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## **DEVELOPING HUMAN-FACTORED MODEL FOR LEARNING SOCIAL BEHAVIOUR DURING GAME PLAYING**

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### **Abstract**

The purpose of this study is establishing the foundation towards developing appropriate learning technology using gamification concept to nurture children's good social behaviour values. With the advent of increasing technological accessibility among children, the authors found parallel increasing need for incorporating actual face-to-face social skills currently missing in learning activities for children. There is a need to inculcate human factor in learning activities for 21<sup>st</sup> century children. This is a desktop review analysing social factors in gamification, gamification elements effecting social behaviours, and gamifying human behaviours. The analysis leads towards identification of learning activities affecting social behaviour, components for gamifying social behaviour, and gamifying social factors which are critical for affecting learning social behaviours among children. The results lead towards the development of a human-factored model for educating positive social behaviour amongst children. Results from this study are expected to guide the development of technological-supported educational applications that encourage inculcation of prosocial behaviour for 21<sup>st</sup> century children. Future educational tools are expected to support Sustainability Development Goal 4: provision of quality education to all.

*Keywords:* Human-systems integration, education and training, social behavioural changes, user-centered design and sustainable design informatics

### **Introduction**

Gamification has become phenomenon since 2011 when some scholars found games can benefit users especially in the learning context. Deterding et al. (2011) defined gamification as the use of game design elements and characteristic for games in non-game contexts. Prambayun (2015) defined gamification as an activity that uses the game's mechanical elements to solve practicality in a way that attracts a particular group. Instead of focusing on educational performance – using game elements could also influence the players especially in 21<sup>st</sup> century generation (Zichermann, 2011; Lee & Hammer, 2011). Intuitively, gamification has a great potential for enhancing cognitive development, thus increasing children's engagement and promoting certain behaviours to motivate children that empower and engage them (Wastiau et al., 2009; Lee & Hammer, 2011).

In Malaysia, the Malaysian Education Blueprint calls for 21st Century learning and emphasises the use of fun-centered student-centered approaches and strategies (KPM, 2012). Gamification is an effective approach in shaping children who are knowledgeable and skillful in the future (Nazmi et al., 2018). The need to integrate the play approach in early childhood education curriculum has long been identified by researchers in early childhood education (Bodrova & Leong, 2010). Learning through play is more

encouraging through fun and child-centered learning (White, 2012). While in language learning context, scholars pointed play is one of the best ways to help children master in the abstract language concept through concrete experience. This study supports Aliza & Zamri (2014) who argued that play approach is appropriate in preschool for ensuring the effectiveness of language teaching and learning process.

### **Research Objectives**

To identify the element of game that could affect social behaviours and leads good examples to players from game-learning experiences.

### **Research Questions**

There is a need to implement the good social behaviour elements in-game to nurture and educate players about moral values through gameplay.

### **Methodology**

This study conducted a desktop survey on selected topics of socialisation in gamification to build up the foundation for an emerging technological approach in learning. It covers social factors in gamification, gamification elements that effect social behaviour and gamifying such behaviour. For each topic, the study presented major works by prior scholars, how their works could support this study and what aspects need to be enhanced to support inculcating the socialisation aspects in educational games. Then, this paper will analyse how learning activities would emphasise real social interactions such as moral issues and prosocial behaviour for individual culture in creating reciprocal behaviour by “players” during gaming process. This paper concludes with a discussion on potential integrated solutions for development of a theoretical framework in developing a learning technology for supporting language acquisition for 21<sup>st</sup> century children.

## **Literature Review**

### **Socialisations in Gamification**

This section divides socialisation in gamification aspects into three parts. Generally, socialisation is known as the process of inducting the individual into the social world. According to Samiksha (2018), the term socialisation refers to the process of interaction through which the growing individual learns the habits, attitudes, values and beliefs of the social group into which he has been born. It is also a process whereby one internalises the norms of his groups, so that a distinct ‘self emerges, unique to this individual (Horton and Hunt, 1985). Worsley (1982) explains socialisation as the process of transmission of a culture, the process whereby younger generations learn the rules and practices of their respective social groups. The first part will cover social factors in gamification while the second part will elaborate on gamification elements that are effecting social behaviour. Finally, the third part will discuss about gamifying the learning behaviour.

### **Social Factors in Gamification**

Many scholars have identified gamification is a new concept to use elements from video games in non-game application (Simões et al., 2013; Deterding et al., 2011; Kim & Werbach, 2016). Cambridge Dictionary (<https://dictionary.cambridge.org>) defined application as a computer program where software is designed for a particular purpose that user can download onto a mobile phone or other mobile device. Luis et al. (2014) stated that e-learning gamification, which is the use of game-thinking and playful design in non-game contexts, has shown its promise as a motivational tool. On view of this perspective,

Deterding (2013) had highlighted that social factors could predict attitude towards gamification and intention to continue using gamified services, as well as intention to recommend gamified services to others.

De Marcos et al. (2016 & 2017) further explain that social gamification aims to bring together gamification and social networking to combine the potential of both approaches to create compelling socially-driven user experiences. Such combination has been designed to address the situated motivational affordances of children. People could use a variety of social and gameful mobile apps in order to motivate themselves and others to maintain difficult habits such as exercising (Hamari & Koivisto, 2015). Hence, this study agrees that game-based learning activities (GBL) on children could promote positive learning and prosocial behaviours (Chin & Effandi, 2015).

Scholars such as Simões et al. (2013) have proposed the purpose of applying gamification concept in education is for enhancing a children's motivation through game learning activities. In this matter, Deterding et al. (2011) argue that social factors are strong predictors for attitudes and use intentions towards gamified services. The targeted behaviour could reflect the use of gamification to motivate children. For this instant, it is possible to utilise the user's perceptions on how other users perceive the use of such service. Some scholars found support in several studies demonstrating positive effects of gamification plugin compared to traditional e-learning approach specifically in academic achievement (De Marcos et al., 2014). For instance, 3D art class contained gaming components such as storyline and storyboard has proven to increase engagement and motivation of children as compared to traditional teaching methods by using paper, colours and static model (Villagrasa & Duran, 2013).

Amid the rapid growth of this gamification practice, several scholars found gamification practices tend not to take unfair advantage of workers, exploitation, manipulation, intentionally or unintentionally harming workers (Kim & Werbach, 2016). In fact, this study agrees that gamification ethics could be applied in gamification phenomenon to ensure everyone involved in the gamification process would benefit fairly. Furthermore, De Marcos et al. (2016) had stated another benefit from an educational perspective — its ability to harness motivational aspects of gamification to stimulate participation and engagement with learning contents and with other participants. Their study highlights social networks could facilitate communication develop explicit social ties and highlight relevant content elements for participants. Hence, they agreed that social gamification could be used for improving the overall academic performance in practical assignments and for promoting social interactions among children (De Marcos et al., 2017).

Social influence, positive recognition and reciprocity have positive impacts on how much people are willing to exercise for their health as well as their attitudes and willingness to use gamification (Hamari & Koivisto, 2015). The scholars also found that the more friends a user has in his or her, the larger the effects would be. In this regard, the scholars agree on the potential of GBL as an effective approach in nurturing children's positive learning and prosocial behaviours. Herewith, this study agrees with Chin & Effandi (2015) that prosocial behaviour as an important indicator to social and emotional competency over a long period of time. Therefore, this study posits the nurturing of prosocial behaviour among preschool children is a crucial factor, especially within their learning environments.

In summarising socialisation in gamification, this study is recommending a focus on the social elements where gamification could be integrated to create opportunities for social interaction. Among the elements of gamification from including experience, peer interaction and collaboration, storytelling, feedback and visual elements. These social

interactions would cause expected behavioural benefits to their users. Examples of the social values would include cultural and prosocial behaviour and socialisation where gamification could support facilitation of moral discussions. This study hypothesises:

*H<sub>1</sub> = Gamification elements would create opportunities for good social interactions to occur thus leading to prosocial behaviours among participants.*

### **Gamification Elements Effecting Social Behaviour**

This section describes gamification elements effecting social behaviour. Gamification in learning is making education more exciting and fun without affecting their credibility (Dichev et al., 2014). Many scholars agree how this approach could provide positive effects especially on motivational affordances (Hamari et al., 2014). Social gamification could also aim to bring together gamification and social networking in combination where the game developers have opportunities to create compelling socially-driven user experiences (De Marcos et al., 2016).

The gamification elements, such as badges and rewards, are among the effective mechanisms to encourage children's participation in their learning activities (Da Rocha et al., 2016). Scholars such as Mekler et al. (2014) highlighted how points, leaderboards and levels, as well as participants' goal causality orientation influence intrinsic motivation, competence and performance as an indicator. Gamification has been proven to increase children's intrinsic motivation and self-efficacy (Banfield & Wilkerson, 2014). Besides, Nicholson (2014) and Williamson (2017) where found the meaningful gamification is when the gameful and playful layers help users find their personal connections that motivate engagement with a specific context for longer duration. Moreover, playing is a form of children's art and a channel for expressing feelings and causes for excitement and excitement that may increase their engagement and enhances user engagement through the mediation of psychological needs satisfaction between game dynamics and enjoyment (Saayah, 2004; Buckley & Doyle, 2016; Suh et al., 2016; Williamson, 2017).

The critical advantage this study seeks is on applying gamification as the added motivational factor affecting the learning and understanding behavioural changes as promoted by Dichev et al. (2014). This study found several studies regarding utilisation of games for learning motivation. The scholars found the effects of gamification approach. However, are greatly dependent on the context in which the gamification is being implemented, as well as on the users using it (Hamari et al., 2014). From psychological aspects, De Marcos et al. (2016) found children mostly focused on aspects such as motivation, attitude and enjoyment while on educational perspective that could harness the motivational aspects of gamification to stimulate participation and engagement with learning contents among the players.

Social networks may facilitate communication, explicit social ties and highlight relevant content elements for participants. Besides, Da Rocha et al., (2016) agreed the purpose to use gamification approach are to generate involvement among individual and particular situations, increasing their interest, engagement and efficiency while performing a specific task. Gamification elements, such as points, levels and leader boards, may afford feelings of competence hence could enhance intrinsic motivation and promote performance gains (Mekler et al. (2014). This statement also supported by Fitz-Walte et al. (2016) who argue game application tend making easy for learners to record their practice sessions. In this scenario, effect of the gamification on behaviour change, perceived motivation and user experience to exercise while playing game.

Nicholson (2014) also added the reward-based gamification can be useful for short-term goals. If the goal is long-term change, then rewards should be avoided and other game-based elements used to create a system based on concepts of meaningful

gamification. Saayah (2004) found that teachers do not understand the concept of learning through play and thought it being difficult to carry out learning activities through play because it is still unclear about the whole experience. Scholars such as Nicholson (2014) and Buckley & Doyle (2016) found the approach of gamification could impact the intrinsic and extrinsic motivation on the participation and performance on children's achievement. Both their studies agree gamification could go beyond merely providing fun and enjoyment. Among their suggestion, gamification could be generating diverse game dynamics, with rewards, competition, altruism, and self-expression in such a way that according to Suh et al. (2016) could help people to satisfy their psychological needs.

In summarising how gamification elements are effecting social behavior, this study would like to propose future studies to focus on the motivational aspects, social behavior changes and the engagement activities between participants. Future studies may want to look into real social interactions and their social impacts. This study hypothesises:

*H<sub>2</sub> = The more social relationship is built by participating gamers during learning activities, their motivational aspects and social behaviour will increase.*

### **Gamifying the Behaviour**

This section describes about gamifying the behaviour. Gamification training program has been used to prevent childhood obesity based on motor games, and active video games developed for overweight children ages 8 to 12 (Gonzalez et al., 2015). The potential of social networks also has been harnessed by educators and institutions either using popular social networking sites or specific educational instances (Kirillov et al., 2016) and by applying game mechanics and dynamics to tasks and e-learning processes, user engagement could be increase with an e-learning application and its specific tasks (Muntean, 2011).

Rapp (2017) found the new meaningful elements in the video game world could inspire the design of novel gamified systems. For example, the scholars (Su CH, Cheng CH., 2015) claims that gamification learning approach could influence science learning, achievement and motivation through a context-aware mobile learning environment, and explains the effects on motivation and children learning. In fact, Codish & Ravid (2014) agree the inclusion of game elements into non-game contexts such as education and workplaces are essential to develop models that would help explain and predict the influence of personality in environments. Scholars such as Koivisto & Hamari (2014) also propose gamification as a solution for engaging people in individually and socially sustainable behaviours, such as exercise, sustainable consumption and education.

Moreover, this study found a need for specific module based on play approach for teaching and learning of language skills among preschool children. For example, in social computer game Fish 'n' Steps, invented by Lin et al. (2006), it was formed to promote increase in physical activities (Aliza & Zamri 2017; **Lin et al., 2006**). From the games learning activity, individual behaviour can be changed (Dick et al., 2013). Meanwhile for education purpose, Massive Open Online Courses (MOOCs) are becoming familiar modules in Malaysia. Some applications such as Schooooooool.rooms invented by Simoes and Aguiar (2011) are being used for assessing learning in elementary schools.

From the gamification approach, these findings revealed that group play sessions increased the motivation and level of participation of children compared group without play sessions (Gonzalez et al., 2015). The collaboration and social aspects are recommended in the design of educational video games for better results. Kirillov et al. (2016) also agreed with Gonzalez (2015) about the influence of gamification on improving of the learning environment and its effectiveness, hence reducing the level of stress. The

games were waiting for the evaluation of their skills and knowledge, changes the behaviour of the children, promotes the formation of new habits.

The basic games creation is for entertainment. However, some scholars such as Muntean (2011), **Koivisto & Hamari** (2014) stated gamification is not only for entertaining users but at the same time it can be used for modelling behaviours and could influence by gender, age and demographic differences. Hence, Su CH, Cheng CH. (2015) stated children could value the outdoor learning activities made possible by the use of a smartphone and its functions and could achieve a better learning performance and motivation than either non-gamified mobile learning or traditional instruction. The game elements applied into an examine the children's perception of playfulness (Codish & Ravid, 2014). This statement supported by Aliza & Zamri (2017) had agreed that the module based on play approach for teaching and learning language skills among preschool children has the potential for development and could motivate language learning in pupils (Aliza & Zamri, 2017). Some scholars agree the game could serve as a catalyst for promoting exercise and for improving game players' attitudes towards physical activity likes Elgg social platform where gamification elements had helped children enhance their engagement (**James J. Lin, Mamykina et al., 2006**; Cabot et al., 2017).

In view of gamifying behaviour of users, this study would like to propose introducing other elements such as role play to enhance the social aspects through gamification. This study proposes in building up the relationship between socialisation factors and gamification that could be represented in real interactions between human and gamification approaches. This study hypothesises:

$H_3 =$  *Real interactions in gamification learning activities will increase the effectiveness of pro behaviour socialisation for aspects among participating gamers.*

### **Discussion**

Based on the above literature findings, this study now discusses the learning activities affecting social behaviour, gamifying social behaviour and gamifying social factors.

#### **Learning Activities Affecting Social Behaviour**

The gamification interactions that are formed during game-play are connecting children thereby increasing socialising online through computers without direct or real communications between people (Simões et al., 2013). Additionally, there are schools especially those rural and remotes that do not have sufficient access and tools to apply the method of teaching using this internet at their schools. However, De Marcos et al. (2014), says that in term of assessing knowledge shows that the traditional e-learning approach was better. However, they only focus on the social interaction on e-learning platform. Additionally, the social factors only focusing on children motivation driven by the rewards that are introjected to children which eventually stimulated their participation (De Marcos et al., 2017) and social interaction in mobile application (Hamari & Koivisto, 2015). The motivational aspect, the social behaviour change and the engagement between participants resulting from real social interaction are strongly recommended in this study. This study posits that the social impact would occurs when the gamification approach is used in learning activities. Learning activities involving social elements (such as moral issues and pro-social behaviour) in real-life engaging interactions between participants during gaming process could motivate positive social behavioural changes among participants.

### **Gamifying Social Behaviour**

From previous study, gamification does not emphasise the social aspect in their observation as it focuses more on the gamification elements like motivation (Hamari et al., 2014) and only focuses the social interaction in e-learning platform (De Marcos et al., 2016). Researchers usually used the gamification approach in order to see the effect of gamification on the understanding of driver learning and not about the impact on the behaviour of the driver (Fitz-Waltes et al., 2016) and to measure the intrinsic and self-efficacy by individual and not in social terms (Banfield & Wilkerson, 2014). Besides, they use the gamification element for better understanding about the guidelines to designers of gamification systems that rely on non-reward-based game elements to help people find personal connections and meaning in a real-world context (Nicholson, 2014). Besides, the scholars only focus on gamification element rather than social impact through the approach and also gamified it through online platform activity (Mekler et al., 2014; Buckley & Doyle, 2016). However, for education terms, gamification approach has been used in order to measure the achievement among children in certain courses and focusing on the engagement contexts from individual side (Saayah, 2004; Ayoung Suh et al., 2016).

Therefore, the motivational aspect resulting from social game activity are recommended in this study where the social impact could occur when the gamification approach is used in learning activities. This study recommends integration of real social interaction that could happen when children do the learning activities through gamification approach in order to find out the social engagement in real time learning environment without focusing only on certain game element. Using gamification element is recommended to see the social interaction activity, the behaviour changes and the overall social interaction that happen through gamification approach. This study proposes on the outcome to be on social behaviour while users are involved in gaming activity, the social achievement and elements in real interaction through gamification approach and also the engagement between participants in learning activity. Overall, this study proposes emphasising real social interactions that could create reciprocal behaviour by participants during their gaming processes.

### **Gamifying Social Factors**

In order to get the solid and perfect data about social factors, there is no exact instrument and approach can gamify it. From previous study, the result from article was conducted through questionnaire and interviewing process, not from real experiment (Kirillov et al., 2016). There are several studies that focus on e-learning platform and application platform, social interaction between human and computer, not in real interactive and engagement (Muntean, 2011; Rapp, 2017; Lin et al., 2006; Cabot et al., 2017). Hence, Su & Cheng (2015) only focus on the positive relationship between learning achievement and motivation, not in relationship between children while they work together while Codish & Ravid (2014) focus on the importance of rewards in their engagement. Koivisto & Hamari (2014) only emphasises demographic factors in determining the effectiveness of gamification approach. Dick et al. (2013), only focus on illustrating how gamification concepts and principles were applied to the development of an online, multiuser, substance abuse and relationship violence prevention game for youths. Aliza & Zamri (2017), only measuring the differences of language skills among preschool children.

This study further recommends future inclusion of social aspects in educational activities where the real engagement elements could happen in normal classroom through gamification approach. The expected positive relationships between participants while they are involved in gamification activities could be measured. Moreover, other elements

such as interaction between peer may become useful in enhancing the social aspects. The relation between socialisation factor and gamification in real time activity and the comparison about their social behaviour while they engage in gamification activity are strongly recommended for future studies. In addition, understanding social interaction between humans for possible incorporates in an app is proposed. In line of the above, this study hypothesises:

$H_4 =$  *Learning activities emphasising real social interaction such as moral issues could facilitate real-life social interactions by users thereby could enhance cultured social behaviour.*

In summary, this study has proposed for hypothesis from literature. Figure 1 illustrates the relationship of these hypothesis for easier explanation. It shows how incorporation of moral values and culture aspects could be supported by social game, game elements and behaviour in a game design. The successful integration will lead towards prosocial behavior learning outcomes among students. This study proposes this relationship as the Human-factored Model for Learning Social Behaviour Game-Based Model.

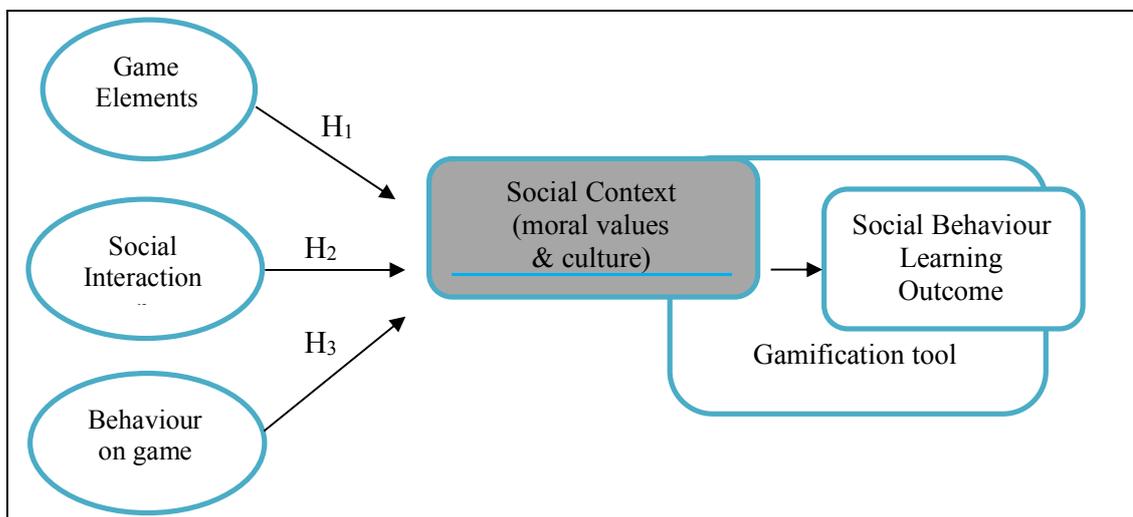


Figure 1. Human Factor Model for Learning Social Behaviour Game-Based Model

### Conclusion

This study is proposing a Human-factored Model Learning Social Behaviour Game-Based Model. It presents how moral values and cultural aspects if supported by the social game, game element and behavior in application design could lead towards prosocial behavioral learning outcomes. This study has hypothesized gamification elements would create opportunities for good social interactions to occur thus leading to prosocial behaviors among participants. It hypothesis the more social relationship is built by participating gamers during learning activities, their motivational aspects, and social behavior will increase. Thereby, this study hypothesizes real interactions in gamification learning activities will increase the effectiveness of pro behavior socialization for aspects among participating gamers. In conclusion, the Human-factored Model Learning Social Behaviour Game-Based Model posits that *learning activities emphasising real social interaction (such as moral issues and prosocial behaviors) could facilitate real-life social interactions by users thereby would enhance cultured social behavior.* Results from this study are expected to lead towards the development of technology-supported educational applications that would utilize human factors to inculcate prosocial behaviour among 21<sup>st</sup>

century children. Future educational tools are expected to support Sustainability Development Goal 4: provision of quality education to all.

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