The psychology and technology mix: Exploring the design of a gamified solution using persuasive technology

ABSTRACT

As the world stands at the brink of the Fourth Industrial Revolution, educators have had to reconsider their teaching practises and the impact thereof. Technological advancement, however, cannot progress without taking into account the human element of the intended end users. This paper uses a case study approach to explore how educators can apply persuasive technology frameworks in designing gamified solutions in order to increase student motivation to work consistently and to assist them with taking ownership of their learning process. We use the example of a gamified solution which was developed for students enrolled in a financial management module at the University of Johannesburg. The gamified solution introduces a new approach to creating an environment that is conducive to students being motivated to work consistently during the semester. Through the use of choice architecture, this gamified solution nudges the students to make right decisions for themselves without infringing on their freedom of choice. This paper also highlights the importance of applying multidisciplinary perspectives into intervention development. In particular, the gamified solution discussed in this paper, incorporates principles from: behavioural economics, persuasive technology theories, and educational psychology. Broadly, this paper tackles the question on how innovations within the context of the fourth industrial revolution can be used to re-engineer the delivery of tertiary education towards student-centred approaches.

Keywords Gamification, Motivation, Student engagement, educational psychology, persuasive technology, Human Factor, Psychology, Behavioural Economics, Education

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1. INTRODUCTION

The role of a university lecturer is one that includes ensuring that their students pass the learning modules that lead up to the students obtaining their degree (Kahu and Nelson, 2018). In order for a student to successfully complete a course, they need to exhibit good study habits, one of which includes the ability to work consistently (Credé and Kuncel, 2008). University lecturers have noted the challenges they face in keeping their students consistently engaged with the course content and to take ownership of their learning (Wanner and Palmer, 2015). South African universities have been on a drive to increase the use of technology as a mode of teaching and learning instruction with the hopes of influencing the study habits of the students (Odora and Matoti, 2015). These efforts, however, do not seem to be translating to the intended outcome of encouraging university students to take ownership of their learning and pass their course modules (Alrasheedi and Capretz, 2015). In 2009, Fogg designed a behaviour model for persuasive design called the Fogg Behavioural Model. This model incorporates human psychology and technology to help users to design persuasive systems that influence human behaviour through the use of technology (Fogg, 2009). Theories of human psychology and persuasive technology design may be the missing link, for university lecturers to more effectively engage their students and influence them to work consistently (Williamson, 2017).

At present, there is limited literature that explores how university lecturers can learn about the use of persuasive technologies in their methods of instruction. This case study research paper explores the incorporation of persuasive technology features on an existing technology-based teaching solution at a South African university, namely the University of Johannesburg. The objectives of this study are as follows:

- to explore the use of persuasive technology (Psychology and Technology) within the context of 4th Industrial revolution to enhance University students' motivation to consistently learn financial management module rather than the use of compulsory face to face tutorial classes.
- to propose a theory of change with regards to how University students are motivated to work consistently in order to pass.

The goal of the author is to communicate how a university lecturer approached and integrated persuasive technology into their teaching instruction. This research study is intended to be self-reflective case study, rather than relying on qualitative and quantitative methods to show effectiveness of persuasive technologies in an education context. This paper suggests best practices for university lecturers interested in exploring the use of persuasive technologies in their teaching pedagogies and makes recommendations for future research in the use of persuasive strategies.

2. BACKGROUND

By the time a student enters a tertiary institution, they would have formed various study habits based on their primary and secondary education experience. At a university level, a student is introduced to the concept of freedom as they are no longer bound by a system that forces them to employ good study habits such as working consistently. A university student is often aware of good study habits that would lead to a successful learning outcome, but still choose not to behave in a manner that will achieve this. Interventions are often required in order to overcome the challenge of influencing university students to engage with their course content and form a good study habit of working consistently. The use of technology has become more entrenched into the daily lives of people and is often used as tool to influence how people behave (Wang, Xiang and Fesenmaier, 2016). The use of technology to influence behaviour is called "persuasive technology" (Fogg, 2002; 2009; 2012). This research paper is part of a larger project to develop a system that persuades university students to work consistently during the semester through the use of technology. Research shows that before one embarks in influencing or changing behaviour, one needs to understand how human behaviour works (Kaptein, Markopoulos, de Ruyter and Aarts, 2009). The section below discusses the need to understand how human beings behaves and provides insights into human psychology to assist us in understanding how human beings make decisions.

2.1 Understanding human behaviour

Human behaviour is something that is complex and as such it is important to understand how human beings make decisions before one attempts to change or influence human behaviour (Thaler, 2015). By incorporating psychology and economics, the field of behavioural economics has assisted economists in building models that assist human beings to make better decisions for themselves (Thaler & Sunstein, 2008). For example, the financial industry incorporates behavioural economics into their models to encourage their clients to make sound decisions such as saving and/or investing money. The insurance industry has also incorporated behavioural economic principles to nudge their clients to make better decisions in terms of their health and safety (Reisch, Sunstein & Gwozdz, 2017). With the above examples, the industries used an understanding of human behaviour first and then incorporated it into their models in order to predict and alter human behaviour. The aforementioned industries identified that although human beings try to make decisions that are in their best interest, they are unable to. The field of behavioural economists created an avenue for economists to develop models that take into account the complexity of human nature by understanding that human beings exhibit varying limitations with regards to their rationality, will power and social preferences. (Benjamin, Brown and Shapiro, 2013).

In order to further understand the irrationality of human behaviour, the next section discusses how the lack of will power influences the decisions made by human beings to act in their best interest. In

particular, the lack of will power that university students have to work consistently throughout the semester will also be discussed.

2.2   Limited will power and decision making

There a three aspects of human psychology that influence how humans make decisions. These three are (1) limited cognitive abilities, (2) problems with self-control and lack of will power and (3) limited self-interest (Thaler, 2015, p. 258). Of particular interest in this study is the limited will power exhibited by humans when it comes to making decisions that are in their best interest.

Human beings are faced with the constant tension of weighing out their current desires versus their future desires (Fudenberg & Levine, 2012). People have a tendency to place more values on their current desires as opposed to their future needs (Strotz, 1956) as they struggle to do what they know is right (Mischel, 2014). Philosophers have hypothesised that the challenge faced by people to make decisions in their best interest is due to the conflict between two different "selves" (Thomas Schelling, 1960, 1978). These two selves are described as being "present self" and "future self". The "present self" is more concerned with maximising immediate happiness whereas the "future self" is focussed on making decisions that will be in alignment with long term satisfaction (Urminsky, 2017). For example, in the context of a university student working consistently, a student's "present self" would be more inclined to prefer to study more in the future but their "future self" would prefer the action to study to be done at present. Due to the conflict of these "two selves", there then subsequently results in the postponement of decisions as there is constant battle between these two selves (Frederick et al., 2002). Behavioural economists, Thaler and Hersh Shefrin, also proposed a model called the "planner-doer" model to further explain this phenomenon of conflict between two selves. In the planner-doer model, the "planner" is the self that is concerned about future preservation whereas the "doer" self is only concerned about present fulfilment (Thaler and Shefrin, 1981). Understanding this human behaviour phenomenon assists us in understanding how the human brain processes making decisions.

The human brain comprises of systems that interact as a collective mass. These systems sometimes do not work in cohesively which affects a human beings ability to make rational decisions (Kurzban, 2012). The dual-process theories in psychology help us to further understand how the human brain processes information in order to make decisions. The dual process theory explains how the human mind can make a decision based on two different processes (Fudenberg & Levine, 2011). Decisions can be processed using the intuitive process and deliberate processes both of which can exist simultaneously and are often in conflict with one another. The intuitive process is known as System 1 or the Automatic System and is described as uncontrolled, effortless and fast (Evans & Stanovich, 2013). It is the system that drives human beings to make decisions unconsciously without putting much effort into them. The human mind tends to want to do what is easier and more comfortable and most of decisions are made using the system 1 part of the brain as they require less effort (Rebs, Brandenburg & Seuring, 2018).

The deliberative processing is called System 2 or Reflective System and is described as being slow, controlled and deductive in the process of decision making and thinking (Fudenberg & Levine, 2012). Figure 1 below summarizes key aspects of these two human brain processing systems and how they compare to each other.

System 1	System 2
• Intuitive • Automatic • Uncontrolled • Effortless • Associative • Fast • Unconscious	• Analytic • Reactive • Controlled • Effortful • Deductive • Slow • Self-aware

Figure 1: The Dual Process Theory (Adapted from Thaler and Sunstein, 2009)

It is important to understand how the human brain works so that one can gain a better understanding of how human beings systematically make wrong decisions (Thaler, 2015), in particular, with regards to their limited will power to act in their best interest. In developing intervention models to assist university students to develop good study habits with regards to working consistently in order to pass, educators would need to have an understanding of human psychology in order to successfully effect change in the behaviour of their student body. Once an educator has this understanding of human psychology, it can be applied to the unique set of characteristics that make up their student body.

2.3   Generation Z

The current student body that is at university has been termed as the Generation Z, which is the group of individuals that were born between mid-1990 and mid-200s (Seemiller and Grace, 2016.). Members of Generation Z are characterised as a generation that started using technology from an early life stage and have been exposed to a large amount of technology while growing up (Shatto and Erwin, 2017). This generation of students know how to use technology platforms to find the information they require for possible solutions at their own pace and timing (Brodsky, 2018). This generation of students is one that has been described as individuals that have a deep need of freedom of choice and do not respond to restrictions or negative reinforcement as a motivation to change behaviour (Geek, 2007). Traditionally, in order to influence students to form the study habit of working consistently, university lecturers at the University of Johannesburg have incorporated the use of compulsory attendance to weekly small group classes, also known as tutorial classes. The use of these compulsory tutorial sessions was intended to assist university students to make decisions that were in their best interest by restricting their freedom and autonomy. Behaviour models that use this sort of approach are called paternalistic models as they restrict the users' freedom of choice and responsibility (Thaler & Sustein, 2003). Although these methods have yielded some success over the past years (Cassells, Issacharoff,

Loewenstein, O'Donoghue & Rabin, 2003), this is unlikely to be sustained as the tertiary education system starts to receive a new breed of consumers – Generation Z. The field of behavioural economics proposes a way of designing a model that influences users to make decisions that are in their best interest whiles still respecting their freedom of choice and autonomy (Thaler & Sustein, 2003). This approach is called libertarian paternalism and the next section discusses the use of gamification in designing a libertarian paternalistic model.

2.4   Gamification and libertarian paternalism

Advocates for libertarian paternalism suggest the use of choice architecture when designing a model that is intended to assist users in making decisions that are in their best interest (Sustein and Thaler, 2003; Thaler and Sustein, 2003). Gamification is a tool that has been used in many industries such as the financial, insurance and health and insurance industries in order to influence the targeted population to act in a certain way whilst still preserving their autonomy (Wu, 2011, Cugelman, 2013). The principles of gamification are rooted in the use of game playing elements to encourage users to engage with a product or service (Deterding, Björk, Nacke, Dixon, and Lawley, E., 2013) that is ordinarily unappealing and difficult for the human being to perform. Working consistently is something that university students find difficult to do due to the lack of will power and the knowledge of how to do it effectively in order for them to pass the module at the end of the semester (Filippou, Cheong and Cheong, 2015). Working consistently as a study habit is not something that comes automatically to university students and as such educators need to create a learning environment that is conducive to appealing to the system 1 part of the brain whilst simultaneously developing the system 2 side with regards to working consistently (Fitkov-Norris and Yeghiazarian, 2013).

Motivation plays an important role in formulating gamified solutions. There are two types of motivation, that being extrinsic motivation and intrinsic motivation. Gamified solutions can be used as a tool to increase extrinsic motivation as it appeals to the motivation of achieving an outcome (de Aizpurua, Price and Tucker, 2018). Extrinsic motivation, however, has been found to not to be enough to effect long lasting behavioural change (Wu, 2014). In designing a gamified solution in an education context, the ultimate goal should be that of students realising the intrinsic value of working consistently and thereby increasing the internal desire for the students to perform their tasks out of desire and fulfilment rather than in anticipation of an external reward (Hidi, 2016.)

There is limited research studies that have been done in incorporating human psychology into the design of a gamified solution. Zimmerman and Cunningham (2011) emphasise that in designing a gamified solution, one cannot just simply focus on the gaming elements but need to incorporate human psychological aspects and the success of a gamified solution largely hinges on human psychology incorporation. The Fourth Industrial Revolution has been described as one that will merge digital, physical and biological spheres (Schwab, 2017). Educators at South African universities have also been

mandated to ensure that their teaching pedagogies are in line with the changing technological climate. Technology, however, cannot and should not be embedded haphazardly to learning outcomes with the hopes of changing student behaviour. As with any attempt to influence and change behaviour, technology needs to be used in conjunction with the understanding of human behaviour. This is where the use of persuasive technology will assist in the designing of technology innovations that focus on changing human behaviour. Theories of persuasive technology will assist users in designing effective technology systems that can influence users to change behaviour. The following discusses theories of persuasive technologies and how they can be used in designing a system that influences changed behaviour without infringing on the users freedom of choice.

3.   PERSUASIVE TECHNOLOGIES

Technology can be used an effective tool to influence human behaviour if it is used in alignment with an understanding of human psychology. In first understanding human psychology, one can incorporate technology as a tool in order to assist humans to make decisions that are in their best interest. (Fogg, 2013) Technological innovation is increasing at a rapid pace and it is important for educators to incorporate this into their teaching pedagogies in order to remain relevant to the technologically advanced student body they have. The use of technology by educators will also assist them to better align to the needs of Generation Z that comprises the current student body. Persuasive technology is a method that incorporates human psychology and technology in order to influence human behaviours. Its mode of influence is to affect human behaviour through persuasion rather than coercion (Fogg, 2009). The latter, through coercion, which the current student body seem to be averse to.

Persuasive technology models are used across varying industries including business, marketing and education in order to motivate the end user to behave in a certain way. The basic premise of persuasive technology is to effectively use technology in order to impact human behaviour. A few models have been suggested in literature but for the purposes of this intervention, the theoretical concepts from two models have been applied. These two models are the Hook Model and Fogg's Behaviour Model. The following section will explain both models and their history and explain how they are relevant in the designing of a gamified application for university students to motivate them to work consistently.

3.1   Persuasive technology models

The first persuasive technology model is the Hook Model which was created by Eyal and Hoover in 2013. This model is used as a basis of flow (Figure 2) in order for one to understand how technology can be used to change behaviour. The basic premise of this model is that when one is triggered through the use of technology, one then acts in a certain way in anticipation of a reward and thereby investing in the process of the anticipated changed behaviour.
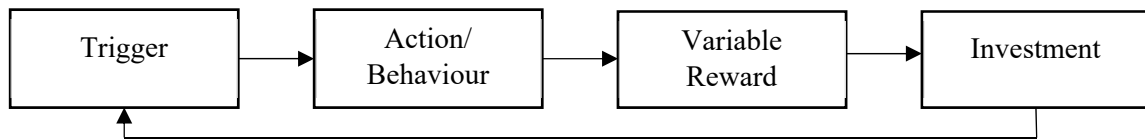
Figure 2: Hook Model (Eyal and Hoover, 2013)

The Hook Model assumes that a trigger is all that is required in order for a changed behaviour to occur. It proposes that technology can be used as a trigger for the end user to act in a certain way in the anticipation of a reward and thereby investing in the process of the anticipated changed behaviour (Eyal and Hoover, 2013). The Hook Model assumes that technology is the only external force required to influence an act of changed human behaviour. For example, under the Hook Model, the use of an email notification to a student reminding them to read a chapter before attending a lecture is all that is required for them to read the chapter. Fogg, however, suggests that in order for a technological trigger to be effective, the end user needs to have a sufficient amount of motivation and sufficient amount of ability for there to be a changed behaviour (Fogg, 2013). Under this premise, Fogg developed Fogg's Behaviour Model which suggests that in order for behaviour to be influenced, the three elements of motivation, ability and trigger must occur at the same time (Fogg, 2013). A trigger is deemed to be unsuccessful and therefore not resulting in the intended behaviour when motivation and/or ability is low. A trigger is successful when the user is motivated and able to perform the task relatively easily. The Fogg Behaviour Model also suggests that motivation and ability can compensate for each other in order for a trigger to be successful. If for example, a university student has low motivation to read a chapter before a lecturer but it more than capable to perform this task due to its simplicity, then the trigger required would be one that motivates the student to perform the task required. The opposite is also true, if the university student is highly motivated to complete the task but struggles with understanding the learning material, then then trigger would need to focus on simplifying the task in order for the behaviour or action to occur. Both the Hook Model and the Fogg Behavioural Model provide useful insights in understanding how to develop a system that incorporates human psychology and technology in the context of education. These two models can be used in combination as illustrated in Figure 2 below.
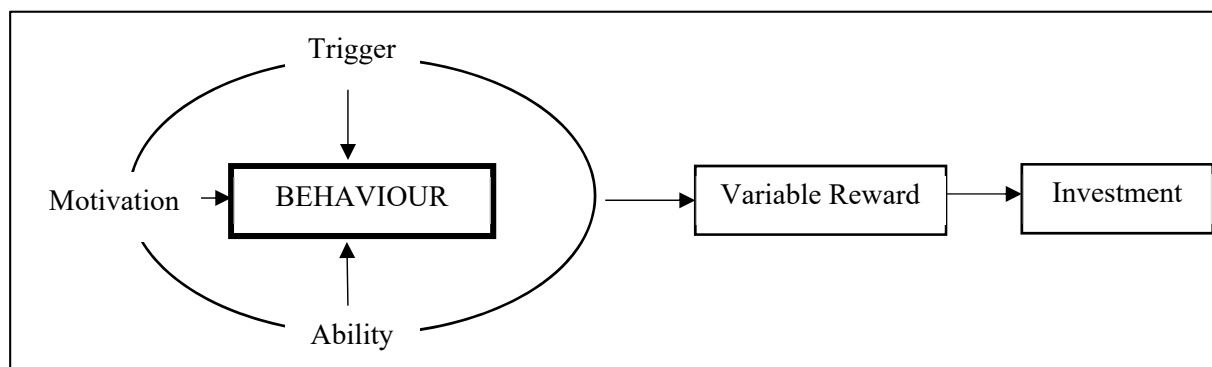
Figure 2: Hook and Fogg Behaviour Model combined (Eyal and Hoover, 2013; Fogg, 2013)

These two models in combination can be used as a base for designing an educational persuasive technology system using gamification. The objective of this paper is to use a gamified solution in the name of WorkSmart Rewards Programme ™ as a case study of how to apply persuasive technology to assist students at a university level to work consistently. The concept of persuasive technology will then be described in depth through the case study of a gamified solution designed and implemented using psychology, behavioural economics and technology at a university in South Africa. The following section describes how this gamified solution was designed in line with persuasive technology models. A new working model is then suggested as a framework to use in an education context.

4.   CASE STUDY: WORKSMART REWARDS PROGRAMME

4.1   Overview

The WorkSmart Rewards Programme ™ is a gamified solution that was developed and designed in response to the problem faced by South African university students: the lack of motivation and will power to work consistently. This gamified solution is a part of a larger project to create an educational system that persuades university students to work consistently and to gain life skill principles and habits that they will use when they enter the world of work. This gamified solution was incorporated into a second year Financial Management module at a South African university called the University of Johannesburg. The basic premise of this programme is to motivate university students to work consistently whilst still preserving their autonomy by encouraging them to make decisions that are in their best interest rather than forcing them. An online learning management system (LMS) called Blackboard ® was used as the technology platform to implement it. All students at this South African university have free access to this online platform.

The WorkSmart Rewards Programme provides a platform that appeals to the system 1 part of the brain of university students by incorporating game play elements into its structure to motivate them to work consistently. The programme also simultaneously develops the system 2 part of the brain of university students by systematically demonstrating the concept of working consistently through the use of gamification. During the semester, students have a series of tasks that are available to them that they are encouraged to complete on a weekly basis. All the tasks are uploaded and assigned on the online learning management tool called Blackboard ®. Successful completion of these tasks leads to points being awarded to the student. The students are notified of the points that they gain on a weekly basis through the use of online badges in order to motivate them to continue to work consistently. At the end of the semester, the total amount of points accumulated during the semester are tallied and the students are assigned a status level based on the number of points accumulated. Each status level determines the reward that the student will receive at the end of the semester. There are two types of rewards: an intangible reward and a tangible reward. The intangible reward is the percentage mark that will

contribute towards their semester mark and ultimately their final mark after completing the last assessment opportunity. The tangible rewards are physical prizes awarded to the top achievers during the semester. Both of these rewards are incorporated in order for the university student to remain invested in the process of working consistently in order to pass the module at the end of the semester. Figure 3 below gives an overall illustration of the WorkSmart Rewards Programme.

Figure 3: Process description of the WorkSmart Rewards Programme

The aim of this study is to design a gamified solution using persuasion technology in order to motivate university students to work consistently with the ultimate aim of them passing the module. The purpose of this paper is propose a theory of change with regards to how university students are motivated to work consistently in order to pass. The traditional approach used at universities was a paternalistic in nature as it restricted the freedom and responsibilities of the students. The approach that is being proposed is a libertarian paternalistic approach which still has the intention of affecting the behaviour of the university students while also respecting their freedom of choice. This approach is widely used by the American government to nudge its citizens to make decisions that are in their best interest by creating environments that make making the right decisions conducive (Benartzi, Beshears, K.L. Milkman, Sunstein, Thaler, Shankar, Ray, Congdon, and Galing. 2017). This is called choice architecture (Ungemach, Camilleri, Johnson, Larrick and Weber, 2017).

4.2 Underlying conceptual framework

The WorkSmart Rewards Programme uses choice architecture by using behavioural tools to frame university students to make good decisions in their best interest with regards to working consistently throughout the semester. This programme takes into account the limited will power that university students have to make decisions to invest in their "future self" by forgoing present desires. The programme was designed with the knowledge that the human brain operates under two systems and so the programme aims to persuade the system 2 part of the university students' brain to work consistently with the aim of this skill becoming a system 1 whereby it comes naturally and automatically to the students. The programme also incorporates the nudge theory which is a concept that encourages positive reinforcement as a way to influence the decision making processes of the university student body. Using the nudge theory provides the educator with a tool to designing a platform that gives rewards and incentives while "nudging" the user to change their behaviour and in this case with regards to working consistently.

4.3   Theory of change: persuasive technology education system

The Hook Model and the Fogg Behavioural Model combined will now form the basis of creating a new framework for persuasive technology that can be used in an education context. A framework called the WorkSmart Rewards Programme Persuasion Framework is suggested below and then an explanation of each element is given thereafter.
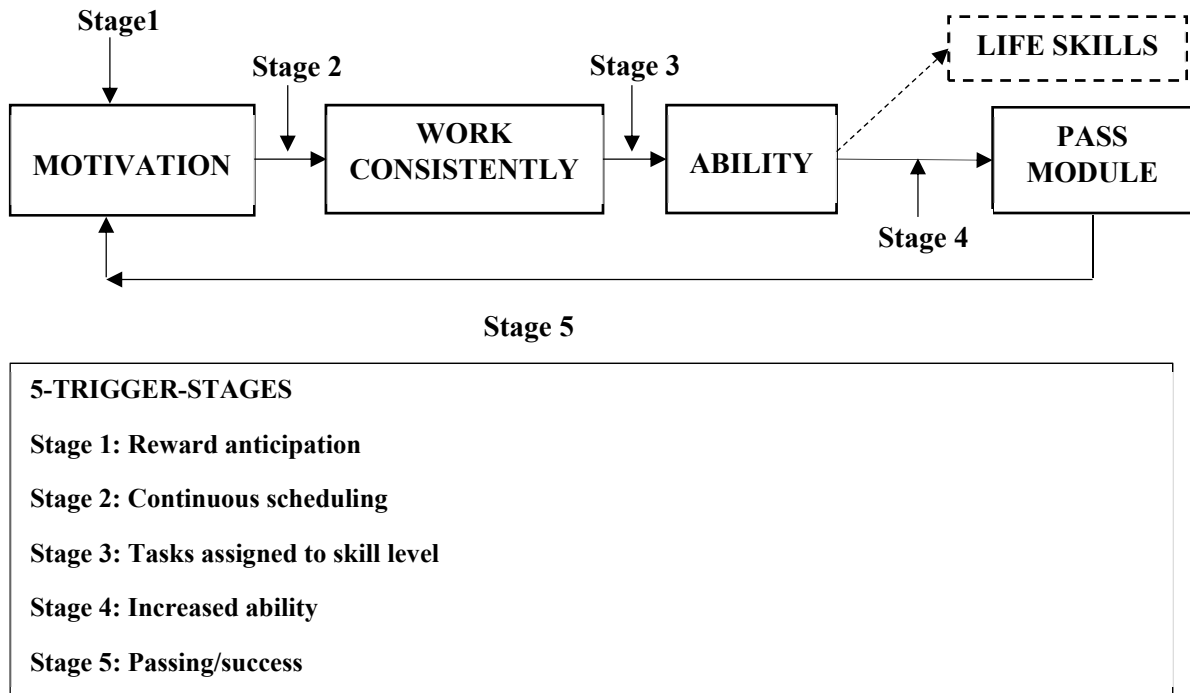

Figure 3: The WorkSmart Rewards Programme Persuasion Framework (The 5 step educational persuasion technology system)

The overall aim of the WorkSmart Rewards Programme (WRSP) is to motivate university students to pass the module where the WSRP is implemented. It is a system that includes the accumulation of points upon successfully completing certain tasks in order to achieve a reward status. The WSRP persuasion framework in the figure above illustrates that in motivating students to work consistently, their ability to perform the tasks increases and thereby leading to an overall success of the module. The system incorporates five different triggers being (1) anticipation of a reward, (2) continuous scheduling, (3) tasks assigned to skill level, (4) increased ability and (5) passing/success. These triggers work in sequential stages and depend on the preceding trigger to be successful in order to move on to the next stage trigger. The system will be explained below under the 5 different stages as explained in the following section.

4.4 The five-stage trigger system

Stage 1 trigger: Reward anticipation and Motivation

The first stage of this educational persuasion system is to motivate the university students through the anticipation of a reward at the end of the semester. The first type of reward is an intangible type of reward represented in the form of status levels as shown in Table 1 below.

Status Level	**BLUE**	**BRONZE**	**SILVER**	**GOLD**	**PLATINUM**
Points range	10 - 49	50 – 199	200 - 249	250 - 299	300 – 410
Percentage contribution	10%	40%	50%	75%	100%

Table 1: Reward status levels for the WorkSmart Rewards Programme

The trigger in this first stage is the anticipation of a reward at the end of semester in the name of a percentage contribution to the students semester mark. A higher semester mark gives the student a higher possibility of obtaining a higher final mark for the module. The purpose of the stage 1 trigger is to provide motivation via external means. Research shows that there are two types of motivation: namely, extrinsic motivation and intrinsic motivation. Extrinsic motivation is one which depends of the anticipation of an external reward in order for an act to occur. Intrinsic motivation is one where a user is motivated to complete a task or change a behaviour purely on the anticipation of the internal joy and contentment that this will give the user (Firat, Kilinc and Yuzer, 2018). Studies have shown that action based on extrinsic motivation is short lived and that there has to be intrinsic motivation being developed in order for the intended behaviour change to have long term effects. The purpose of this stage 1 trigger is to appeal to the students system 1 part of the brain so that they have that initial engagement and interest in the module. The anticipation of a reward in itself is not enough to keep the students motivated to work consistently throughout the semester so another trigger is required which is explained in the next section.

Stage 2 trigger: Continuous scheduling and working consistently

The second stage of the persuasive education system involves using continuous scheduling that will assist the students to work consistently. The system is still operating in the extrinsic motivation realm because motivation initially is low as a result of uncertainty faced by the students with regards to their abilities in terms of the module content. The purpose of the continuous scheduling is to give the students a structure that they can adhere to in order to develop the skill of working consistently (Fogg, 2011). Tasks are assigned to the students on a weekly basis and are designed to enable them to consolidate their learning at the end of each week as content is completed. All the tasks are available to the students on the online learning management system. There is no weekly deadline attached to the tasks so as to preserve their autonomy as suggested by behavioural economists in creating a choice architect environment that nudges the user to make decisions in their best interest (Thaler, 2015). In this system,

the educator is creating an environment that will enable the student to work consistently but without taking away their freedom of choice. They are encouraged to complete their tasks on a weekly basis through weekly announcements on the online platform and in class. The use of badges is used to encourage and motivate the students to continue to engage with the content. The purpose of this stage of the persuasive system is to develop system 2 of the students' brain to encourage them to tackle things that a seemingly difficult on the onset and to make them realise that with practise it will become easier. Fogg (2013) explains that the outcome of desired behavioural change comes from an accumulation of tiny habits. These tiny habits of working on a consistent basis is what forms everlasting change and so for behaviour to be changed it needs to be done slowly but surely.

Stage three trigger: Task assignment and Ability

In order to change behaviour, one needs to have a certain amount of ability to do so (Fogg, 2013). When a university student initially engages with a module, they usually have low ability with regards to the understanding of the course content. This is why this stage of the persuasive system is important as it triggers the students to gradually increase their ability as they complete each subsequent tasks. The students are able to do so as the tasks are pitched at varying degrees of difficulty and the student only proceeds to the next level of difficulty once they have ascertained to have successfully completed the current level of difficulty/ability. Csikszentmihalyi (1997) explains through the "Flow State" that in order for a human brain to engage with something, the level of difficulty needs to be increased gradually. The tasks that are assigned to the students not only test their knowledge of the module content but also have other skill proficiencies embedded into them such as critical thinking skills, analytical skills, time management skills and writing skills. These are skills that have been identified as to being important for a university graduate to have as they enter into the world of work where the Fourth Industrial Revolution will shape the jobs that will be available in the future. By the time the student enters into this stage of the system, they are able to work using internal motivation as their ability increases. They are still driven by the anticipation of the reward at the end of the semester but are able to work independent to the realisation of that reward. This stage is still developing system 2 part of the brain and by now the student is able to handle difficult concepts more easily than before as the concept of working consistently becomes a habit.

Stage four trigger: Increased ability and Passing module

The stage four trigger is the students increased ability to perform the tasks that were assigned to them on a weekly basis. This trigger is the one that motivates and enables the student to subsequently pass the module. In this stage the student is able to function beyond a system and they have a sense of fulfilment in their potential and talent. This according to Maslows hierarchy of needs is the stage of self-actualisation (Maslow and Abraham, 1954). Maslow suggests that any motivational system needs to address the higher level needs of people. In this stage, the student has a higher level of internal

motivation and is able to operate mainly on self –fulfilment (Pardee, 1990). Working consistently was initially something that was in the system 2 part of the brain as it took effort and deliberate action, is now in the system 1 part of the brain as it becomes a natural inclination and requires less effort. The purpose of the persuasive educational system is to for the students to reach stage four of the system by the end of the semester. This then being in line with the goal of the student passing the module and also taking ownership of their learning. The motivation to work consistently would have moved from the responsibility of the educator to motivate to the responsibility of the student to motivate themselves.

Stage five trigger: Passing/success and Motivation and life skills

The Fourth Industrial revolution has forced educators to rethink what skills their graduates need to have when they enter the world of work. The technical skills required for the future are uncertain so educators need to also place emphasis on the professional skills so that students are better equipped to take the challenges they may face in the future. Stage five of the persuasion system is a stage whereby the student uses their past experience of success from working consistently to motivate them to continue working consistently in other modules and in life. With every new endeavour, the student will now have a strategy that will assist them to increasing their motivation and their ability and ultimately achieving their outcome at the end.

The WorkSmart Rewards Programme Persuasive System is designed to assist students to work consistently during the semester with the aim of them successfully completing the module and also accumulating life skills that they can use later. It incorporates five stages of triggers in order to influence the university students to engage with the course content and then ultimately take ownership of their learning process.

5.   FUTURE WORK

Technology has become ubiquitous with our daily lives and it is a good source to use to affect and/or change behaviour through increasing motivation and ability. Future work includes creating a prototype for a mobile application that students can download at the beginning of the semester and use throughout the semester. The purpose of this application would be so that the students have easy access to the tasks and progress as they will be able to track their status at any given time. The mobile application will also include additional triggers such as notifications to remind the students to complete tasks. The notifications will also act as motivation as the student is notified of reaching a new status. The application will assist the students to engage with the course content at a continual basis. Future work also includes implementing real life tasks that the student will engage with on a weekly basis.

6.   SUMMARY

Motivating university students to work consistently during the semester so that they can pass the module can be difficult. The use of technology can assist educators to increase the motivation levels of the

students. Motivation in itself is not enough to change behaviour as one needs to exhibit a certain level of ability as well. Triggers are a useful tool to use in order to increase motivation and ability and then ultimately alter behaviour. The WorkSmart Rewards Programme Persuasive System was designed to be used as a technology intervention to motivate students to work consistently and pass the module. The system includes the use of psychological theories and behavioural economics and five different triggers that assist the user to change their behaviour. The ultimate aim of all five triggers in this proposed system is for the students to work consistently, pass and to take ownership of their learning. The system is currently designed and used on the online learning management system called Blackboard. A mobile application prototype is the next step to be used in combination with the existing system on Blackboard. The system will be used to alter students' behaviours and assist them in making decisions that are in their best interest without taking away their freedom of choice.

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