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Games-Based Online Course Design: Prototype of Gamification for Online Tutors

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Abstract

With the ubiquity of interactive games in students' lives and the rise of gamified experiences across the web and mobile applications, online tutors and practitioners of technology enhanced learning have been inspired to incorporate games-based elements. This paper introduces a prototype of an online application that helps online tutors to embed gaming to design their online course. We developed a framework for online course leaders which explains how Wikis (as an online learning platform) can support students' learning, interaction, and sharing of knowledge in the online community. We are presenting a metaphor for the course design in a gameboard like "snakes and ladders". This metaphoric game enables online tutors to elaborate online interaction among their students. The game methodological design approach for this metaphoric game merges different pedagogical theories such as (socio-constructivism) with practice in online learning (Wiki) and gives the online tutor an idea about what theory/approach is used when selecting any technological tool or moving forward in the game. This framework could help tutors, educational institutions and students to use a common language with students to describe their teaching and learning activities. Primarily, it helps tutors to make decisions about learning activities, facilitate, guide and support students' communication and collaboration.

Keywords: Collaboration- Community of Practice -Motivation-Online course design-Games-based learning

Study Background

Although many students and education professionals are comfortable using technology outside of an educational domain, there is a gap between theory and practice when technology is used for academic attainment and fulfilment of instructional objectives (Gumbo, *et al*., 2012; Schmidt, *et al*., 2009). Hence, according to Smolin & Lawless (2011), through technology, teachers and students need to moderate the boundaries between academic environment and in communities. Therefore, this prototype, aims at softening these barriers and bringing gaming into educational environment to be designed by tutors and played by both students and tutors.

Upon embedding gaming for tutors and students, another challenge emerges explained by Bayne and Ross (2007), which is the technological gap between "digital natives and digital immigrants", terms invented by Prensky (2001). In the 21st century, use of technology in instructional pedagogy and curriculum have become requirements to be ready for this century. In order to reach this goal, it is important to develop a teacher's knowledge and competence who are competent in the use of technology to meet their students' needs. One of the 21st century technological endowment that students are immersed in games, explained by Posso (2016), because of the internet revolution, many students spend most of their time in playing online games. Therefore, in order to facilitate bridging the aforementioned gap, tutors have been inspired to incorporate games-based elements. Mainly, in this study, gamification for online tutors will be situated to design their online course. The objectives behind this embedding are; firstly, to shift the use of game from out of the class into the teaching and learning practices. Secondly, when tutors use gaming in the course design, they are using a common language with students to describe their teaching and learning activities. This common platform between students and tutors can help to bridge the gap of technology between the two. Thirdly, for tutors, involving them in the online course design, can help them to minimise the gap between theory of learning and practice of learning using technology. The prototype merges different pedagogical theories with practice in online learning, using virtual learning environment and highlights for the online tutor what learning theory/approaches used when selecting any technological tool and/or moving forward/backward in the game.

Games-Based-Learning (GBL)

Zyda (2005) describes pedagogy as any activity that educates and the challenge lies in making this activity subordinate to the game story. In other word, there is a game in each learning approach. GBL is the use of digital games with educational objectives as tools that support learning processes in a significant way (EU LLP, 2009). Studies in the field of GBL show a clear relation between playing digital games and learning. There is a number

of arguments in favour of digital games as learning tools (EU LLP, 2009). Rivera (2016) confirmed that GBL enhances students' motivation for learning because of their engaging nature. In details, when students have fun, the learning pressure starts to disappear, they are challenged and the challenge usually increases as long as the game goes on and engagement is augmented. The perceived engagement allows them to freely define and modify their strategies according to their learning objectives and goals. Therefore, players keep on improving their skills and learning new strategies until the game is completed.

Among the negative critiques that are associated with GBL is that it promotes isolation and anti-social behaviour for players (Rivera, 2016). From this stand, Bhargava (2016) stressed that GBL needs to include social engagement in its design to minimise the social isolation that students might have. Therefore, it is one of the adapted approaches in GBL, to allow two or more players in the game design. In the proposed prototype, as educators are the game designers, the design is aligned with the theory of socio-constructivism where knowledge is socially mediated (more details about this theory in the section "Theoretical Basis for Games-Based Learning Design").

Another feature of GBL that it is remarkably aligned to good learning because it provides short feedback cycles. Research on learning and behaviour shows that students learn faster when there's a shorter interval between behaviour and reinforce (feedback in the education scenario) (Rivera, 2016). This allows players to explore the game environment freely, trying out their suggestions, learning by "Try and Error" method and getting immediate information. Worth to mention, from safety view, players can use the obtained information from the game to redefine wrong assumptions in a risk-free environment. This characteristic is well aligned with educational requirements, given that most educational approaches require the educator to provide students with feedback about their achievements. Nevertheless, in traditional educational approaches where the tutor usually has one-to-one feedback, ultimately there is a significant delay until students can receive the appropriate feedback. For Lowe (2012) delayed responses from tutors to students can discourage students, even may increase levels of stress for some students. Hence, GBL instant feedback can help to reduce feedback delay tremendously. In this sense, GBL can provide meaningful learning experiences by simulating highly interactive scenarios that professionals encounter in real-world settings. GBL challenging, engaging and competitive features represent a good medium to promote active learning and improve students' problem-solving skills and not only relying on memorisation.

Tutors and Games-Based Learning

With games fantasy element that engages players in a learning activity through a storyline, tutors have been inspired to incorporate games-based elements. However, Moore-Russo *et al.*, (2018) noticed a lack of research focused on the design of gamified online courses. We claim that there is similar lack of research that focuses on the design of gamified online courses by tutors themselves, addressing benefits, challenges and opportunities of being designers for their games-based learning course. Reasons behind this paucity of research in this area are not clearly identified. It can be because of lack of tutors' technological competence to design an online course (Maksym, 2005), or the strategic separation between the online course design by developers and the delivery of the course by online tutors (Holems and Gee, 2016). In the following section, benefits behind the design of gamified online course by tutors, are highlighted.

Knowledge of Learners

GBL are designed in order to balance the subject matter with the gameplay and the ability of the learner to retain and apply the subject matter to the real world. GBL uses competitive exercises, either putting the students against each other or getting them to challenge themselves in order to motivate them to learn better (Holmes and Gee, 2016). In this context, it is the tutors' strategic approach of the game and their knowledge about learners to decide: how, when and for who to embed and design the game. As according to Vlachopoulos and Makri, (2017), in order to design GBL, learning goals (i.e. knowledge acquisition), subject discipline, strategies and approaches (i.e. linear) and description (i.e. decision making), need to be identified. Consequently, if the tutor is the game designer, GBL can fit into the purpose behind using it more effectively, as ultimately, tutors' knowledge of the course objectives, outcomes and learners are wider than the course designers who can be technology practitioners only.

Borrowing game designs

Another challenge that is confronted when tutors borrow game design from pre-developed game (i.e. market saleable game), this challenge is related to the achievement of learning outcomes. In some cases, tutors select GBL as learning approach to achieve certain objective. For example, objective (1) freedom to fail, by allowing

students the freedom to fail with self-directed or unplanned progression through tasks that allow for exploration. Rewards are used in connection with student-selection of tasks to provide students (Lee and Hammer, 2011). Objective (2) giving students a sense of control while promoting challenge, curiosity, and contextualization to trigger students' internal motivation (Rogers *et al*., 2012). Another example, that might use GBL with no clear objective, where tutors are displaying a screen shot from the game, draw a parabola (game goal) over the image, and then launch into a lecture without connecting how understanding parabolas can impact and improve game play (Moore-Russo *et al*., 2018). The aforementioned examples are based on borrowing games-based design to achieve specific objective(s) which might not align with the holistic aspired learning outcomes (Ke, 2009). Consequently, the potential for disconnections or misalignments between the learning objectives and the gaming context increases.

Knowledge of theoretical educational design

The challenge facing GBL design is how to integrate the learning objectives into the game in a way that goes beyond making the game enjoying and engaging for the educational purposes. Egenfeldt-Nielsen (2005), describes the problem is the lack of connection between the learning theory and the game-play. Moreover, according to Moore-Rosso (2018), GBL is teaching-learning strategy composed of software applications or products that use games for learning or educational purposes. In other words, GBL design is based on theoretical educational design, not technological knowledge solely. Therefore, when tutors are the GBL designers that facilitate the Integration between teaching and technology and bridging the gap between them.

Paradigm shift of tutor's role to be GBL designer

For tutors to be GBL designer, according to Chwif & Barretto (2003), it requires new set of skills and paradigm knowledge shift. The shift affects the teacher by changing the learning from being teacher-centred to being student-centred (Rogers, 2004). For Chwif and Barretto (2003), this shift changes the role of the teacher when using games from being an agent transmitting knowledge to becoming a promoter who enables learning. Table 1, gives a comparison between conventional teaching and game based teaching. This table presents the shift in tutors' and students' roles, their motivations and the course content with the existence of game and without.

Paradigm	Conventional	Simulation Games
Teacher's	Role Agent	Promoter
Student's Role	Receptive	Active
Contents	Predominantly	Theoretical Real
Motivation to Learn Contents	Sequence Curiosity	desire to solve a problem

Table 1:Comparison between conventional teaching and games-based teaching (Chwif & Barretto, 2003)

The above table endorses Rogers' *et al* claim (2010) that positions the implementation of interactive activities such as games and simulations when students are placed in the centre on their learning. That implies changes in the tutor's role paradigm (Barr and Tagg, 1992) and skills (technology, content, pedagogy knowledge-TPACK model for Shulman, 1986)

Theoretical Basis for Games-Based Learning Design

The game prototype design goes through four theories of learning: behaviourism, connectivism, socio-constructivism and community of practice, are explained in the following section.

Behaviourism is based on a stimuli-response pattern for conditioning behaviour to become automatic (Piaget, 1967). This theory focuses on objectively observable behaviours and discounts any independent activities of the mind. For behaviour theorists, as learning is the acquisition of new behaviour based on environmental conditions. Consequently, from gaming perspective, there is a concern from disconnection between the game and learning (Maddock *et al*., 2009). However, for the proposed prototype, in the initial phase of the game (step 1-4) (see figure 2), behaviourism as learning theory is implemented, where it is teacher-centred approach with no student engagement or embedded activities.

Connectivism, for Downes (2012), knowledge is distributed across a network of connections (formed by actions and experience). Learning counts on the students' abilities to construct and traverse those networks and they learn when they undertake activities and conduct practices. Mallon and Gilstrap (2014), critique connectivism that it can lead to some educational chaos as an open-ended process. However, keeping the fact of flexible

online learning environment, the applied framework in this paper guides tutors to support their students to be able to manage that complex and rapidly changing environment (see figure 3).

Socio-Constructivism

Constructivist learning theory in which students construct their knowledge (Zain *et al*., 2012). The idea is that learners construct their own understanding of the world in the form of rules and mental models which they use to make sense of their experiences (Semple, 2000). The goal is to immerse the learner in a virtual world like the real world and allow learning to take place in a natural way. Socio constructivism is derived from constructivism, for Vygotsky (1978) knowledge is socially situated and it is constructed through interaction with others. This theory emphasises the need to scrutinize the tools used as mediating activities. Atherton (2010) explains that social constructivism presents the idea that the learner is actively involved in a joint collaboration with both tutor and peers to create new meaning. It is related primarily to the social theory of constructivism which is laid down by Vygotsky (1978), and highlights the importance of social community in learning as well as increases the importance for learners, when learning, to be actively involved in a joint enterprise with tutor and peers. Egenfeldt-Nielsen (2005) gives the examples of reading, writing, or hearing which use language as a tool. In the proposed prototype (see figure 5), in steps (9-12), socio-constructivism as learning theory is implemented, where different approaches and tasks that tutors can elaborate to mediate learning through discussion, reflection, and analysis in a social context.

Community of practice

Wenger (2006) presented the model of communities of practice (CoP). These communities are formed of people who are engaged in a collaborative process of learning; they practise activities to pursue their common tasks. These communities develop their practices through various activities, such as problem-based learning (PBL) and activity-based learning (ABL). This theory suggests that learning starts at an initial understanding then moves to testing that knowledge and finally ends at building a more refined understanding. The cycle comprises of four steps: understand a system, have a goal, receive feedback, and update knowledge. In the proposed prototype, step 12 (see figure 4), CoP as learning theory is implemented, where students are engaged to pursue a collaborative project/task.

Which theory to be used?

Becker (2006a) points out the difficulty and argues that retrofitting one learning theory onto a successful game is possible but tricky, the challenge faces game design is how to integrate the learning objectives into the game in a way that goes beyond making the game a sugar-coating for the educational purposes. Therefore, according to Murphy (2016), despite the problems with theories in enabling the construction of suitable teaching methods, these theories remain a helpful tool to gain insight into the more practical methods to explain how the different elements of the game are going to influence the learner. Consequently, combining elements of different theories to form another is vital role for theory building. Becker (2006) cites the example of the movie industry that has been around for 100 years but has no sure-fire formula to create blockbusters. We might add to Becker's view (2006a) that embedded theories within GBL design might not be "one size fits all". Elements such as: learning objectives, outcomes, knowing learners and individual differences between them, can lead to the selection and embedding various theories of learning in different sequence.

Methodology

This framework introduces an understanding of Wiki as an example of an online collaborative learning environment. Wiki is closely aligned with the social-constructivist approach and is more natural than many tools where open collaboration and exchange of ideas are important. However, tutors and course administrators have the freedom of choice to select different online learning tool or Learning Management System (LMS) (i.e. Moodle) that can help them to achieve their learning goals and address the planned pedagogical plans. Worth to denote that the applied metaphor is inspired from the work of Cummings and Barton (2008), which is originally created for understanding how wikis can support the creation and maintenance of learning communities. However, the proposed framework in this study adds the lenses of pedagogical theories and approaches that are underpinning each block in the framework.

The framework is presented as a board-game metaphor like "Snakes and Ladders", where course leaders are the "players". Tutors advance by one square every time they complete a task to empower their students and engage them in the online community. Every four tasks the tutor is able to "level-up", moving between different pedagogical theories and approaches. The premise of this research is based on the use of a 'learning design'

construct as the key tool to support the game design process. The research vision is to embed this specific support tool within a learning management system such as Blackboard, then, each tutor can design his/her games-based course according to the course needs and requirements. The blow diagram illustrates the sequence of the game that online tutors follow highlighting different feedback checkpoints.

Discussion of Game Design

Figure 1: Gameboard of a metaphoric game for online course design

The gameboard (framework) illuminates three phases: (1) planning; (2) establishing social interaction and (3) sustaining social community. Throughout the game and before starting each phase, there is a student feedback checkpoint and the tutor has the choice to add more checkpoints, if needed. There are two reasons behind these checkpoints. Firstly, to assure the principal of shared responsibility and collaboration between the members of online community (students and tutors), as according to Troisi (2014), student feedback opens the opportunity for more frequent feedback and shared responsibility for course success. In addition, it facilitates course tutors to be more iterative, dynamic and to fit the needs of their students. For Kim (2006), different feedback checkpoints in the online learning environment reflect a successful community building. In details, it is essential in the planning and designing of online course to reflect the student' needs, views and suggestions. Secondly, numerous feedback checkpoints and responding to them, add the feature of flexibility to the gameboard, as the outcome of a checkpoint can be "snake" where the tutor may find that leaping back is a requirement to work on an area of improvement or "Ladder" to move forward and achieve progress. The following section details the three phases of the framework.

1. Planning

Figure 2: Planning phase in the gameboard: Block 1 – Block4

The framework starts after the determining the course aims and objectives by tutors and/or course administrators. The first step (*Block1*) in the framework starts by knowing learners through many methods (i.e. one-to-one interview, VARK online test (Fleming, 2006)). According to Turner-Bisset (2001), the objective of knowing learners is that tutors will be able to contextualise the knowledge of learning theories and how a particular group of learners would respond and behave. Another pedagogical benefit for knowing learners that it enables tutors to present their lessons in a manner that suits all learning styles, learners' needs and preferences (Skvorak, 2013). The player (tutor) proceeds to the next two blocks; Block 2 determines the pedagogical plans and Block 3 determines technological plans that suit the different learning needs and pedagogical plans that have been identified in *Block1* and *Block 2* respectively. Referring to the design of online learning community, Kim (2006) addressed that, investing too heavily in a technological and educational platform that can't be easily changed or updated, is one of the most common mistakes in designing the online

community. Croft *et al*., (2010), refers to flexibility as a feature in the online course design according to the nature of this environment, as technology tools and internet search capabilities are expanding the scope of learners' choices and preferences, leading to constant change in their individual goals and learning objectives. Therefore, the design in this stage is recommended to be simple, flexible and well-focused. The pedagogical theory underpins this stage is "Behaviourism" (Piaget, 1967), and this is sought to prove that behaviour could be predicted and controlled. The applied approach is teacher-centred, where student's voice is controlled and the paradigm reflects knowledge transmitted from tutors to the students. However, an advantage for this applied metaphor of "Snakes and Ladder" is that, if the tutor finds a required change in a previous block and leaping ahead is not recommended, he/she can fall back into earlier phase and go ahead again following the sequential blocks. In *Block 4,* tutor proposes different frameworks for Wiki designs that can address different learning needs and are associated with numerous pedagogical and technological plans.

2. Establishing social interaction

Figure 3: Establishing social interaction phase in the gameboard: Block 5 – Block 8

At this phase, students experience using and interacting with Wiki in *Block 5* and going through a feedback checkpoint. At this point, students' voices reflect their initial feedback about the proposed framework to confirm their perception, understanding and interaction with their Wiki without barriers.

Connectivism is the learning theory that is supporting this phase. For Downes (2012), learning is no longer an individual activity and knowledge is distributed across networks of: individuals, information, experience, etc. *Block 6,* underpins the production of interpersonal relations and the circulation of communication between the online learning community. Social interactions are a "guided doing", students organise their individual behaviours, social positioning, self-presentation and emotional expressions. However, connectivism as integration of principles can be explored by chaos, network and complexity (Mallon and Gilstrap, 2014. Siemens (2004), raises an enquiry that when learners are equipped with many options within networked connectivism, it is difficult to determine how or whether they are motivated and empowered for individual and autonomous decision making. For Dron (2007), lack of autonomy has engendered some frustration for both learners and facilitators. Dewey (2011) considered both empowering learners to make decision within learning and the students' ownership of the learning, are important elements in the online environment to get engaged and motivated. Therefore, the next two blocks; *Block 7* and *Block 8* respectively, focus on motivating learners (i.e. guiding learners to pose questions and enquire into resources questions) and giving them a degree of autonomy on their leaning (i.e. giving permissions for editing and posts).
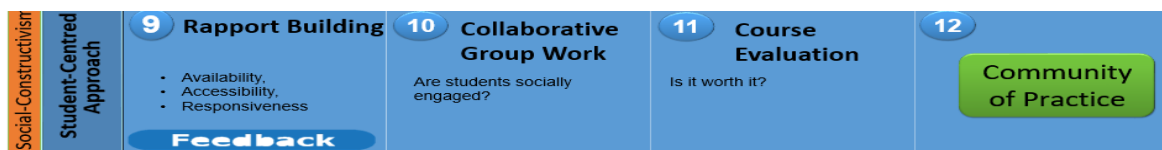
3. Sustaining social community

Figure 4: Sustaining social interaction phase Block 9-Block 12

This phase focuses on sustaining collaboration throughout the course duration, with feedback checkpoint as a start and the tutor establishes the rapport in *Block 9*. Rapport is a state of harmonious understanding with another individual or group that facilitates communication (Bernieri, 1998). In other words, rapport is getting on well with another person or group of people, by having things in common to make the communication process easier and effective. In online learning, building rapport is a challenge because of the absence of face-to-face communication (Murphy and Rodríguez-Manzanares, 2012). According to Frisby and Martin (2010), establishing rapport in the educational setting is relatively a new variable to be considered. In the context of online learning, where students and tutors are physically absent, rapport is less known regarding its construct, importance, how it might be built, and what it might look like (Miles *et al.*, 2009). In this gameboard, we adopted some examples for the tutor that can guide them to establish rapport with students and between the students themselves. For

example, the instructor provides the exchange of personal information among the students (i.e. written bio of personal background and experiences).

In *Block 10*, students' active collaborative groups can sustain social community, as group work enhances education through knowledge exchange and experience of the online diverse educational community. According to Johnson and Johnson (2009), collaborative group work provides effective leadership, decision-making, trust-building, communication and conflict-management between group members. Pedersen and Digby (1995) highlighted that cooperative learning helps to build and maintain long term student-tutor relationships. In *Block 11*, the tutor manages the course evaluation from the students. Keutzer (1993), lists advantages to course evaluations: (1) retrieved information can be used to make changes throughout the current course; (2) students feel empowered to help design their own educational process; (3) it allows an individual assessment of specific behaviours rather than a group rating and (4) the evaluations go directly to the course tutor, so they can identify the points of strength and the areas of improvement.

Block 12 is the final step in the metaphoric game with the emerging of CoP, where mutual engagement is developed between students who share a common interest in a specific area of knowledge and/are willing to work and learn together over a period of time to develop and share that knowledge (Wenger, 1998). The final tip regarding CoP is that it is the end of the game but does not finalise the learning experience. It is recommended that if the aim is to develop social communication and collaboration among learners, a menu of various online technology communication options to be provided. For example, Blogs, message boards, chat, and synchronous online meetings.

This gameboard can be challenged by the given control to the tutors, as the tutor is the decision maker and control owner. The question to be highlighted is; what would happen if the tutor decided to leave the game at any stage? The answer is that the main beneficiary of this gameboard is to support the online tutor in gamifying the design of online course. Therefore, tutors may need preparation with CPD in gaining the professional and experiential skills that they need to develop their teaching practices using this framework model before piloting it with students.

From the previous explanation it can be noted that each phase in the framework reflects pedagogical effect on student' learning. *For students*, each phase in this framework reflects pedagogical effect on student' learning. In phase 1, upon knowing learners, tutors can design the course and select the pedagogical and educational plans that suit students' needs and preferences. Through students' feedback, their voices reflect the accessibility and suitability of their selected Wiki to confirm their perception, understanding and interaction without barriers. In phase 2, initiating interpersonal relations and the circulation of communication between the online learning community, students get motivated and engaged in their learning. In phase 3, within the developing of online social community, mutual engagement to develop and share knowledge is established between students who share a common interest and willing to work and learn together.

For tutors, this framework can be beneficial for online tutors as it can help them to decide whether the selected online application (i.e. wiki) is appropriate to achieve the aspired learning aims of their courses and to track changes as their course progresses. With the assistance of many checkpoints such as students' feedback and students' activities of communication and collaboration, tutors can achieve the best of the course aims. Another key advantage of this metaphoric game is that it enables tutors to be aware of and practise the powerful role they are playing in activating their learning communities and pushing the community forward if it would be hindered.

Conclusion

This framework could help tutors, faculty, students, and designers to use a common language with students to describe their teaching and learning activities. For tutors, in particular, it helps them to make decisions about learning activities and the role that wikis can play in accomplishing those goals.

The benefit of this study that when online tutors are aware of the impact of what that use in online learning; activities, media, on their students' motivation and engagement, they can improve their teaching practices and choices using technology. Another benefit it can be expected form GBL of online learning for online tutors that, as it can engage students with its impact on motivation, it is expected to motivate tutors to use it and approach them with students as both are using similar approaches in their practices: teaching for online tutors and learning for online students.

Future Development

This prototype will be submitted as a prospective project for funding for testing and evaluation. Worth noting that, at this stage, this prototype has been partially developed to be tested, for research use only using Visual Basic .NET object-oriented programming language. Upon the project being funded, the prototype will be developed to a scalable product and hosted online to be used for education in particular or producing it adjustable for other disciplines.

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