Learning: Developments, Desires, and Future Directions' (2009) 40(2) *Simulation Gaming* 193, 206.

⁴⁴ A notable exception is Dobrescu, Greiner and Motta, above n 11, 24.

⁴⁵ Hamari, Koivisto and Sarsa, above n 2, 6.

⁴⁶ M D Hanus and J Fox, 'Assessing the Effects of Gamification in the Classroom: A Longitudinal Study on Intrinsic Motivation, Social Comparison, Satisfaction, Effort, and Academic Performance' (2015) 80 *Computers & Education* 152, 159.

⁴⁷ J S Carton, 'The Differential Effects of Tangible Rewards and Praise on Intrinsic Motivation: A Comparison of Cognitive Evaluation Theory and Operant Theory' (1996) 19(2) *The Behavior Analyst* 237, 241. For a detailed literature review on strategies for enhancing motivation see: V Torres van Grinsven, *Motivation in Business Survey Response Behavior: Influencing Motivation to Improve Survey Outcome* (PhD Thesis, Utrecht University, 2015) 46–49, and references cited therein.

⁴⁸ See, for example, N Zepke and L Leach, 'Improving Student Engagement: Ten Proposals for Action' (2010) 11(3) *Active Learning in Higher Education* 167, and references cited therein.

responses to gamification.⁴⁹ This is a research gap that the authors will explore in subsequent papers.

Second, some studies caution that students' positive perception of gamification may be short term; their positive perceptions could be caused by a novelty effect and diminish over time.⁵⁰ This is of increasing concern if gamification becomes a more regular occurrence in university teaching – the novelty effect may be accelerated, with students losing interest at a quicker rate.⁵¹ Further, a study by Koivisto and Hamari, conducted across a range of age groups, found that the younger the user, the stronger the novelty effect, suggesting that younger users bore more easily than more mature users.⁵² This needs to be kept in mind by academics, particularly if gamification is taking place in undergraduate courses.

Third, academics such as Hamari, Koivisto and Sarsa note that regular usage is paramount in order to captivate the student's interest in an immersive world.⁵³ This suggests that ongoing interactions are preferable to one-off applications of simulation games. However, ongoing usage may not occur unless rewards are attached to continued participation in the game. For example, a study by Fitz-Walter, Tjondronegoro and Wyeth used a mobile event application to assist students starting university. One of the features of the application was an 'event check-in' feature, with students rewarded in the application each time they checked into an event, up to a maximum of three events. No further achievements were received if students checked in to more than three events. Once the three achievements were unlocked, the majority of students stopped using the check-in feature.⁵⁴ In any game design therefore, ongoing rewards need to be considered, whether they are in-game rewards or rewards in the form of higher student marks.

Accordingly, it is important to be cognisant of these three considerations when designing and evaluating simulation games.

⁴⁹ For example, the following papers attribute varying learning styles to varying outcomes but do not categorise and elaborate on this concept: C Dichev, D Dicheva, G Angelova and G Agre, 'From Gamification to Gameful Design and Gameful Experience in Learning' (2014) 14(4) *Cybernetics and Information Technologies* 80; Caponetto, Earp and Ott, above n 5.

⁵⁰ R Farzan, J M DiMicco, D R Millen, C Dugan, W Geyer and E A Brownholtz, 'Results from Deploying a Participation Incentive Mechanism within the Enterprise' (Paper presented at the Conference on Human Factors in Computing Systems, Florence, 5–10 April 2008) 10.

⁵¹ R van Roy and B Zaman, 'Moving Beyond the Effectiveness of Gamification' (Paper presented at CHI '15 Workshop: *Researching Gamification: Strategies, Opportunities, Challenges, Ethics*, Seoul, 18–23 April 2015) 3, <https://www.researchgate.net/publication/301659476_Moving_Beyond_the_Effectiveness_of_Gamification_Workshop_paper>.

⁵² Koivisto and Hamari, above n 8, 183. In this study, users ranged in age from under 19 (the exact age of the youngest participant is not given) to 59, with a median age of 28.

⁵³ Hamari, Koivisto and Sarsa, above n 2, 6.

⁵⁴ Z Fitz-Walter, D Tjondronegoro and P Wyeth, 'Orientation Passport: Using Gamification to Engage University Students' (2011) *Proceedings of the 23rd Australian Computer–Human Interaction Conference* 122, 125.

IV DEVELOPMENT OF THE GAME

PlayTax was developed over several months, with meetings held with colleagues from the School of Economics, game designers and programmers. The initial meetings were concerned more with the overall objectives and 'look' of the game. The points considered were: (a) the number of countries from which students would have the option of choosing; (b) the choices they would have in relation to business structure, financing, location of intellectual property (IP), and transfer pricing issues; and (c) the fictional product that students would be developing. The fictional product we chose was called 'Forever Mind' – a device that you could attach to your ear to store your memories.

We found that, at least for the initial pilot, several simplifying assumptions were necessary. We also found that we continually needed to explain issues to the programmers that we had taken for granted. We had anticipated that this would be the case with topics like tax treaties, Australia's controlled foreign company (CFC), foreign income tax offsets and transfer pricing rules, but also found that explanations and checks were needed for more basic business issues such as the relationship between sales and cost for transactions between related entities.

A major simplifying assumption that we made in the scenario overall was that the Australian company was foreign controlled and its objective was to maximise after-tax profits (with the tax objective to minimise its global tax). We had originally intended to have an alternative scenario where the company was controlled by Australian residents and that its basic tax objective was to minimise foreign tax. Paying tax in Australia (rather than a foreign jurisdiction) would result in franking credits and the ability to pay franked dividends (of importance to domestic shareholders). The alternative scenario will be the focus of the second version of *PlayTax*, which is being developed for use in Session 1 2017. This is discussed further in section seven of the paper.

A second simplifying assumption was that all outbound direct investments by the Australian company would be into wholly owned foreign subsidiaries. Investment via foreign branch operations was not permitted. This was partly due to the difficulty of calculating profits attributable to a branch and to the divergent views within the OECD on the old and new versions of Article 7 (dealing with the taxation of business profits) of the OECD Model Tax Convention on Income and on Capital. Other simplifying assumptions related to transfer pricing and the source of internet sales and other sales. Students were also allowed to relocate IP from Australia to a foreign jurisdiction without any Australian capital gains tax (CGT) consequences, which is clearly not reflective of 'real world' tax outcomes. Originally, we were not overly concerned about this, as the CGT consequences of shifting IP would be similar regardless of the foreign jurisdiction selected. Additionally, students were told in class that this is an assumption purely for the purposes of the game, and that in 'real world' scenarios CGT would need to be considered. Nevertheless, as discussed in section five of the paper, a number of students incorrectly stated in their assignment that IP could be transferred to a foreign jurisdiction without CGT consequences.

In the game, debt funding of foreign subsidiaries was permitted, but borrowing by the Australian parent company was not, thus avoiding the possible operation of Australia's outbound thin capitalisation rules. Attribution under Australia's CFC rules, foreign income tax offsets and exemptions for foreign dividends were all taken into account.

However, in the case of foreign tax credits, whilst the 'bottom line' result of the gross-up and credit mechanism was shown, the detailed application of the mechanism was not.

Students were given the choice of locating their manufacturing and IP in one or a combination of four fictional offshore countries: Freeland (a double tax agreement (DTA) country very similar to the US); Funland (a DTA country very similar to Singapore); Euphoria (a non-DTA country very similar to Hong Kong); and Nirvana (a non-DTA country very similar to Vanuatu). In addition to each country having different tax rules, they each had different manufacturing capacities and costs. Once students had set up their subsidiaries, they needed to decide how to sell the product (either through inter-subsidiary sales, independent agents in Australia, online sales, or a combination of these). The final step in the game required students to repatriate profits from their offshore subsidiaries back to Australia. Once profits had been repatriated, students were advised whether they had achieved the 'optimal' result, that is, whether they had maximised their after-tax profit. Whilst we considered making the objective of the game to minimise tax liability, we thought it was important for students to realise that tax is just one factor that a company will need to consider in their overall strategy. It is possible in the game to achieve a sub-optimal result even if the tax liability is nil, as after-tax profits have not been maximised.

After the basic structure of the game and the available choices were decided we then developed verbal and algebraic explanations of the costs, sales, expenses, profits, dividends and tax treatments of events that could conceivably arise in the scenarios that were open to students. The programmers then used the algebra we had developed to program the game to produce the results that we intended. Here we encountered numerous communication difficulties, resulting in many revisions to the programming. After Build 8 of the game we found that it produced a correct result in what we regarded as the optimal scenario, and at that point we decided to use it in a class setting as described in more detail in section five below. However, Build 8 still produced some incorrect results, as such, further debugging was necessary. For example, errors were found in the treatment of debt finance and in the treatment of Australian sales by a subsidiary located in a non-DTA country. Due to the issue identified in section four regarding students misunderstanding the ability to transfer IP without CGT consequences, this is now provided as a 'warning' in the game to specifically alert them to the fact that the 'real life' consequences would be different.

One additional issue, which will be addressed in future versions of the game, was that the game referred to a subsidiary located in a particular country merely by the name of that country. When tax paid by the various subsidiaries was presented, this produced the misleading impression that a subsidiary located in a no-tax jurisdiction was paying tax in that jurisdiction when in fact it was paying Australian tax. Eventually by Build 11 we formed the view that the game produced accurate results in all the scenarios that we were able to test.

The figures below show a selection of screenshots from various stages of Build 11 of *PlayTax*. They demonstrate the variety of decisions students need to make throughout the game, and a sample of results that can occur.

Before starting the game, students are given the option to design an avatar, where they are able to pick the gender, hair style, and clothing of their character. The character

shown in the figures below is the 'default' avatar, if no personalisation selections are made.

Figure 1: Initial email

When the game commences, students are presented with an email that explains the product they are responsible for manufacturing and selling, and their overall objective.

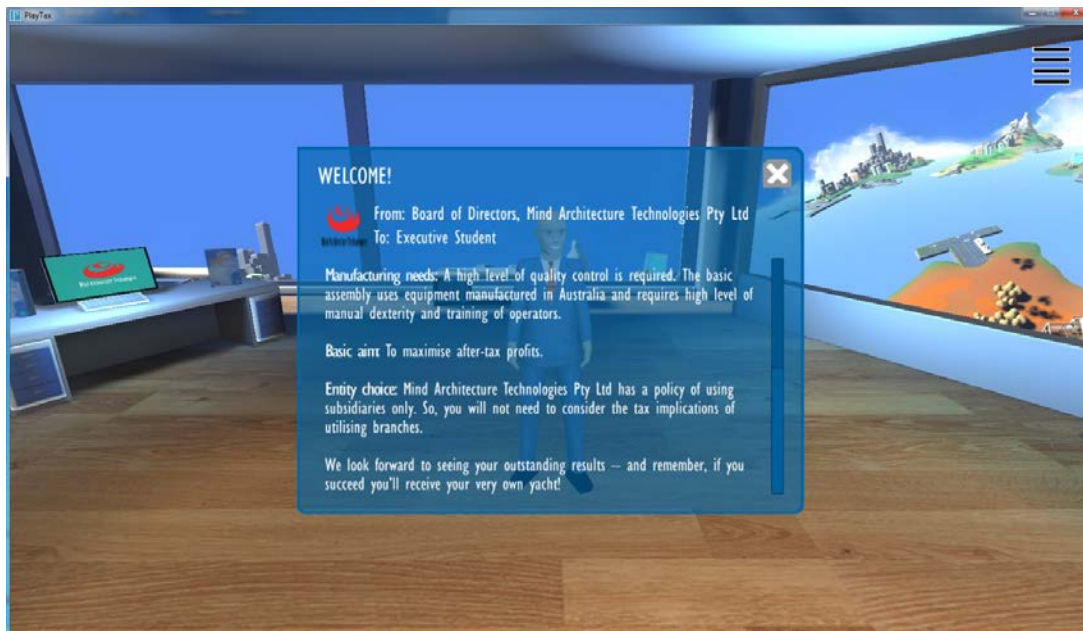


Figure 2: Mentor

After reading the initial email, a 'mentor' appears. From time to time throughout the game, the mentor will appear and give students 'hints and tips'. (For example, reminding students to consider thin capitalisation and CFC rules).



Figure 3: Auditor

Before any decisions are made, an auditor appears – students may be ‘audited’ if, for example, they breach the CFC rules.

The mentor and auditor characters are fixed, with their gender and other characteristics unable to be changed by the user. It has been noted in demonstrations of the game that both these characters (as well as the default avatar) are male. ‘John’ was chosen to be presented as the mentor as the lecturer in charge of the course, and the auditor was represented as a male due to the gender of the current Australian Commissioner of Taxation. Increasing diversity in game characters is something that will be considered in future versions of the game.

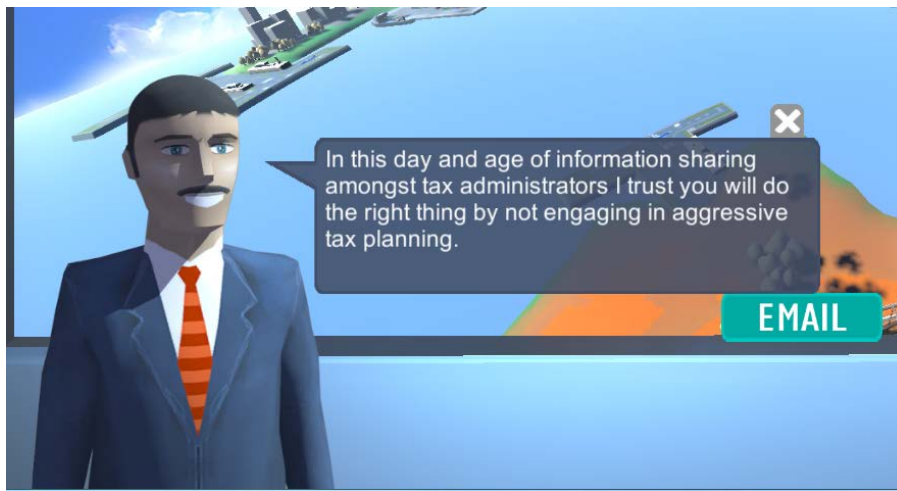


Figure 4: In-game personal computer: Island information

Students are encouraged to access an ‘in-game personal computer’, which provides them with the tax characteristics of the various countries (known as ‘islands’), such as tax treaty networks and withholding tax rates.

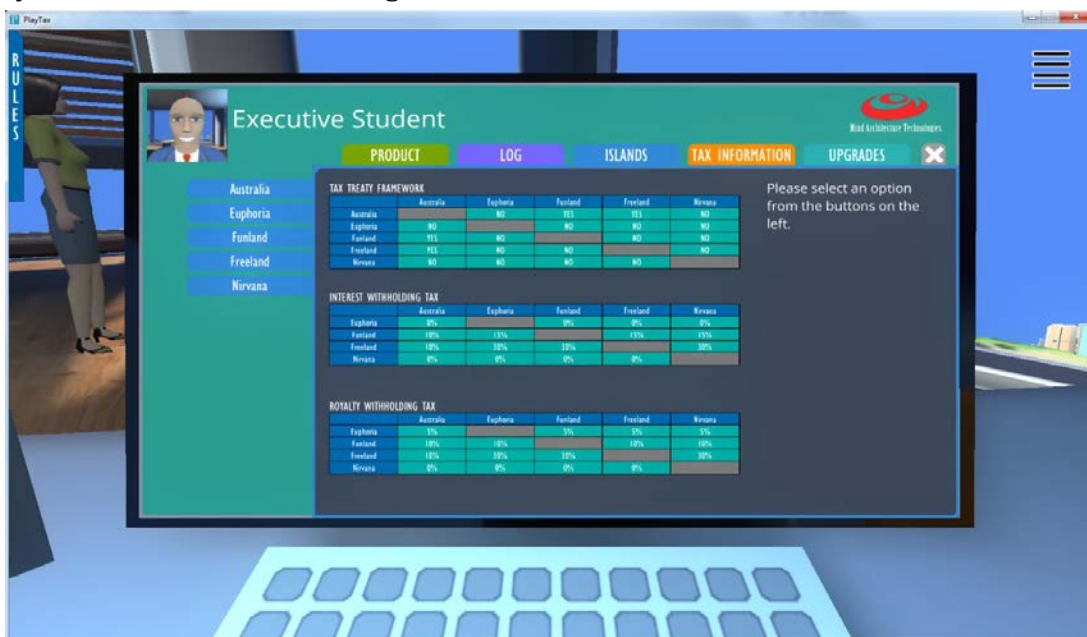


Figure 5: In-game personal computer: Textbook

Another feature of the in-game computer is that it provides a significant amount of course content. At this stage the content is limited to international tax issues that are relevant for the game.

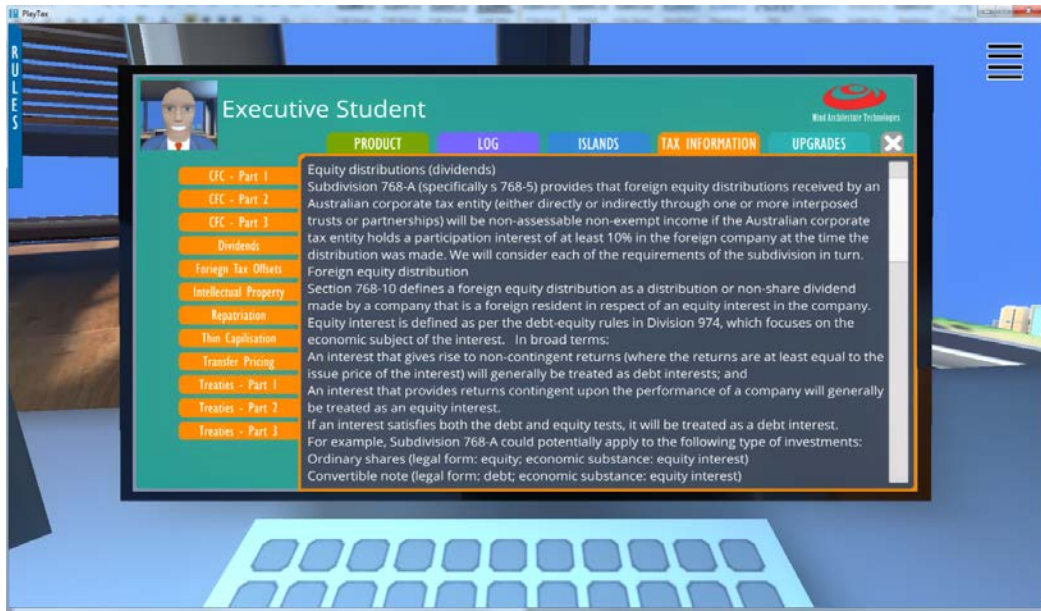


Figure 6: Tax information for specific islands

Students can select the various islands to see tax information (such as tax rate) and other relevant information (such as manufacturing capacity and costs).



Figure 7: Setting up manufacturing subsidiary

When a student selects the island in which to set up their manufacturing subsidiary, they are required to select the debt/equity funding mix.

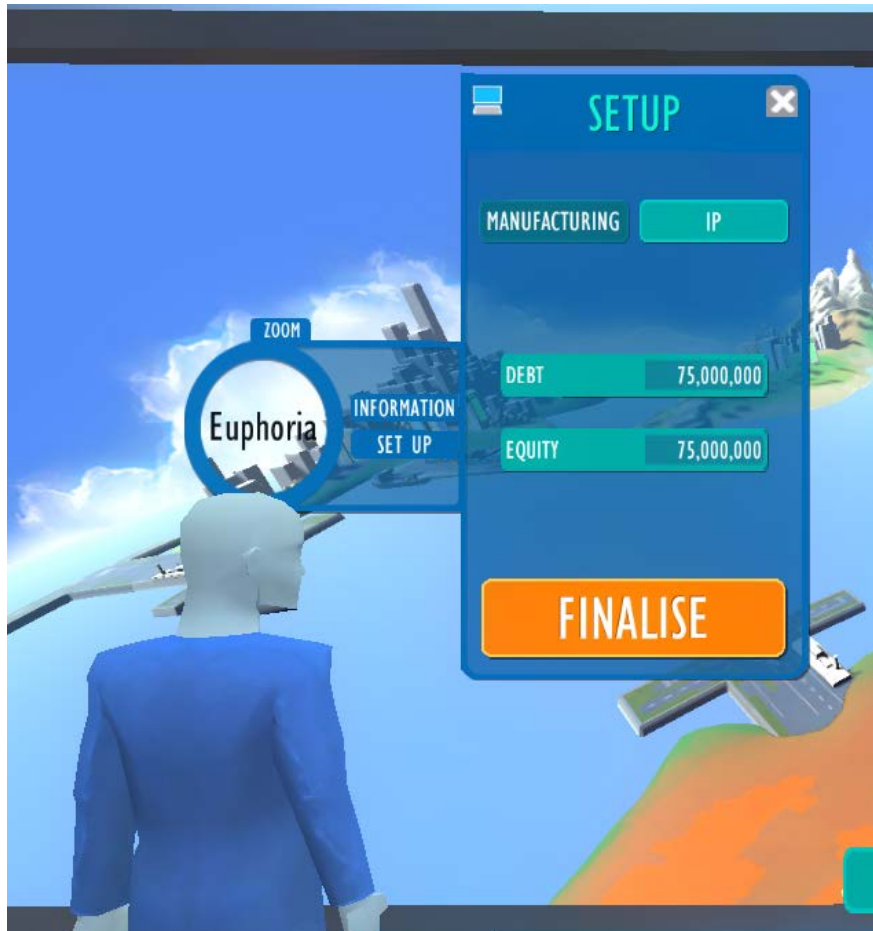


Figure 8: Thin capitalisation warning

Before a student makes a decision as to the level of debt/equity funding, they are reminded to consider the thin capitalisation rules. (Other 'warnings' will also appear throughout the game).

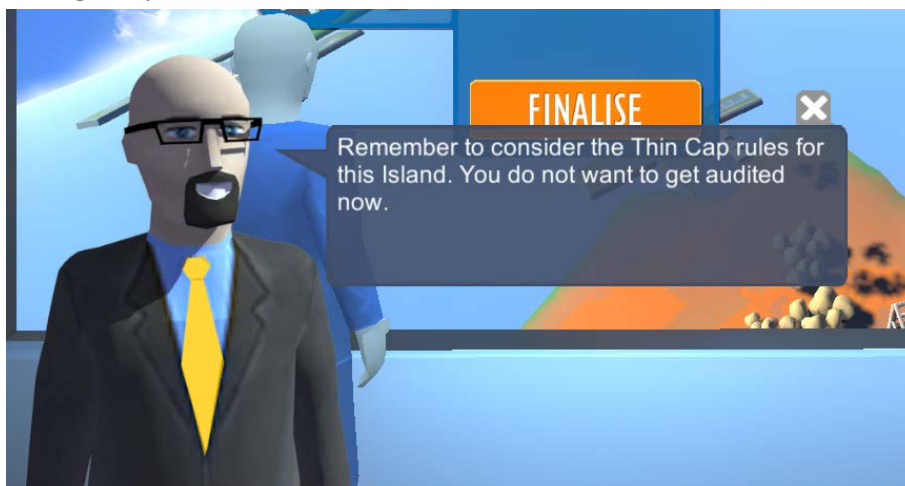


Figure 9: Setting up IP subsidiary

Students also select which island will hold the IP. This can either be the same island where the manufacturing subsidiary has been established, or a separate island.



Figure 10: CGT consequences

When students set up a subsidiary to hold the IP, they are reminded that in a non-game scenario, CGT consequences would need to be considered.

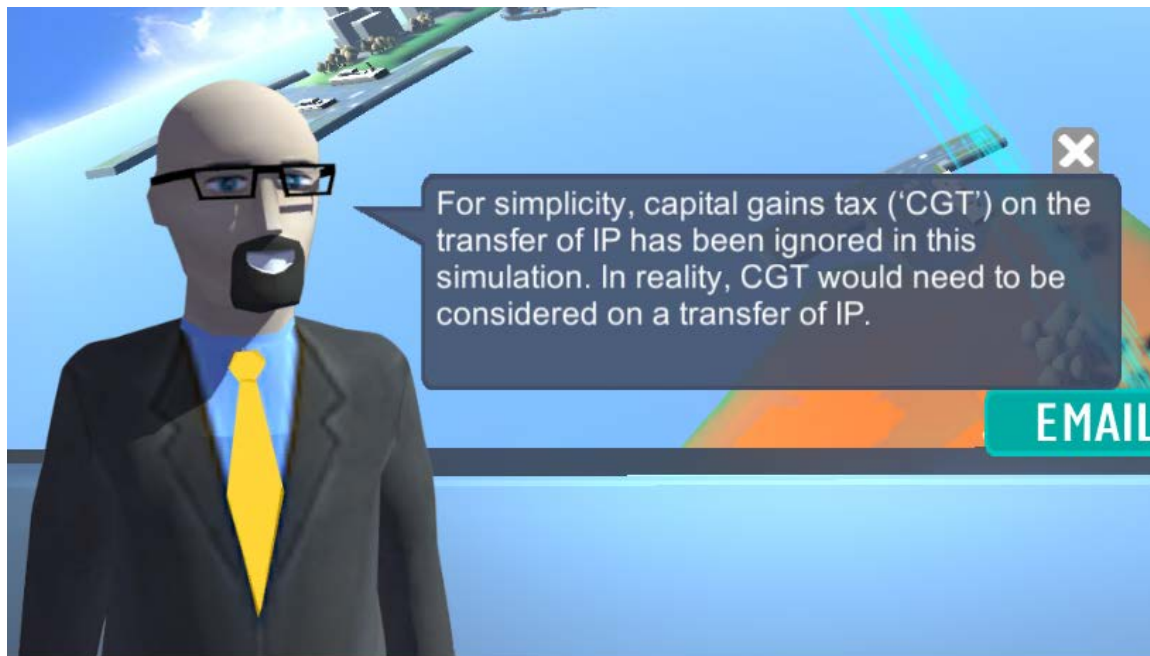


Figure 11: Sales mix

Once both subsidiaries have been established, students need to decide how to sell their product, and whether to charge management fees between subsidiaries.



Figure 12: Repatriation

Once the student is satisfied with their decisions, they can finalise the game by repatriating the profits back to Australia.



Figure 13: Optimal result

Once a student has confirmed that they want to finalise the repatriation, a tax summary report appears, and students are told whether they have achieved the optimal scenario.



Figure 14: Tax summary report

The tax summary report shows income, expenses and income tax for each subsidiary.

TAX SUMMARY REPORT					CFC RULES	
REPORT					Euphoria	
	Euphoria (Subsidiary)	Nirvana (Subsidiary)	Australia (Parent)	TOTAL	TURNOVER	\$360,000,000
COST	\$300,000,000	\$360,000,000	\$0	\$660,000,000	CHECK	0%
SALES	\$360,000,000	\$414,000,000	\$0	\$774,000,000	ATTRIBUTED	\$0
ROYALTIES PAID	\$18,000,000	\$0	\$0	\$18,000,000	ATTRIBUTED TAX	\$0
WHT ON ROYALTIES	\$0	\$900,000	\$0	\$900,000		
ROYALTIES RECEIVED	\$0	\$17,100,000	\$0	\$17,100,000	Nirvana	
INTEREST PAID	\$0	\$0	\$0	\$0	TURNOVER	\$468,000,000
INTEREST RECEIVED	\$0	\$0	\$0	\$0	CHECK	4%
MANAGEMENT PAID	\$36,000,000	\$0	\$0	\$36,000,000	ATTRIBUTED	\$0
MANAGEMENT	\$0	\$36,000,000	\$0	\$36,000,000	ATTRIBUTED TAX	\$0
ATTRIBUTED TAX	\$0	\$0	\$0	\$0		
INCOME TAX	\$990,000	\$0	\$0	\$990,000		
DIVIDENDS PAID	\$5,010,000	\$107,100,000	\$0	\$112,110,000		
DIVIDENDS RECEIVED	\$0	\$0	\$112,110,000	\$112,110,000		
AFTER TAX PROFIT	\$0	\$0	\$112,110,000	\$112,110,000		

SCENARIO **OPTIMAL** You have maximised your after tax profits

TRY AGAIN

Figure 15: Non-optimal scenario (1)

If a student has not maximised their after-tax profits, they are told their scenario is 'not optimal'.



Figure 16: Non-optimal scenario (2)

If students receive a non-optimal result, they are asked if they would like to try again.

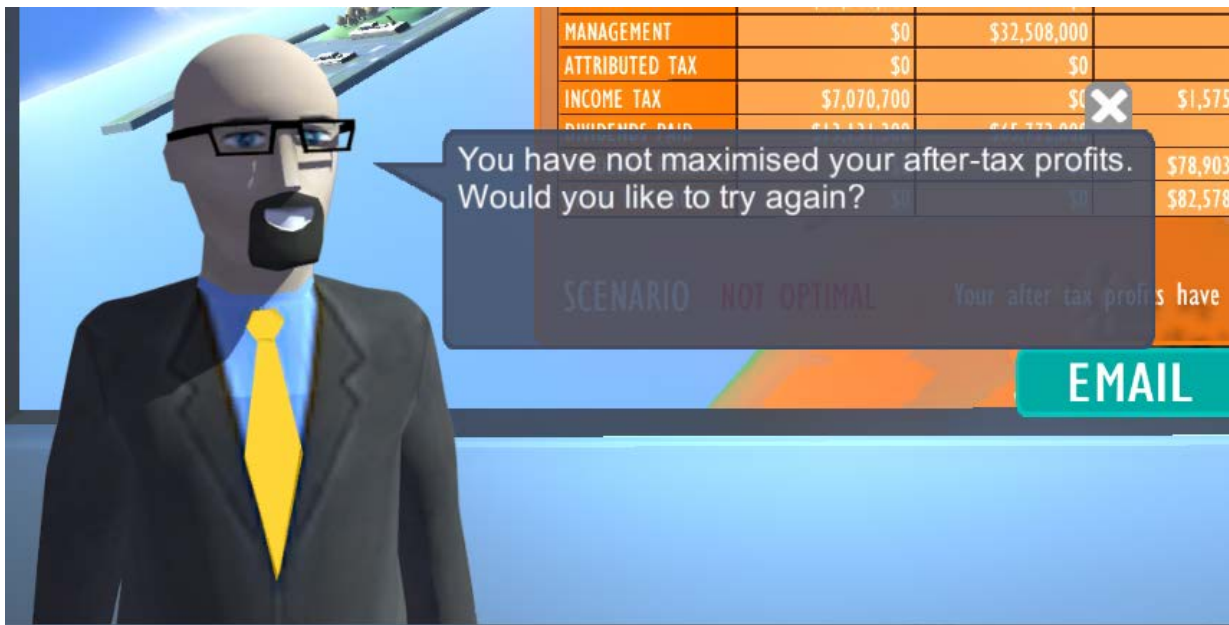
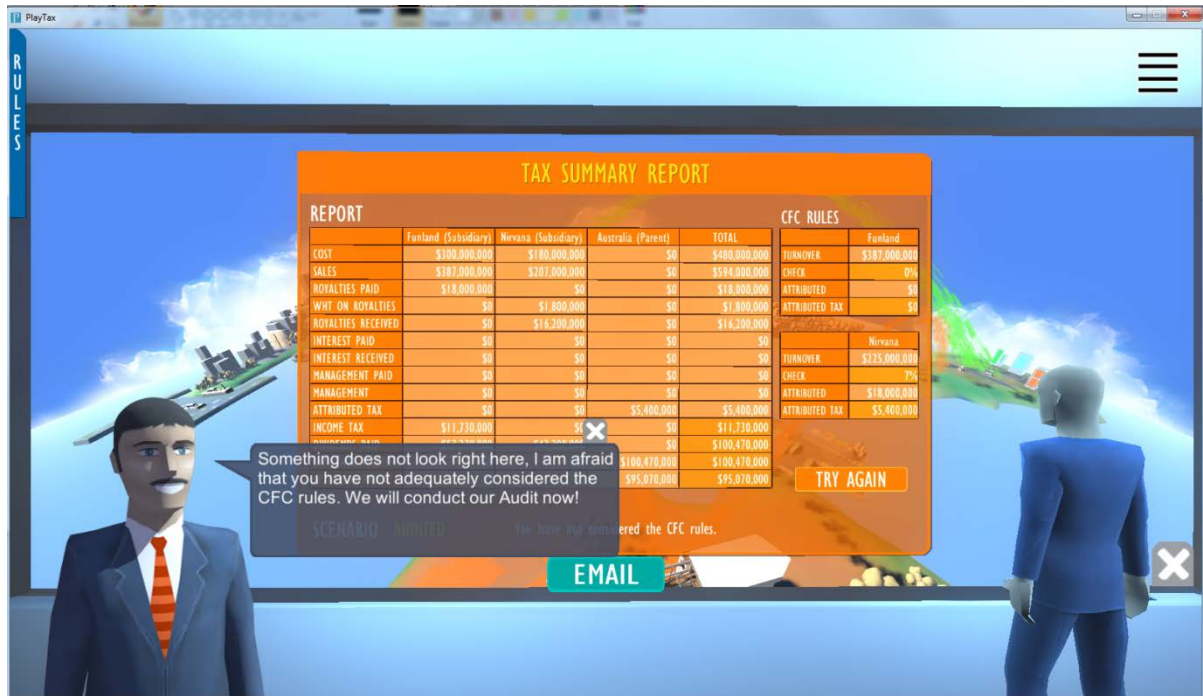


Figure 17: Audited scenario

The tax summary report also shows if income has been attributed under the CFC rules. If this occurs (or if the thin capitalisation rules have been breached), the auditor will appear to inform the student they are being audited.

**V LESSONS LEARNED FROM PILOT TESTING**

Due to the longer than anticipated time taken to develop the game, rather than allowing students to play it in their own time over Weeks 3 to 10, it was played as an in-class activity in Week 11. This proved to be sub-optimal, as students had to be shown in class what the objectives and rules of the game were and how the various features worked. The version of the game used still had false positives: in particular, producing incorrect results where offshore subsidiaries were financed wholly by debt. As such, we considered it would be unfair to award marks based on whether students achieved optimal outcomes in the game and instead gave each student who participated in the game five marks. After the students had all attempted the game we provided a debrief advising what we considered would be the optimal outcome and the reasons why.

Unfortunately, we did not implement a formal written evaluation by students of the game. However, paper course evaluations (known as CATEI) were distributed to students as part of UNSW's usual course evaluation process. The CATEI evaluations include a 'comments' section, but very few contained comments on the game or in relation to 'simulation games' (case studies used throughout the semester). The comments that were received varied significantly:

Simulation helped with understanding in a true environment.

Simulations were helpful and also meetings prior to help identify the main issues.

Some new and creative assessment.

Loved the simulation games – good application.

Helped to play games and work as a team.

PlayTax was not available until the second last week.

The teacher should take us through the course by explaining hard topics, but it just got wasted by boring games – like simulation & online games in the class.

Having more discussion about topics rather than so many games wasting lecture time.

Clearer instructions on simulation game and report.

VI EFFECT OF THE GAME ON STUDENTS' PERFORMANCE IN THE ASSIGNMENT

A total of 39 students submitted responses to the assignment in 2016. The average mark for the assignment in 2016 was 18.95/30. In 2015, 40 students submitted responses to the assignment and the average mark was 18.74/30. There were no significant differences in the assignment question asked or the information provided to students (other than the online game) in 2015 and 2016. In both 2015 and 2016 the assignments were marked online. The same academic marked all assignments in both 2015 and 2016. During marking, comments were made on assignments using the 'comment' function in Turnitin (a feedback and work assessment platform).

Two of the simplifying assumptions made in the game were unfortunately reflected in errors in student assignments. Several students assumed that they could move IP from Australia to another jurisdiction without there being any Australian tax consequences. Comments noting this error were made on 41 per cent of assignments. By comparison, in 2015 comments noting this error were made on 25 per cent of assignments. In addition, in 2016 several students assumed that a foreign subsidiary of an Australian company was a permanent establishment (PE) of that company. Comments noting this error were made on 28.20 per cent of assignments; by comparison, comments noting this error were made on 12.5 per cent of assignments in 2015.

The game was programmed to indicate when a strategy adopted by students produced attribution of income under Australia's CFC rules. The game identified CFCs, determined whether the 'active income test' had been satisfied, and calculated attributable income. We expected that playing the game would increase students' awareness of issues in relation to these topics. However, a significant percentage of students made errors of some kind in relation to the application of Australia's CFC rules. Comments noting errors in relation to Australia's CFC rules were made on 58.97 per cent of assignments in 2016; comments noting errors in this area were made on 35 per cent of assignments in 2015.

The game was also programmed to differentiate between the forms of unilateral relief from international juridical double taxation in Australian domestic law. Hence the game calculated a foreign income tax offset when profits were repatriated to Australia via interest or royalty payments, and treated active foreign branch profits and non-portfolio dividends as non-assessable, non-exempt income. However, the offset was not displayed as such, rather the net Australian tax payable (where relevant) was shown. Nonetheless we expected that playing the game might increase students' awareness of issues in

relation to these topics. On the contrary, one of the highest percentages of errors by students occurred in relation to forms of relief from international double taxation on repatriation of profits to Australia. Comments noting errors in relation to unilateral relief from international juridical double taxation were made on 64.10 per cent of assignments in 2016; comments noting errors in this area were made on 45 per cent of assignments in 2015.

In the game in 2016 students were able to determine whether to fund their offshore subsidiaries using debt or equity or a mixture of both. As the stated objective of the game was to minimise global tax the optimal result was produced by 100 per cent equity funding (as Australia would treat the dividends as non-assessable, non-exempt income).⁵⁵ In 2016 only 2.5 per cent of assignments contained comments noting errors in relation to the effects of debt and equity funding. This was one area where comments noting errors were significantly higher in 2015, at 20 per cent of assignments. This may be explained by the fact that, in 2015, the presentation by the lecturer on general principles of international tax planning, made the point that, where a company is owned by Australian shareholders, the dividend imputation system can mean that shareholders are indifferent to whether the company pays the full rate of Australian corporate tax or zero foreign tax. In those sessions the point was made that debt funding typically will reduce the foreign tax paid and increase the Australian corporate tax paid. In 2015 comments on this issue also included comments on errors in relation to the foreign income tax offset system and, hence, some of the comments could be classified as relating in part to misunderstandings of unilateral relief from international juridical double taxation provisions.

VII OVERALL EVALUATION OF THE GAME, PLANNED ADJUSTMENTS AND FUTURE DEVELOPMENT

Without a specific systematic survey of student responses to the game it is not possible to draw reliable conclusions on this issue. For this reason, as set out below, in 2017 a systematic survey of students will be made following the completion of the game.

The comparison of comments on student assignments in 2015 and 2016 may suggest some areas where the game affected student understanding of a technical issue. In all areas examined there were significant differences between the 2016 and the 2015 error count, with the 2016 count being higher in all areas with the exception of the effects of debt versus equity funding. The area with the highest error count in student assignments related to Australia's unilateral relief from international juridical double taxation. It is possible that this was due to the way foreign income tax offsets were handled in the game, with only net Australian tax payable being shown. Another area with a high error count in 2016 was in relation to Australia's CFC rules. This was somewhat surprising, given that the game identified CFCs, applied the 'active income' test correctly, and attributed relevant income to Australia and allowed a foreign income tax offset on attribution. A more granular analysis of the comments made on student assignments in 2015 and 2016

⁵⁵ The dividends would be classified as 'foreign equity distributions on participation interests' under the *Income Tax Assessment Act 1997* (Cth) sub-div 768A.

than has been made in writing this paper would be necessary to try to determine whether the significantly higher error count on this issue was related to the game or not.

Three areas of error that arguably may be related to the game were: (a) in relation to the transfer of IP; (b) assuming that a foreign subsidiary was a PE; and (c) in relation to debt or equity funding. As the game allowed students to transfer IP to a foreign subsidiary without adverse Australian CGT consequences it is conceivable that the significantly higher error count on this issue in 2016 may have been attributable to the game, giving students the mistaken belief that such transfers could be made without there being adverse CGT consequences. A possible link between students' poorer performance on the PE issue and the game is less obvious but still conceivable. The game only allowed students to set up foreign subsidiaries and made no mention of the PE concept at all. It may be that students were led into assuming that a subsidiary was the optimal choice, and then, having looked at Article 7 (business profits) of the OECD Model, assumed that for a source country to tax a subsidiary it had to be a PE of a foreign resident. Again, more granular analysis of the comments made on student assignments in 2015 and 2016 would be necessary to try to determine whether the significantly higher error count on this issue was related to the game. It is also conceivable that the lower student error count on debt versus equity funding issues was related to the game. As the game strongly showed that equity funding of offshore subsidiaries was optimal when the client's objective was to minimise global corporate tax payable, it may be that the lower error count on this issue was attributable to fewer students using any form of debt funding at all.

Version 2 of the game is being developed for use in Session 1 2017. We propose that Version 2 will include an additional scenario in which the Australian company is wholly owned by Australian residents with the result that it should be indifferent as to whether it pays the full rate of Australian corporate tax or zero foreign tax in relation to its offshore investment. This will mean that the game will need to take the effects of the Australian dividend imputation system into account. Given the student errors arising from the treatment of transfers of IP in Version 1, Version 2 of the game will account for the Australian CGT consequences. Consideration will be given to whether investment in overseas branches will be allowed. If so, we will most likely need to adopt the Australian version and interpretation of Article 7 of the OECD Model when the branch is located in a DTA country.

For Session 1 2017, our intention is that the game will be played in students' own time over several weeks (probably from Weeks 3 to 7), with feedback provided on various student choices either in the game itself or by lecturers in class or using online student feedback functions. To assist students in making more informed decisions the game will contain links to detailed online course materials that have been developed. Whilst Version 1 of the game contained some course materials that could be viewed on the 'in-game computer', we were limited to showing the information as simple text, and as such had to remove items, such as diagrams, that are often used to illustrate examples. An in-game advisor will remind students to read this material before making relevant choices. Version 1 of the game merely produced a 'pass/fail' result. Students were told either that they had maximised their after-tax profits or that they had not. Consistent with the motivational literature we propose to provide progressive feedback that praises students for good choices and informs them of the results of their choice so that the assessment (in the broader sense) is driven by decisions that students make rather than by the end outcome of their choices. We are also considering requiring students to critically reflect

on their performance in the game at the end of the semester, by, for example, discussing how their decisions in the game changed over time.

A pre-class survey of students will be administered to ascertain such information as: (a) the prior experience of the student with computer games; (b) the learning style of the student; and (c) the prior experience of the student with gamified courses. A post-game survey will also be administered, and relationships (if any) between the student experience of the game and the students' learning styles and prior experience of computer games and gamification will be examined. Student performance in the outbound international tax planning assignment will be evaluated based on lecturer comments on student assignments and these results will be compared with the results for 2015 and 2016 as set out in section six above.

VIII CONCLUSION

Any new forms of teaching or assessment bring with them both opportunities and challenges – gamification is no different. International Business Taxation was the first course in the School of Taxation and Business Law to use a computer game as a learning tool and a form of assessment, and we experienced numerous challenges throughout the development and implementation of *PlayTax*.

As outlined in this paper, the gamification literature to date is limited, but the challenges that have been identified by existing literature were consistent with the *PlayTax* development experience. First, a significant time commitment was required, particularly when it came to explaining the relevant tax rules to the programmers (and developing the algebraic formulae). We also did not anticipate the number of different builds that would be required before we were satisfied with the outcome. Each new build required testing to ensure previously identified errors had been corrected. Second, the literature noted that simulations are not necessarily the most appropriate tools to teach course concepts and content. Certainly, the errors in student assessment noted in section six of this paper highlight the fact that *PlayTax* did not improve student knowledge in a number of areas. Students appeared to accept the simplifying assumptions made in *PlayTax* as the correct taxation rules, even if they were told otherwise in class. This may be due to continued use of the game outside the in-class context, with students being exposed to the simplified incorrect rules on a more regular basis than the correct rules.⁵⁶

PlayTax did not have the positive impact on student performance in assessment that was anticipated. However, this finding in itself adds to the existing literature on gamification. Seaborn and Fels, in a survey on past literature on gamification, expressed concern that shortcomings of gamification may be downplayed, with studies that yielded negative results not being considered for publication (what they termed the 'file-drawer effect').⁵⁷ By acknowledging the shortcomings of *PlayTax*, we have identified potential reasons why the game did not achieve the desired outcomes. This allows opportunities for refinement

⁵⁶ D Rapp, 'The Consequences of Reading Inaccurate Information' (2016) 25(4) *Current Directions in Psychological Science* 281, 282.

⁵⁷ Seaborn and Fels, above n 1, 28.

in future semesters. We will continue to use *PlayTax* in Session 1 2017 and are developing an alternative scenario that changes the overall tax objective. In order to encourage student engagement and improve student performance, the game will be made available earlier in the semester. Students will then have the opportunity to play it throughout the semester as different concepts are explained, with ongoing feedback provided so students can reflect upon their performance.

The paper also highlighted the lack of empirical studies in relation to gamification, particularly in relation to differing student learning styles. The student response to *PlayTax* was mixed, but as noted, no formal evaluation by students of *PlayTax* was conducted. Going forward, surveys will be taken both pre- and post-game in order to gain a greater understanding of the student experience. This will allow us to make alterations to *PlayTax* in future semesters to better fulfil student needs, and will also contribute to the current research gap in gamification literature.

Gamification is being used in an increasing number of diverse contexts. Whilst some of these may be trivial, such as using gamification as a strategy by media companies to increase viewer engagement with television shows,⁵⁸ it can also be used to encourage 'individual socially sustainable behaviours', such as reducing energy consumption and monitoring health conditions.⁵⁹ As the use of gamification increases, it is of growing importance that these research gaps in the literature be filled, and that the literature presents an accurate picture of both its benefits and shortcomings.

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⁵⁹ Koivisto and Hamari, above n 8, 179.

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