

The Effect of Gamification and Self-Determination Theory on Motivation of Learners

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Abstract

The author of this report examines research describing self-determination theory, gamification, and their effects on learner's motivation. The structure of motivation within the framework of self-determination theory and how that structure may be applied to gamification is discussed. An examination of research on the motivational effects of gamification including both intrinsic and extrinsic motivations is done. The author concludes there is evidence that properly implemented gamification takes into account the framework of motivation within self-determination theory can increase the motivation of learners. The author found little evidence on implementation of gamification or what proper implementation looks like. Further research into the practical application of gamification and longitudinal studies of the effects of gamification are suggested.

Keywords: *gamification, intrinsic motivation, extrinsic motivation, self-determination theory*

The rise of video games and their seemingly unending motivational nature has brought about the desire by teachers to find a way to implement the mechanics of games into their curriculum. Primarily, educators want to tap into the motivational nature of games to enhance the learning of their students. Games, and the elements of games, are being used and implemented in classrooms around the world. Schools are adding eSports teams as an extracurricular activity alongside traditional sports. Despite the rapid adoption of gamification in curriculum and athletics, the field of study of gamification is still relatively young. The author discovered very little research on the implementation of gamification present in modern day curriculum planning. It is remarkable that the majority of research reviewed for this report has been conducted in the just the last twenty years.

Public schools and post-secondary education institutions are not the sole focus of gamification research. The research presented was conducted on the implementation of gamified elements in the workforce, in classrooms, and global society as a whole. Many applications available to users of cellular phones include some form of gamification elements integrated into the app. Gamification, anecdotally, has a seemingly influential effect on motivation, and the research is beginning to discover how and why. Through the research presented, the primary theory cited for why gamification affects motivation is Self-Determination Theory.

Self-Determination Theory

There is much that remains a mystery when it comes to human motivation. The virtual shelves of Amazon are lined with non-fiction books written to assist the self-help reader gain a little insight into individual motivation. With such a market for people to learn about their motivations, it seems that attempting to learn what motivates someone other than ourselves should be nearly impossible. Self-Determination Theory (SDT) attempts to unravel the workings of human motivation.

The Center for Self-Determination Theory calls SDT a “broad framework for the study of human motivation” (The Center for Determination Theory, n.d., para. 2). SDT posits that for any motivation to even exist, an individual has certain basic psychological supports (autonomy, competence, and relatedness) that must be met (Ryan & Deci, 2020). The level to which those supports are fulfilled influences the motivational level of the individual. Deci et al. (1991) explain that each of the three supports is interrelated, stating that any of the three can enhance motivation, but will only enhance intrinsic motivation and internalization when the other two are also supported.

SDT, as described by Ryan and Deci, differentiates motivation into three basic levels: (a) amotivation or the total lack of motivation, (b) extrinsic motivation, or motivation fueled by outside factors, and (c) intrinsic motivation or motivation that is fueled by internal factors. SDT further breaks down extrinsic motivation into 4 levels (2020). These four levels appear as a continuum that begins near amotivation with external regulation, then proceeds to introjection, identification, and concludes with integration which is nearest to intrinsic motivation.

As the motivational source moves further from amotivation toward intrinsic motivation, the level of autonomy (described as integrated internalization) increases. Autonomous motivation, one of the support pillars of SDT, was found by Taylor et al.’s (2014)

investigation to have a strong correlation to academic achievement. Ryan and Deci (2000) found the opposite was also true; students who were influenced by extrinsic factors of motivation were less likely to show interest or effort in academics.

Milyavskaya and Koestner (2011) performed a study testing SDT across a variety of domains. These domains spanned such personal domains as family and friends and less personal domains such as school and work. The results of the study showed that need satisfaction, or how well the key SDT supports were met, explained 40% of the variance in autonomous motivation between each of the domains, and need satisfaction had a similar effect across all the domains studied. This correlation between autonomous motivation and the continuum of motivation as described by Ryan & Deci (2020) supports the claim that a curriculum that is need-supporting can lead to greater engagement. It is this engagement that the field of gamification is intended to create.

Gamification

Gamification has been described in many ways, but generally is categorized with the broad idea of using some of the elements commonly included in games and integrating them into something that is not a game. Hanus & Fox (2015) describe it in careful detail as the “use of narratives to change the context around a typical activity, the creation of social competition, and the incentivizing of behavior through badge and reward systems” (para. 1). Just as the definition of what constitutes gamification is being narrowed, so too are the defined practices of what an effective implementation should look like.

A study by Groening and Bennewies (2019) that looked exclusively at the inclusion of the gamification element of digital achievements (badges and leaderboards) found no significant difference in self-reported motivation, but did see an increase in persistence (defined as how many of the study tasks the subject completed) which is synonymous with engagement to the subject. Upon review, several other studies provide evidence of this same increase in persistence and engagement. Denny (2013) showed an increase in the number of student contributions with no reduction in quality when badges were introduced. Mekler et al. (2017) introduced points, levels, and leaderboards in their study and discovered that there was no real difference in measured intrinsic motivation, and yet the number of tasks performed increased with no decrease in quality.

Intrinsic motivation may not be the only factor included to judge gamification and its usage. Increasing persistence, performance, and engagement may be enough to discover measurable gains. Kapp et al. (2020) tested gamification on retail employees in a twelve-month study. In this study, employees were allowed to log in to the training system at any time or place and play a casual game that had integrated learning elements and found that the addition of the casual games increased engagement and the employees were more motivated to come back and engage.

Caution may be warranted as there is evidence that gamification may lead to a decrease in intrinsic motivation. Hanus & Fox (2015) studied the effects of gamification through badges and reward systems (leaderboards and points systems) and discovered that in the groups where gamification elements were included, intrinsic motivation, classroom satisfaction, and final exam performance all decreased. This result may have been expected though. Desi and Ryan (2020) explain that Cognitive Evaluation Theory (CET), a sub-theory of SDT that is largely related to intrinsic motivation, suggests that rewards like badges, leaderboards, and points naturally produce feelings of competence, however, to be effective for a student's intrinsic motivation they must also elicit a sense of autonomy. Further, if those rewards are seen by the learner as controlling, or forced, they can harm students' autonomy (Ryan & Desi, 2020). Since intrinsic motivation is so closely tied to autonomy, the implementation of game elements must be carefully considered.

Some of the reviewed studies that seem to indicate that gamification is detrimental to student motivation also seem to point the way to implementation of gamification in such a way as to avoid the pitfalls they encountered. Hanus and Fox (2015), for example, found that reward systems reduced motivation, satisfaction, and performance, but also found that for students who were bored in the classroom or do not wish to be there, rewards and incentives might have the opposite effect, increasing their motivation. They also found that gamification is more likely to work when learners can choose whether they participate. Mekler et al. (2017), in the discussion of their study, noted that the gamification elements did not increase intrinsic motivation but may have been an effective extrinsic motivation. It should be acknowledged that there were course and visual design flaws that were detrimental to their study (suggesting that aesthetics may play a part), and lastly, that those participants who felt more autonomously driven in the task reported more intrinsic motivation. These findings support the CET/SDT claim that intrinsic motivation is tied to autonomy.

Van Roy and Zaman (2018) specifically designed a study to examine the effects of gamification when applied with the need supporting features of SDT. At the conclusion of their study, they discovered that if game elements are designed that support a student's needs, they have the potential to stop or decrease a decline in autonomous motivation. They also discovered that motivation is a unique element for each learner and the designer needs to be selective when including a variety of need-supporting elements. Their findings, along with Mekler et al.'s (2017) findings that aesthetics may have played a part in the lack of motivation, and Hanus & Fox's (2015) findings that rewards seen as controlling can decrease motivation, all seem to point to the idea that implementation of gamification can be a tenuous affair.

Proper implementation of gamification elements along with a variety of how they support the needs of autonomy, efficacy, and relatedness may be the key to using gamification to increase motivation and learning. In Su and Cheng (2014) the authors found that when students were exposed to a gamified environment that encouraged student curiosity and interest in the subject, the student's motivation increased. The researchers also concluded that the implementation of gamification must include the effective use of instructional design methods if the desired result is to increase student motivation. In the study, they used ARCS, but suggest that any of the standard instructional design methods might give similar results if used effectively.

Implementation

If the proper implementation of gamification is the key to not only increasing student engagement, but also improving student motivation, the focus of inquiry becomes the elements of proper implementation in the classroom. Successful implementation, suggests Suh et al. (2018), is a matter of using game dynamics that successfully satisfy the students' psychological needs. In the same study, the elements of rewards increased competence and autonomy, the ability to express oneself increased autonomy, leaderboards and points (competition) increased competence and relatedness, and altruism also increased relatedness.

It is likely the collaboration of all the elements of gamification that are implemented and how they mesh, that creates the success of the gamification. Suh et al. (2018) also found that the three psychological needs as described by SDT accounted for 48.9% of the variance of enjoyment. Gamification works, they conclude, by adding enjoyment through the satisfaction of those psychological needs. The ignoring of those needs, or even one

of them, by the designer, could reduce the enjoyment of the learner and lead to a decrease in engagement.

Garris et al. (2002) discuss an instructional model that centers on a process called the Game Cycle. This Game Cycle is, they claim, the cornerstone of engagement created by computer games. The Garris team also performed a review of twenty-one studies and findings concluded that while there was no difference in the effectiveness of games over conventional teaching, eight out of eleven of those studies examined the retention of learning. These studies indicate retention was higher for training that was game-based. In seven of eight studies that evaluated instructional interest, students preferred simulation game activities over conventional teaching methods.

Discussion

If instructional designers can create and implement gamification elements that feed the psychological needs of the students while also drawing the students into the repeating pattern of the game cycle, it could create the ideal mix of motivation and engagement that draws the educators to gamification in the first place. Mekler et al. (2017) argue that while game elements may not increase intrinsic motivation, they may act as effective extrinsic incentives. In SDT, extrinsic motivations can move toward intrinsic motivations as they become more internalized. The path to internalization, according to Ryan and Deci (2020), hinges greatly on the level to which the activities support the SDT psychological supports of autonomy, competence, and relatedness.

Through research, indications are that it may be necessary for the gamification elements to support all three psychological factors (Mekler et al., 2017; van Roy & Zaman 2018; Su & Cheng, 2014) and there may even be negative effects when they do not (Hanus & Fox, 2015; Groening & Binnewies, 2019). Research also shows that need satisfaction can, directly and indirectly, affect the well-being of the individual (Milyavskaya & Koestner, 2011).

Certainly, there is evidence that gamification can be used to increase the motivation and performance of learners (Kapp et al., 2020; Su & Cheng, 2014; Suh et al., 2018). SDT explains that intrinsic motivation is not the only motivational factor that influences learning. SDT also incorporates the idea that extrinsic motivation can be improved through integrated internalization (Ryan & Deci, 2020). Towards greater self-determination and thus greater intrinsic motivation, Deci et al. (1991) suggest

autonomous choice, reduced command structures, acknowledgment of feelings, and openness of information for decision making and task completion. Garris et al. (2002) provide the Game Cycle model as a framework for the gamification of instructional content. The combination of the two within the SDT motivational framework could provide a catalyst for effective gamification.

If the desired goal is the increased intrinsic motivation of the student, the path is clear. Using the prescribed elements of SDT, create activities and work that increases the integrated internalization of the learning. Gamification, used holistically, can provide a tool for educators to use to that end. To what extent gamification can, or should, be incorporated into the curriculum is still open for debate and subject to the findings of additional research.

Further Research

More research in the field of gamification is suggested. Much has been done to attempt to isolate the effective elements of the engagement of gamification, but little research was found on the effective implementation of a holistic gamification design using a solid and accepted instructional design approach. Could such research show that the proper implementation of gamified elements has a desirable effect on the motivation of students? Such research might also lead to standards and methods that are more broadly usable in a multitude of educational situations.

Further, of the research found, only the van Roy and Zaman (2018) study represented a longitudinal study on the motivational effects of gamification. In this study, some evidence was presented that indicated that the long-term effects of gamification may be different from the shorter-term effects. Additional longitudinal studies are suggested to provide more evidence on the long-term effects of gamification and determine if the findings of van Roy and Zaman can be reproduced.

Conclusion

Ultimately, the research provided no conclusive evidence on the positive effect of gamification on intrinsic motivation in learners. However, research suggests that gamification can increase the engagement and persistence of learners (Kapp et al., 2020; Su & Cheng, 2014; Suh et al., 2018). SDT suggests that increased engagement and persistence, in the right circumstances, could lead to greater integrated

internalization of motivation which could also lead to greater intrinsic motivation, or, at the very least, more efficacious and autonomous extrinsic motivation (Ryan & Deci, 2020).

Seen through the lens of SDT, increased intrinsic motivation may be more of an ideal goal than a practical one. Instead, aiming for increased overall motivation, both extrinsic and intrinsic, maybe a more realistic goal. With that more realistic goal in mind, gamification may be an extremely useful tool for educators. A tool that the research reviewed indicates that if properly implemented, and with attention to pedagogical best practices, could increase the overall motivation of learners and have an overall positive effect on educational outcomes.

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