

Gamification beyond Badges

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Abstract: Gamification in education refers to the application of game dynamics, mechanics into the teaching and learning engagement. This paper makes a case for viewing the objective of Educational Gamification as a Gameful Educational User Experience. In an effort to facilitate the integration of tablets in the teaching and learning environment of rural schools, gamification was used as one of the design tenets to engage and motivate teachers. The Gamification of the ICT4RED Teacher Professional Development Course as an instance of the Mobile Learning Curriculum implemented is outlined through the UX lens of the user, system and context.

Keywords: Rural Education, Gamification, Educational Gamification, Gameful Educational User Experience, Teacher Professional Development, Mobile Learning Curriculum, User Experience (UX)

1. Introduction

The ICT for Rural Education Development (ICT4RED) project is part of a research programme (TECH4RED) initiated by the South African Department of Science and Technology (DST) in collaboration with the South African Department of Basic Education (DBE), the Eastern Cape Department of Education (ECDoE) and the South African Department of Rural Development and Land Reform (DRDLR). TECH4RED aims to contribute to the improvement of rural education via technology-led innovation. The learning from this programme will enable evidence-based policy development within government. The research programme is expected to continue for at least 3 years and is envisaged to provide for a range of technology interventions including, amongst others, in ICTs, water and sanitation, health, nutrition and energy. This list is not exhaustive of the possibilities but is a considered selection of key interventions. [1].

Within TECH4RED the ICT4RED project aims to investigate how the application and deployment of new and existing technologies (which include e-textbooks and other electronic resources) at schools in the Cofimvaba district of the Eastern Cape Province can assist to develop a framework that can be replicated and scaled to other provinces and across the rural education system. Currently this takes the form of introducing tablets to schools. Each teacher would receive a tablet and the learners would, depending on their grade, either receive a tablet for use, or be part of a group that would share a tablet in class [2].

The *Teacher professional development* (TPD), along with *Content* and *Technology* forms one of the three primary drivers within the ICT4RED initiative and aims to guide the development of relevant teacher knowledge and proficiency to enable classroom practice to portray a 21st century teaching and learning engagement [3]. The *ICT4RED TPD curriculum* is an instantiation of the Mobile learning curriculum [4] and is currently in its second iteration of three. The first iteration was at a single school, Arthur Mfebe and has now expanded to include an additional 11 schools. The third iteration will see the implementation extended to another 14 schools [5]. The initial design of the TPD curriculum incorporated some implied game elements. Although the early success at Arthur

Mfebe could not directly be attributed to any single factor, it was significant enough to motivate a more articulated redesign to incorporate a purposeful Gamification of the second iteration.

The comprehensive narrative regarding the design and application of the ICT4RED TPD curriculum is beyond the scope of this paper which will limit itself to outline how the design strategy of using game design elements was implemented towards the creation of an enhanced TPD learning interaction.

Having outlined the context of the initiative, the following section will briefly look at *Gamification* as a design strategy.

2. Gamification as a design strategy

The concept of gamification and the potential to deploy gamified applications is seen as a new line of enquiry for human-computer interaction and can be considered as in the progress of establishing itself as a novel line of enquiry for researchers [6-9]. Deterding, Dixon, Khaled & Nacke [10] argue that the term Gamification, “does indeed demarcate a distinct but previously unspecified group of phenomena, namely the complexity of gamefulness, gameful interaction and gameful design, which is difference from the more established concepts of playfulness, playful interaction or design for playfulness”. They then make a clear distinction between games and gamified applications, but state that both can lead to gameful experiences.

The term *Gamification* has its origin in a 2008 blogpost by Brett Terill [11] where he refers to his thoughts on the “gamefication” (sic) of the web stating that “[t]he basic idea is taking game mechanics and applying [it] to other web properties to increase engagement”. As of yet, there is limited agreement on a single understanding of Gamification. The most used being that *Gamification is the application of game dynamics and mechanics into non-gaming environments* [10, 12, 13], as defined and proposed by Deterding *et al.* [10]. Huotari and Hamari [14] argue that this definition needs to be extended to incorporate an emphasis on the experiential nature as an alternative to a more narrow systemic understanding. They point out that in an extensive literature survey they found “no elements that were solely unique to games”. Further to their argument, they state that authors like Juul [15] and Deterding *et al.* [10] noted that a game establishes itself within a combination of conditions and does not solely consist of any one condition in itself. They shape the conundrum this presents by arguing that a game is recognised through the experiential conditions unique to games. The experiential condition is quoted as described by McGonigal [7] as *gamefulness*. Deterding *et al.* [10] has further deliberated on the concept of gamefulness, and infers that it is the result of a gamification strategy through the use of game design elements to produce a user experience of gamefulness. Incorporating the hedonic nature evident in games, Huotari and Hamari [14] suggest a definition of gamification as “*a process of enhancing a service with affordances for gameful experiences in order to support the user’s overall value creation.*” They thereby put emphasis on the goal of gamification rather than the methods used to achieve it.

This goal of gamification is inferred to as “making non-gaming products and services more enjoyable and engaging [10]”, “encourages motivation and engagement [16]”, and providing for an “engaging experience [8]”. Marache-Francisco and Brangier [9] argue that “[i]t is about designing for an experience that drives the user through a journey.” In the process, what Huotari and Hamari [14] refers to as a “core service”, is enhanced. This enhancement is co-produced by the game designer and the player. The designer contributes the storyline, rules etc. and the user or participant as “player” participates or interacts and completes the production of the games service. This implies that the gameful experience is designed for, but also determined by, the user or participant as player and is an individual awareness.

3. Gameful Experience as a Gameful User Experience

From the brief arguments above it can be construed that the gameful experience is a specific type of user experience achieved by a strategy of incorporating game design elements into the User Experience. The User Experience, as opposed to experience, is then viewed as a unique manifestation of experience that involves a service or product, is related to an interaction with the system and is interactive [17].

In keeping with Huotari and Hamari [14] arguments, considering the User Experience proposes a more holistic view of the user's engagement with interactive computing devices as it include both the pragmatic issues and hedonic or experience attributes [18, 19]. The User Experience is focused on the user as an individual and is considered a personal experience affected by, not only the usability of the technology in use, but also the user's expectations and previous experiences [17, 20]. The Usability Professionals' Association [21] regard "every aspect of the user's interaction with a product, service, or company" to contribute to the users perception. They describe *User Experience Design*, as a discipline that "is concerned with all the elements that together make up that interface, including layout, visual design, text, brand, sound, and interaction. User Experience aims to coordinate these elements to allow for the best possible interaction by users." Mäkelä and Suri [22] view User Experience as "a result of a motivated action in a certain context. The user's previous experiences and expectations influence the present experience, and the present experience leads to more experiences and modified expectations." Hiltunen, Laukka & Luomala [23], concur in outlining the importance of the user's expectation of the interaction. Forlizzi and Battarbee [24] additionally emphasise the user's expectations and prior experience of the system within a context of use. Arhippainen and Tähti [25] further this argument by listing components affecting the use experience and deconstructing these to a great level of detail. These authors' definitions and views advance the thought that, in addition to the system behaviours inclusive of usability, the user context in which the user interacts, need to be considered. The perspectives articulated above all directly or indirectly reflect the findings of the review done by Hassenzahl and Tractinsky [20]. They identify three high level components that affect the User Experience namely the *user*, the *system* (this extends to include the application and or service) and the *context*.

Controlling a User Experience suggests the pre-emptive and reactive navigation of randomly occurring factors. Practitioners and designers therefore, cannot design a User Experience but can design *for* a User Experience where components in the interaction are considered [17, 26, 27]. Considering the *Gameful Experience* [7, 10] as a *Gameful User Experience*, it will imply that designers cannot control or design such an experience but can design *for* a *Gameful User Experience* by purposefully incorporating game design elements. This is in keeping with the views of Huotari and Hamari [14] that argue that in gamification the designer is "attempting to increase the likelihood for the gameful experiences to emerge by imbuing the service with affordances for that purpose" and that "gamification can only attempt to support the user in [co]creating gameful experiences." Deterding *et al.* [10] concur and outline that "[f]rom the user perspective, such systems entailing design elements from games can then be enacted and experienced as 'games proper', gameful, playful, or otherwise" and refers to an "instability or openness" that sets gamified applications or services apart for users.

4. Gameful Educational User Experience

One of the attractions of Gamification in the education domain is the possibility to transpose elements found in gaming towards more efficient and engaging learning experiences [13, 16, 28, 29]. Educational Gamification can be distinguished from *serious games*, that are the incorporation of non-entertainment elements into game-environments,

simulation games, which are immersive environments where parts of the real world are recreated [30] or *edutainment*, that is educational entertainment [31], and is not a game for learning purposes [32, 33]. Glover [16] articulates this as follows: “Educational Gamification is not to be confused with Game-based Learning, Simulation, or Serious Games. These focus on creating games (and game-like experiences) which impart an educational benefit, and includes software such as simulators. This is the direct opposite of educational gamification, which seeks to add game-like concepts to a learning process.”

From the deliberations above, Educational Gamification can be viewed as the design strategy of using game design elements in educational contexts to support teaching and learning goals. Fundamentally Educational Gamification has to be about learning and learning gains and should be grounded in best practice pedagogical principles. Beetham and Sharp [34] argue that pedagogy, involves ways of knowing as well as doing, and that similar to other applied disciplines, its concern lies with how practice is understood and how that theoretical understanding is applied in practice. From this argument, they position the term pedagogy as initiating a dialogue between theory and practice, as well as between learning and teaching. They assert that the demands inherent in teaching and learning do not call for a new pedagogy but implies locating the new technology and strategies within proven practices and models of teaching.

A Gameful Educational User Experience can be considered a goal of Educational Gamification as a term that would articulate the design goal of designing for gamefulness [7, 10]. The Gameful Educational User Experience incorporates the high level components that were identified as affecting the UX namely the *user*, the *system* and the *context*.

Having delineated the understanding of what the Gamification design goal is, the following section aims to outline how the design strategy of using game design elements was implemented towards the creation of an enhanced TPD learning interaction.

5. Implementation

In order for the successful application and deployment of new and existing technologies at the schools in the Cofimvaba district, it was essential that classroom practice would accommodate the demands and harness the opportunities presented by these technologies. The most appropriate guide was identified as the 21st century classroom as articulated by Voogt and Odenthal [35].

The ICT4RED teacher professional development curriculum was effected in reaction to the significant portion of literature that identified *Teacher Training* as a critical factor in the successful integration of technology into formal teaching environments. The mere access to, or ownership, of technology without appropriate teacher training, has, in addition, shown not to equate to the uptake and or meaningful integration of such technology.

The curriculum that facilitated the TPD is an instantiation of the Mobile Learning Curriculum [4] and consists of 10 modules that are expedited over approximately, an 8 month period. After implementing the curriculum during the first iteration at a single school, feedback on minor integration of Gamification was significant enough to motivate a more pronounced redesign to incorporate a purposeful Gamification in the deployment of the curriculum for the second iteration. Gamification was a purposefully chosen design strategy towards an enhanced Gameful Educational User Experience. Each of the high level components of the designed Gameful Educational User Experience, namely, the user, the system and the context are briefly discussed below.

5.1 The User

Marache-Francisco and Brangier [9] state that game elements implemented should complement the participant’s profiles. As the second iteration extended to 11 schools and

166 teachers who taught across phases, from preschool to grade 12, the final year of schooling, and subjects, this was a significant challenge. The curriculum v2 needed to accommodate this increased complexity and in addition facilitate the increased array of individual proficiencies, technology skill levels, subject and phase specialisation and roles and responsibilities. In the light of this, it was decided to pitch the curriculum at a lowest common denominator. The design assumption was made that participants:

- would be co-creators of the Gameful Educational User Experience by applying their subject content knowledge, pedagogical knowledge of the context and learners and are participating voluntarily;
- had not previously worked or taught with tablets and did not know how to meaningfully integrate the technology towards the goal of the 21st century classroom practice;
- had limited or no access to the internet at school; and
- had access to, or ownership of an interactive mobile cellular device.

The game elements outlined by Costello and Edmonds [36] for play, derived from a survey of play theories, were adopted to direct the TPD sessions in the design for Educational Gamefulness from an individual participants or users perspective. Although the distinction between play and games are given by various authors [7, 10, 14], Costello and Edmond’s framework accommodate the hedonistic attributes for which a case has been made [14]. In addition Deterding *et al.* [10] argue that “in practice, it can be assumed that they often give rise to playful behaviours”, referring to gamified applications. These elements: creation; exploration; discovery; difficulty; competition; danger; captivation; sensation; sympathy; simulation; fantasy; camaraderie, and subversion was purposefully designed into the facilitation of the TPD session. Not all elements were designed to be present in each of the sessions but rather an appropriate combination was strived for in accordance with Juul and Deterding *et al.* [10, 15]. These elements are focused on the experience of the individual as participating user and articulated as “game design patterns and mechanics” by Deterding *et al.* [10] who describes them as “commonly reoccurring parts of the design of a game that concern gameplay”.

Table 1: Elements towards Gameful Educational User Experience

Element from Costello and Edmonds [36]	Description from Costello and Edmonds [36]	Application to ICT4RED TPD facilitation
Creation	Creation is the pleasure participants get from having the power to create something while interacting with a work. It is also the pleasure participants get from being able to express themselves creatively.	Time and space was incorporated for the creation of artefacts on a personal, a professional, a technical or a pedagogical level as objective and as part of co-authoring of the experience. E.g. the creation of a video, taking of photos or creating a mind map. Pleasure at manipulating a feature on the tablet device to express a dimension of self.
Exploration	Exploration is the pleasure participants get from exploring.	The participant is confronted with an unfamiliar technology in use. The tablet by its nature presents multiple elements that the participant can explore. Time and space is made for guided and free exploration depending on the perceived level of difficulty.
Discovery	Exploration is the pleasure participants get from exploring a situation.	The participants are confronted with technology and applications that they are able to manipulate through exploration to discover features and given time to manipulate these for themselves. E.g. Setting a photo as a background or using an app to send SMS to parents.
Difficulty	Difficulty is the pleasure participants get from having to develop a skill or to exercise skill in order to do something.	The level of difficulty in mastering concepts is pitched to facilitate an initial understanding in the session. An opportunity to exercise the skill through a subsequent challenge is planned and purposefully incorporated. E.g. Participants participate in a jigsaw

Element from Costello and Edmonds [36]	Description from Costello and Edmonds [36]	Application to ICT4RED TPD facilitation
		strategy and are then challenged to apply the jigsaw strategy in their class with their own subject content.
Competition	Competition is the pleasure participants get from trying to achieve a defined goal. This could be a goal that is defined by them or it might be one that is defined by the work. Completing the goal could involve working with or against another human participant, a perceived entity within the work, or the system of the work itself.	There are multiple levels of competition built into the curriculum. The participant competes against the system to achieve goals, operationalized as collecting badges, groups compete against each other in the sessions and schools compete against one another.
Danger	Danger is the pleasure of participants feeling scared, in danger, or as if they are taking a risk. This feeling might be as mild as a sense of unease.	The participants are exposed to unfamiliar technology and unfamiliar teaching strategies. This feeling of unease is anticipated and allowed some space and time. E.g. when participants present their work or try something new.
Captivation	Captivation is the pleasure of participants feeling mesmerized or spellbound by something or of feeling like another entity has control over them.	The participants interact with the technology and their becoming engrossed is deliberately planned. E.g. when participants play a game or use an application to accomplish a goal.
Sensation	Sensation is the pleasure participants get from the feeling of any physical action the work evokes, e.g. touch, body movements, hearing, vocalising etc.	The physical activity and movement of participants are planned for. E.g. Moving around, play acting, talking and interacting with the device.
Fantasy	Fantasy is the pleasure of perceiving a fantastical creation of the imagination.	Fantasy is incorporated by role-play, storytelling and scenarios.
Sympathy	Sympathy is the pleasure of sharing emotional or physical feelings with something	Understanding for other perspectives is planned for through role play and storytelling. There is a facilitation through which the participant has the opportunity to view situations through as experienced by others such as learners, parents or the headmaster.
Simulation	Simulation is the pleasure of perceiving a copy or representation of something from real life.	The facilitation of each session is a simulation of a class where teaching and learning takes place to facilitate an educational goal. The facilitator models a teaching strategy by simulating a class and the teachers experience the class as learners.
Camaraderie	Camaraderie is the pleasure of developing a sense of friendship, fellowship or intimacy with someone.	There is an emphasis on functional group work as part of the simulation. In addition the participants are encouraged to support and mentor each other to achieve a common goal. The rise of technology champions has been a side effect of this.
Subversion	Subversion is the pleasure of breaking rules or of seeing others break them. It is also the pleasure of subverting or twisting the meaning of something or of seeing someone else do so. For example, a work might require participants to behave in ways that would be frowned upon in real life and they might get pleasure from being so naughty.	There is a purposeful inclusion of this element through props such as dressing up, assuming roles or tasks that are subversive by nature. E.g. The module on scavenger hunts has tasks that take the participants out of their comfort zone by, for example, requiring a photo with all participants' feet off the ground and in the role play one of the participants is excessively rude to another.

5.2 The System

The principles that guide the TPD as a system were identified and adapted from Stott and Neustaedter [29] as: Freedom to fail, Rapid Feedback, Progression and Storytelling . They represent the Gamification design principles, heuristics or lenses used towards the Gameful Educational User Experience [10, 37]. These are shortly discussed below.

5.2.1 Freedom to Fail



Figure 1: All Badges. Iteration 2

Linked to formative assessment, there are multiple opportunities for the teachers to achieve a level of competence that corresponds to the set goal or to their own goal. The TPD targets are clearly articulated as a set of 13 compulsory goals and 25 optional goals. Each of these goals is operationalized as a badge.

5.2.2 Rapid Feedback

The course is structured so that the teachers receive feedback on each goal as a badge that they attempt and submit for accreditation. The successions of badges guide them on a learning path and they receive feedback from inbuilt sequencing so that there are multiple small units of accomplishment. Within these, there are larger units that acknowledge a unit of accomplishment.



Figure 2: Learning Path; Iteration 2

5.2.3 Progression

The course is structured to accommodate technology and pedagogical proficiency. For the technology aspect, the participant is assumed a novice and scaffolded to progress from, being able to use the tablet as a personal device (I can work with a tablet), to use as professional device (I can teach with a tablet), and cumulating in the use of a tablet as a collaborative tool (I can work through the tablet). As such the teacher is nudged into becoming an online learner and encouraged to position them to become lifelong learners and contributors in the digital world. Initially the teachers earned badges are displayed on a in a paper badge backpack. This is taken online to a Mozilla Open Standards Backpack.



Figure 3: Paper based badge backpack is first duplicated then replaced with digital badge backpack. Iteration 2

For the Pedagogical use, the teacher is acknowledged as a practitioner and is challenged to apply various teaching strategies to enhance their teaching while integrating technology. The teacher is additionally challenged to become a content creator and reflective practitioner.

5.2.4 Storytelling

The narrative is articulated as a learning path that is operationalized through the attainment of 13 compulsory badges that represent the 13 compulsory learning goals of the curriculum. A *Earn as you Learn* [5] system is adopted whereby teachers and by implication schools can earn technology add-on's as they progress. This ensures that technology is given when the teachers and the school is ready to use it. The technology is given *in use* rather than *in case*. This extends to the teachers who have to complete all 13 compulsory badges to have ownership of the tablet transferred to them in a personal capacity. If they fail to do so the tablet device becomes the property of the Eastern Cape Education Department for possible redeployment. As there are currently 33 badges in total, it implies that they only have to do 40% of the total as a minimum requirement to earn the tablet.

5.3 The context

The school as a context is in addition a co-creator of their own involvement and destiny. The implication of the *Earn as you Learn* for the school is that when the school has achieved 80% of 5 badges per participant they earn a projector; 80% of 8 badges earns the school Mobikit/s (a set of 20 tablets and chargers) and 80% of 11 badges earns them a full tablet integration into the school. This includes an internet link, solar charging solutions and storage facilities. As such the narrative extends from the teacher as participant to the school.



Figure 4: One of the schools receive their projector

6. Conclusions

This paper has documented the Gamification of the ICT4RED TPD course in rural Eastern Cape as part of the TECH4RED initiative. The initial feedback has been resoundingly positive. What has become very clear is that integrating technology is a facilitated process and meaningful integration needs to be planned and assisted. Whatever strategy is implemented it is critical to initiate interaction with the Teachers where they are. What we did in simulating the teaching and learning environment is important. If facilitators cannot simulate integration in context it is highly unlikely that teachers will be able to apply it in their own classrooms. The teacher professional development interaction is costly and needs to be seen as an investment in more than just mastering a technology for the sake of it. In addition Gamification is not always easy to build in and there needs to be a purposefully planned positive Gameful Educational User Experience as a result to translate into a willingness by teachers to experiment in their own classroom. This being said, a successfully gamified TPD course could potentially contribute towards alternative strategies for integrating technology into the formal learning environment.

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