

A Theoretical Framework for Gamified Learning

Sridevi Nair, Jain Mathew



Abstract: *The term ‘gamified’ has been applied to a large number of processes in the organization. Marketing professionals have attempted to gamify customer experiences, while human resource managers have attempted to gamify employee processes like recruitment and onboarding. Being a powerful driver for goal-oriented behavioural change, gamification has the potential to revolutionise the way people work, collaborate, and develop. However, the application of gamification has met with limited success in the organization. Researchers have attributed this lack of success to incomplete understanding of the concept. The current study reviews literature in the area of Gamification in an attempt to arrive at a conceptual model explaining how gamification drives learning. The model proposed in this study is simple and draws from key theories related to Learning and use of technology. The purpose of the review is to provide a base for future researchers and a basic understanding for practitioners attempting to introduce gamified learning.*

Keywords: *Gamification, Learning, Theoretical Framework, Review*

I. INTRODUCTION

Gamification has been described as the process of using game elements in a traditionally non game scenario, to provide the scenario with game like characteristics. The construct has been receiving increased attention from training professionals. This has been attributed to the need to identify and use learner centric methods in training, rather than the didactic model of trainer led learning (Simon, 1996). The shift in how learning is viewed is based on greater understanding of how human beings learn. While the cognitive development in children has been studied since Piaget’s theory of Cognitive Development (1964), researchers are still attempting to understand how learning takes place in adults.

The increasing use of technology at the workplace is the second reason for the interest in gamification. The use of technology first led to the inclusion of Video Games in learning and these proved to be effective tools for learning, especially in the case of complex matters (Cordova & Lepper, 1996). Although, the concept of gamification is not identical to that of game-based learning, the possibility of something game-like being used for learning led to researchers exploring the characteristics of games that could make the learning process effective (Bedwell, 2012).

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Thirdly, the interest in gamification has also been attributed to the changing demographics at the workplace. The growing presence of Gen Y or the “Digital Natives” (Prensky, 2001), at the workplace has led trainers and researchers to evaluate and identify instructional modes that would engage and motivate them to learn.

Malone (1981), is considered one of the first to attempt to evaluate and associate games with learning. However, structure to the concept of serious games was only brought in three decades later by Bedwell et.al. (2012). While most researchers have focused on differentiating the concept of Gamification and Serious Games, Landers (2015) has advocated for understanding the similarities. In his studies, he proposes that although the constructs may be slightly different, researchers and practitioners would gain from borrowing from the literature of Serious Games and the focus must be on advancing the field rather than on creating a new set of theories and taxonomy.

The current article reviews theories in the area of learning that have been commonly referred to in studies on Gamification and Learning. The proposed conceptual model draws from these theories to provide a basis for future research. The review and the proposed conceptual model are focused on “how” gamification facilitates learning and not “why” Gamification.

II. REVIEW OF LITERATURE

For the purpose of this paper, the researchers have reviewed the commonly cited theories in gamification studies. These are some of the key theories that support the proposition that Gamification would lead to better learning outcomes. These theories propose variables that would predict outcomes of learning.

A. Self-determination Theory

The Self-determination Theory or SDT was one of the first macro theories that linked motivation, development and wellness (Deci & Ryan, 2008). While the theory dates back to the 1970s, the first concrete statement was presented by Deci & Ryan (1985). The main difference between SDT and other motivational theories is that SDT treats motivation as autonomous and controlled motivation, rather than a singular concept. Autonomous motivation deals with intrinsic motivation and the type of extrinsic motivation that arises from the belief that there is value to be gained from the activity. This category of motivation would lead to “self-endorsement” of the activity (Deci & Ryan, 2008). Controlled motivation, on the other hand, arises from the expectation of punishments or rewards or the need for approval, avoidance of shame, self esteem requirements and ego related outcomes.

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These motives would force the person to behave and think in a certain way. Both sets of motivation would drive behaviour and are different from amotivation, which is lack of intent (Deci & Ryan, 2008). Amotivation would prevent the participant from even joining in the experience while controlled and autonomous motivation would both encourage participation.

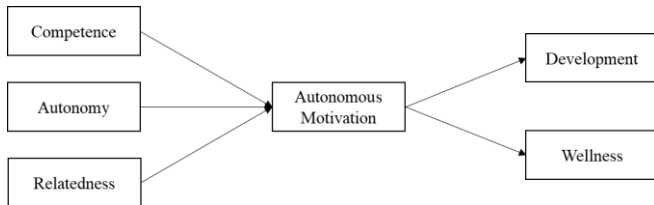


Fig 1: Representation of the Self Determination Theory

As per the SDT, the key is to encourage and focus on Autonomous Motivation and this motivation is driven by the psychological needs of competence, autonomy, and relatedness. There is considerable empirical evidence for the universal nature of these needs and their relation to performance and physical and psychological well-being (Ryan & Deci, 2000; Meyer and Gagne, 2008). According to SDT, human beings are driven by three main motives; the need to experience mastery and control outcomes, to interact and relate to others and to remain the causal agents of their own lives. If an individual perceives that a particular activity would result in the fulfilling of any of these needs, they are self-motivated to participate.

B. Experiential Learning

Kolb (1984) has been attributed for the shift from trainer focused learning interventions to trainee focused learning interventions. While the theory of experiential learning draws from the works of prominent scholars like Jean Piaget, John Dewey, Carl Jung and others, it combines the work of the scholars to provide a holistic and dynamic model of learning. The application of Experiential Learning Theory (ELT) was first seen in the classroom with academic learning. The success of the model in the academic scenario has led to its acceptance and application in other spheres, including organizational training (Kolb, 2007).

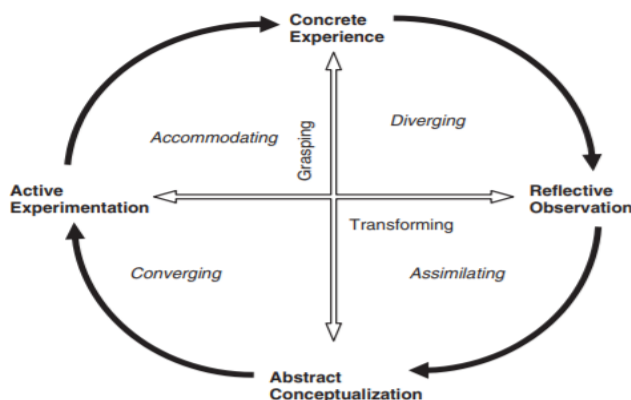


Fig 2: Representation of the Experiential Learning Theory

The ELT cycle provided by Kolb (1984), suggests that learning is a cyclical process that involves two pairs of processes that are dialectically related; Concrete Experience (CE) - Abstract Conceptualization (AC) and Reflective Observation (RO) - Active Experimentation (AE). The

learning process would ideally involve the learner touching all four bases at some point in time. The Concrete Experience (CE) would lead the learner to Reflective Observation stage (RO), where the learner would reflect on the experience and draw on the process of Abstract Conceptualization (AC) to create abstract concepts that would be tested through Active Experimentation (AE).

ELT draws on six propositions shared by the key scholars in the area of learning and development. Firstly, Learning is viewed as a process and not as an outcome. Secondly, the learning process is continuous and involves learning and relearning. Thirdly, as represented in the ELT cycle, the learning process requires the movement between opposing modes of reflection and action. Fourth, learning is a holistic process and draws on the functions of thinking, feeling, perceiving and behaving. Fifth, learning requires a positive interaction between the learner and the environment. Lastly, the learning process must involve the creation of knowledge where in the personal knowledge of the learner creates social knowledge as opposed to the traditional practice of teaching where transmission of knowledge took place, from the society to the learner.

C. Input-Process-Output Model (2002)

This model was proposed by Garris et.al. (2002). In their study, they proposed that the main aim of any training intervention was a motivated learner. Skinner and Belmont (1993) found that a motivated learner was easily identifiable but difficult to find and more difficult to create. In order to understand the creation of a motivated learner, researchers attempted to understand the process of creating the motivated learner. Since an individual can be intrinsically and extrinsically motivated, studies have been divided on which to focus on. While researchers like Malone (1981) have emphasized the need to focus on intrinsic motivation, Vallerand et. al. (1997) believe that every task is evaluated as a means to an end. While intrinsic motivation has been touted as the key determiner of learner behaviour, extrinsic motivation can also encourage learner behaviour by promising value creation and positive outcomes.

The model proposed by Garris et.al.(2002), suggests three major steps. The first step involves the design and creation of instructional material with game like features. This material would then trigger a cycle of learning which involves the user judgement of the material or reaction to material, user behaviours, like time spent on the task, and system feedback. If the integration of the game elements to the instructional material has been carried out correctly, the process would continue as a loop. This loop would then result in the third phase of learning outcomes. Thus, they have modified the traditional training input-process-output format to represent the repetitive nature of the training process when games are involved. The belief is that the use of a game or inclusion of the game like features would result in trainee motivation to revisit the training and make learning an iterative process (Garris et.al., 2002).

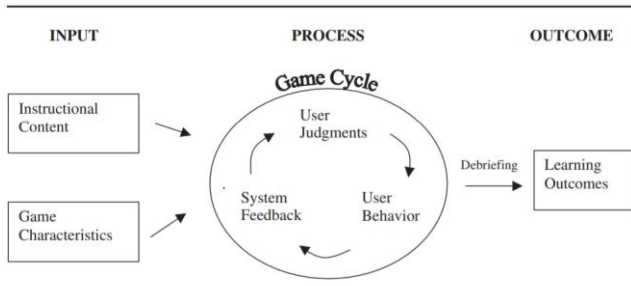


Fig 3: Representation of the Input-Process-Output Cycle

D. Kraiger’s Model of Course Performance

As per Kraiger (2003), there are only three determinants of the outcome of a learning process. The first one relates to motivation or the trainee’s willingness to participate in the training. The second refers to the learner trainability or teachability. This is a reflection of a variety of trainee characteristics like intelligence, focus etc. These are more individual characteristics of the participants. The last determinant represents the learning environment. This is termed as Opportunity and represents the time and resources invested in the learning process.

The model has been considered similar to Campbells (1990) model of Job Performance, where three factors are discussed as determinants of Job Performance. Similar to the model of Determinants of Job Performance, Kraiger’s model has also been represented as a multiplicative model;

$$\text{Learning} = \text{Teachability} * \text{Motivation} * \text{Opportunity}$$

Thus, each element must be present, in some measure, for learning to happen. If any one of the elements is zero, it is unlikely that learning would happen.

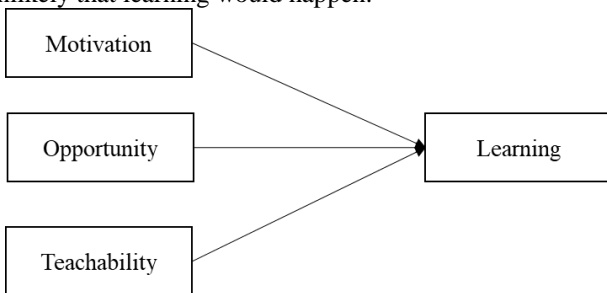


Fig 4: Representation of Kraiger’s Model of Course Performance

E. Theory of Gamified Learning

Landers (2014), suggested the need to have a theoretical framework, specific to Gamification. His studies draw from literature on serious games. According to him, when there are two concepts that are significantly similar, there is a need to understand what differentiates them and see how the concepts can be linked, rather than create a whole new set of definitions, taxonomies, models, and frameworks. This thought was based on the law of parsimony, as applied to scientific enquiry, that suggests that “multiple theoretical constructs should not be used when a single construct would suffice” (Cole et. al., 2012). This is primarily been suggested so that resources are not divided in developing two similar constructs but are used to advance the knowledge about the constructs (Le, Schmidt, Harter, & Lauver, 2010).

In the case of gamification, Landers (2014) suggests that the construct is similar and overlapping with the construct of Serious games. While serious games involve the application

of all the elements of games, gamification proposes the identification and use of only the required game elements to existing instruction.

In his paper, Landers (2014), evaluates the Input-Process-Output model that was proposed by Garris et. al. (2002). According to him, the model suggests that the instructional material drives the process and triggers the cycle that results in the training outcomes. However, Tay (2010) has argued that the purpose of the insertion of the game elements is not to teach the learner about the game elements but to influence behaviour and attitude and thereby improve learning. Whitton & Moseley, (2014) have also proposed that the presence of these elements would influence the level of motivation and thereby improve learning outcomes. Based on these and similar studies, Landers (2014) proposed the Theory of Gamified Learning.

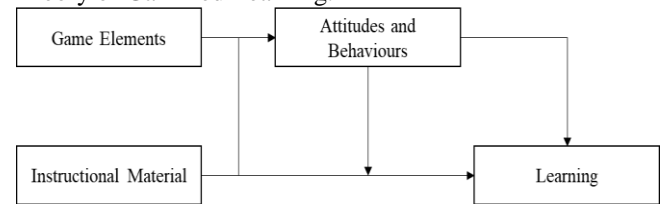


Fig 5: Representation of the Theory of Gamified Learning

The theory of Gamified Learning is based on five propositions. The first proposition suggests that the instructional content would directly impact the learning that is happening. This has been sufficiently explored and evaluated in literature and empirical evidence for the relationship is available (Arthur et. al. 2003; Seidel & Shavelson, 2007). The second proposition suggests that Learning is influenced by learner attitudes and behaviours. Paas et. al. (2005) found that the learning was directly proportionate to the effort that was put into the process. Zhao & Kuh, (2004) suggested that the level of participation would influence the learning. Similarly, it was found that levels of engagement could predict the learning that would result from the intervention. Thus, there is support for the second proposition.

The third proposition of the theory suggests that the Game Elements are likely to influence attitudes and behaviours. Support for this proposition can be found in the literature for serious games (Wilson et. al., 2009). The fourth and fifth propositions are the key relationships in this model. The fourth suggests that the Game Elements moderate the relationship between the instructional material and learning outcomes, through their influence on learner attitudes and behaviours. However, the moderating effect would not independently influence the outcome, but would only strengthen or weaken the initial relationship. Thus, the quality of the original material would still determine the strength of the relationship.

The last proposition looks at the role of the game elements in directly influencing the dependent variable of learning. Landers and Callan’s (2011), in their studies, used the elements to encourage a certain behaviour and found that this improved academic performance. This relationship of mediation is expected to be the primary role played by gamification (Hamari, Koivisto, & Sarsa, 2014).



F. Technology Enhanced Training Effectiveness Model

The change in the work environment and the increased adoption of Technology, require the analysis of the role of technology and its impact on the effectiveness of training. To this effect, Landers and Callan (2012), proposed that there are three main factors that would need to be considered while attempting to enhance training with the application of technology. The first factor to be considered is at the organizational level. At the organizational level, the organization culture could reduce the training effectiveness.

A culture that is skeptical or unresponsive to technologically enhanced training would hinder its functioning. This would be measured in terms of the Organization Climate and Supervisor Support. Similarly, at the individual level, the person's attitude towards technology and the experience with technology are likely to influence the effectiveness of the training. These two sets of factors are expected to moderate the relationship between the Training Design and the Learning Outcomes of Reaction and Learning.

TETEM was primarily developed in order to evaluate training effectiveness in the Virtual World. It was derived from Baldwin and Ford's (1988) model of training effectiveness that proposed that the key predictors of Training Outcomes were Trainee Characteristics, Work climate and Training Design. Training Outcomes, Work Climate and Trainee Characteristics were then expected to influence the Training Transfer. While applying the same model to the context of Gamification, Landers and Armstrong (2017) proposed that while the original model was meant for Virtual Worlds, technology could imply any form of technology, even the regular mobile phones.

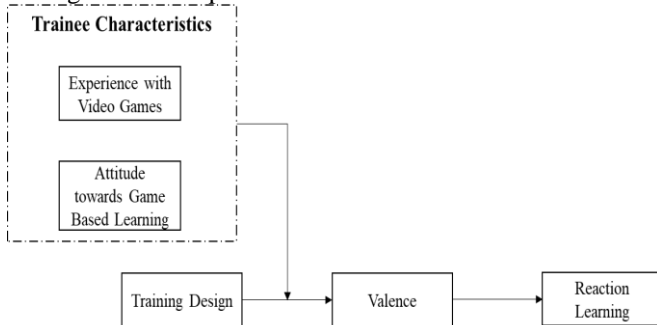


Fig 6: Representation of the TETEM

They proposed that, similar to the original model, the Trainee Characteristics associated with the use of technology would moderate the relationship between Training Design and Pre-Training Valence and thereby influence the Reaction to the Training and Learning from the Training intervention (Landers, 2012). In a study by Landers (2012), the model was tested on Students and empirical evidence was found that supported the proposed model. Hamari et. al. (2014) proposed that the increased pre training valence for a gamified module could be attributed to the novelty factor of the instructional material. The moderating effect also found support in the sample, with people who claimed to be uncomfortable with technology indicating that they did not feel there was much value add from the training and that they would prefer a traditional PowerPoint system to the gamified module.

III. METHODOLOGY

The research article reviews theories that support the application of gamification to the learning process. Identification of the key theories was carried out by reviewing papers written in the field of Gamification, Serious Games and Learning. The theoretical frameworks presented in the research papers were reviewed and the key theories were identified. While a large number of theories have been cited in gamification literature, the researchers found that the above theories were among those commonly referred. The reviewed articles were published in reputed journals and sourced from ProQuest and in some cases, directly from the authors. This was done to ensure quality and reliability.

IV. DISCUSSION

The theories linked to the field of Gamification and serious games are many. In the current article, the researchers have reviewed some of the key theories in order to arrive at a theoretical framework for the understanding and application of Gamification to the area of Learning.

Most researchers have defined gamification as the application of game elements to a non-game context (Deterding et. al. 2011). The definition suggests two main points for researchers and practitioners of Gamification. The first is that Gamification is a process and not a result (Landers, 2012) and secondly, the game elements are to be applied to non-game like scenarios. This suggests that any process can be gamified by the addition of the game elements. Landers (2019), in his paper discusses how gamification is misunderstood and misused. A large number of organizations jump to the application of games, believing that they are gamifying without taking the time and effort to understand how gamification must be done and evaluate which game elements would serve their purpose. This leads to large amounts of money being spent and poor results.

The first step in the gamification process would involve the understanding of the term 'Game Elements'. The popularly considered elements are; Points, Leader boards, Achievements or Badges, Levels, Story or Theme, Clear Goals, Feedback, Rewards, Progress and Challenge. Bedwell and colleagues (2012) provided a list of attribute categories that they believed existed in every game; Action Language, Assessment, Challenge, Environment, Game Fiction, Rules, Interaction, Immersion and Control. Landers (2014) proposes that the game elements in Deterding et. al. (2011) are related to the attribute categories listed earlier. For example, the game element of Leader boards is expected to provide the characteristics of Assessment, Challenge and Rules. This allows us to borrow the categories from Serious Game literature.

The second step involves understanding the purpose of gamifying. The game elements are expected to enhance the instructional material in order to provide better learning outcomes.

As per the Theory of Gamified Learning, these outcomes are achieved by changing an attitude or encouraging a certain behaviour in the learner (Landers 2014). As per Self Determination Theory and Kraiger’s model, the mediating variable in this relationship would be Motivation. These theories suggest that a prerequisite for learning is Motivation. According to Vroom (1964), as explained by the Expectancy Theory, a major driver of motivation would be the perceived, expected value of the outcome. In the case of Training, the Learning that the participant would expect to gain from the process, the perception of the quality of the interaction and the whether they believe the process is worth their time and effort would be some factors that would drive motivation and especially intrinsic motivation. Vroom (1964), calls this Valence and in the case of Training, practitioners and researchers commonly refer to this as pre-training valence.

Thus, the game elements are intended to increase the pre training valence.

Valence is expected to make the learning process more self-driven and thereby improve learning outcomes (Landers, 2014). Thus, Valence would impact the learning outcomes. Kirkpatrick (1975) proposed the four levels of training evaluation. These have been popularly applied to training because of their simplicity in understanding and measurement. The four levels correspond to Reaction, Learning, Behaviour and Results. Given that the last two are to be measured over time, most researchers focus on the first two levels while evaluating training effectiveness. The TETEM proposes that the instructional design would impact the first two levels of Reaction and Learning and the repetitive use of the gamified module is expected to result in behavioural change (Landers, 2012).

Based on the discussed relationships established by the different theories, the researchers propose a theoretical framework for Gamified Learning that draws from the key theories.

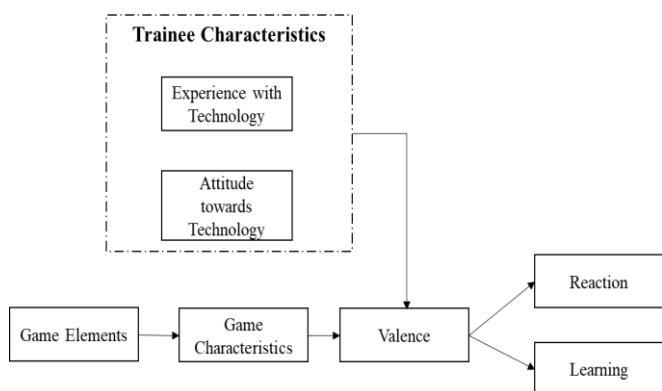


Fig 7: Conceptual Model

The first relationship suggests that the different game elements are expected to provide game like game characteristics to the module. This in turn would improve the pre training valence of the trainee and training outcomes of Reaction and Learning. This relationship has been drawn from the Theory of Gamified Learning. The third relationship is based on the TETEM. In a technologically enhanced scenario, the pre training valence is likely to be influenced by the trainee’s attitude towards the use of technology and the comfort or experience with technology. The fourth proposed relationship is based on the self-determination theory. This represents the relationship between valence and the learning

outcomes. If the individual perceives value in the task, the outcomes are likely to be better (Vroom, 1964)

The conceptual model links Gamification to the literature on serious games. Landers (2014) proposed that the linking of the literature would allow the focus to shift from differentiating and reconstructing the construct to building and advancing the area. The need for a simple model that allows clear understanding would promote the correct application of the concept. The construct of gamification went through a similar hype cycle in 2012, which resulted in a popularity crash around 2014 (Dale, 2014). “Despite emerging from its popularity crash, the growth of gamification research and practice has remained inconsistent. I attribute this primarily to construct confusion among both scholars and practitioners regarding the relationships between the term gamified and other game-related terms.” (Landers, 2019)

V. SCOPE FOR FUTURE RESEARCH

The proposed model has been based on the relationship established through the different theories related to the field. The moderating influence of the Trainee characteristics would require further evaluation. These characteristics would vary with a range of demographic variables and would need special consideration while implementing gamification in an inclusive environment. Research would also be required to understand the Game Elements that form the basis of Gamification. Unlike Games, Gamification proposes the selective inclusion of game elements based on the desired learning outcomes and the desired change in behaviour and attitude to drive that learning. While popular frameworks like the Octalysis Framework (Chou, 2015) have attempted to link the elements to the “core drives” of human behaviour, further research would be required to understand the degree and type of impact of the individual elements on Learning Outcomes.

VI. CONCLUSION

Gamification has followed the Gartner hype cycle since 2011 (Dale, 2014). In 2014, the concept was very close to the Disillusionment phase. It was then revived and emerged from the crash in popularity. However, even in the current phase, the concept remains misunderstood and mistaken for actual games. Practitioners have taken to the blind use of games in their training modules and terming the practice as gamification. While researchers like Landers (2012) advocate for borrowing from literature and taxonomy of serious games, there is a need to understand the difference, to prevent wastage of resources, proper application of the concept, better benefits and development of the field. The current paper provides a theoretical review of the field of gamification and proposes a conceptual model that draws from the key theories applied in the field. The purpose is to provide a snapshot of years of research into gamification. The framework explains how gamification can improve learning outcomes by influencing certain attitudes and behaviours in the learner. This could provide a basic understanding of the concept for practitioners and a base for future researchers to build on.



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