About Gamified Learning and Intrinsic Motivation for Classroom Learning

Games have long-been advocated as a way to engage and re-engage student in classroom learning. In their most sophisticated form, the practices are referred to as gamification and are based on the theory of gamified learning. Available research cautions that participation in a game doesn't guarantee engagement in and may work against enhancing intrinsic motivation for classroom learning.

What is Gamification?

Broadly defined gamification is the "process of making activities in non-game contexts more game-like by using game design elements" (Sailer, Hense, Mayr, & Mandi, 2016). The intent in schools is to enhance student engagement in classroom learning. To clarify game elements, Landers (2014) defines gamification as "the use of game elements, including action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules/goals, to facilitate learning and related outcomes" He stresses that elements are used in isolation or in limited combination to gamify existing instructional processes with the intent of improving learning. (See appended table for Lander's categorization of elements.)

A Sample of Recent Research

Research on gamification has produced mixed results, and there are many areas that remain unstudied with respect to classroom applications. Here are a few examples of recent research to demonstrate the state if the art.

Mekler, E. D., Brühlmann, F., Tuch, A. N., & Opwis, K. (2017). Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in Human Behavior, 71,* 525–534. https://doi.org/10.1016/j.chb.2015.08.048

In an online experiment conducted in Switzerland, Meckler and colleagues, "systematically examined how points, leaderboards and levels, as well as participants' goal causality orientation influence intrinsic motivation, competence and performance (tag quantity and quality) in an image annotation task. Compared to a control condition, game elements did not significantly affect competence or intrinsic motivation, irrespective of participants' causality orientation. However, participants' performance did not mirror their intrinsic motivation, as points, and especially levels and leaderboard led to a significantly higher amount of tags generated compared to the control group. These findings suggest that in this particular study context, points, levels and leaderboards functioned as extrinsic incentives, effective only for promoting performance quantity." In discussing why the game elements did not significantly increase intrinsic motivation, the researchers suggest that intrinsic motivation might have been dependent on how autonomy-oriented the participants were to begin with. With respect to the need to feel competent, they suggest this need was not satisfied because the game elements did not offer feedback that clearly communicated what was considered "good" and that the tasks were not challenging enough for some participants.

---

*The material in this document reflects work done by Bridget Lee as part of her involvement with the national Center for MH in Schools and Student/Learning Supports at UCLA.

The center is co-directed by Howard Adelman and Linda Taylor in the Dept. of Psychology, UCLA, Website: http://smhp.psych.ucla.edu Send comments to ltaylor@ucla.edu

Barata, G., Gama, S., Jorge, J., & Goncalves, D. (2013). Engaging engineering students with gamification. In *2013 5th International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES)* (pp. 1–8). https://doi.org/10.1109/VS-GAMES.2013.6624228

In a study conducted in Portugal, Barat and collegues compared a semester-long engineering course that was gamified through the implementation of levels, points, leaderboards, challenges,and badges, to its non-gamified version from the year before. They hypothesized that a sense of competence would be cultivated through feedback provided by points, levels, and badges and that the need for autonomy would be satisfied by allowing students to choose which achievements to pursue and level up. They also hypothesized that an online forum and leaderboard would allow students to have a greater sense of social relatedness. The researchers report "significant increases ranging from lecture attendance to online participation, proactive behaviors and perusing the course reference materials. Moreover, students considered the gamified instance to be more motivating, interesting and easier to learn as compared to other courses." However, in analyzing students' participation, they found that participation and engagement decreased over time (i.e., higher in the first half than in the second half of the course).

Nicholson, S. (2013). *Exploring gamification techniques for classroom management.* Paper Presented at Games+Learning+Society 9.0, Madison, WI. http://scottnicholson.com/pubs/gamificationtechniquesclassroom.pdf

Nicholson conducted an experiment in the U.S.A. involving students enrolled in a semester-long course that was gamified through points, a leaderboard, and achievable rewards. After the first six weeks, students had the option to decide if they wanted to keep the course as it was or to get rid of the existing gamification system and rewrite a new one. For the first few weeks of the course, students were engaged with the game aspects of the course and were motivated to earn points. However, eventually, the presence of a leaderboard and the system of accumulating points discouraged students, especially those at the bottom of the leaderboard, from trying to accumulate points and participate in activities. At the six-week mark, all the students, except for the student who was at the top of the leaderboard, voted to change and class. They created a new gamification system that was less rigid and more collaborative than the initial one. Unlike the study conducted by Barata and colleagues., students were not satisfied with the course, and ultimately, students' dissatisfaction with the original gamification elements caused some of them to lose motivation and disengage, especially the students at the bottom of the leaderboard who felt that it was not worth trying in the class because they would never be able to catch the leaders.

Hanus, M.D. , & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education, 80,* 152-161. https://doi.org/10.1016/j.compedu.2014.08.019

A longitudinal study also found that gamification elements negatively affected course satisfaction and motivation. Hanus and Fox tested the effects of the implementation of a leaderboard and a badge system, which have been seen as elements that facilitate social relatedness and promote feelings of competence. They compared survey results between students in the gamified course, where earning badges was mandatory, and students in a non-gamified, but otherwise identical course. They hypothesized and found the gamification elements had negative effects. Students in the gamified course reported significantly lower levels of class satisfaction and had lower intrinsic motivation scores than the students in the non-gamified course, which may have come as result of social comparison and competition via leaderboard or lack of autonomy in being forced to earn badges. Those in the gamified course also had lower grades on the final, which the researchers suggest was mediated by the students' levels of intrinsic motivation. Based on previous research where providing rewards for already interesting tasks undermined intrinsic motivation, they also suggest that the negative effects might not be as directly related to the gamification elements themselves, but the result of a participant's initial interest in a task.

In terms of the state of the art, it should be noted that Landers and colleagues stress in their 2014 review that

> *... individual game elements must be linked to specific behavioral, motivational, or attitudinal outcomes, which in turn must be linked to learning outcomes, in order for gamification to be effective. Without establishing such links, gamification may appear to be unsuccessful when implementations have in fact succeeded.*

They offer applied examples of each of nine major categories of game elements and link the elements theoretically to the behavioral and attitudinal constructs they are predicted to affect.

Concerns Raised by the Research

In general, research on motivation underscores that autonomous regulation is associated with enhanced intrinsic motivation, and intrinsic motivation is associated with engagement, persistence ("grit"), conceptual learning, academic achievement, classroom adjustment, creativity, enjoyment and reduced anxiety. With respect to intrinsic motivation, the need for feeling self-determining, competent, and related to significant others is seen as fundamental to intrinsic motivation. (See the work of Deci, Ryan, and their many colleagues as discussed in Ryan and Deci, 2017.)

To date, gamification research indicates increases in immediate participation in the activity, but not in sustained engagement in classroom learning. And as a large body of motivational research predicts, the overemphasis on reward-based gaming practices tends to have a negative impact on intrinsic motivation. With specific respect to initial levels of student motivation, research is needed to determine how students who have little motivation for and those who have become disconnected from classroom learning respond to gamification.

The studies highlighted in this resource attempted to address the need for competence through achievement feedback that stressed game levels or rewards. Findings indicate that the gamification practices did not foster a sense of competence. (Nicholson suggests that the gamification task for which students are being given feedback needs to feel challenging and the feedback needs to provide constructive information, such as relevant "whys" and "hows", in order to promote feelings of competence.)

In addition to autonomy and competence, the impact on the need to feel socially-related is of concern. The studies mentioned above all tried to boost feelings of social-relatedness through a leaderboard that allowed students to track not only their own progress, but also the progress of their peers. Leaderboards foster a sense of social comparison. Social comparison has the potential to foster motivated competition, but it also has the potential to negatively affect motivation.

How Might Gamification Enhance Intrinsic Motivation?

Extrinsic reinforcers are easy to use and can immediately affect behavior. Therefore, they are widely used. Unfortunately, the emphasis usually is on external regulation, and the immediate effects usually are limited to very specific behaviors and often are short-term. Moreover, extensive use of extrinsic reinforcement can have some undesired effects. And, sometimes the available rewards and punishments simply aren't powerful enough to get the desired results.

For an external reward to be effective it must be *experienced by the recipient* as rewarding. What turns something extrinsic into a highly valued reward is that the recipient highly values it. For example, if someone doesn't like candy, there is not much point in offering it as a reward.

Because the use of extrinsics has limits, it's fortunate that people often do things even without apparent extrinsic reason. In fact, a lot of what people learn and spend time doing is done for intrinsic reasons. The innate quality referred to as curiosity, for example, leads people to seek

stimulation and avoid boredom and, in the process, learn a great deal.

Given that schools mean to increase intrinsic motivation for what is being taught and for learning in general, practices need to minimize threats to feelings of self-determination. competence, and relatedness to significant others and maximize opportunities to enhance such feelings. Of particular concern, is minimizing the negative impact of the schools use of external regulation so that it does not overwhelm and undermine a learner's feelings of self-determination and produce psychological reactance.

Given all this, if gamification is to enhance intrinsic motivation, it must be designed to enhance and not thwart feelings of self-determination, competence, and relatedness to significant others. For example, enhancing feelings of self-determination requires ensuring students have a sense of control over participation and what rules are to be followed. This means having options and being involved in decision-making.

Nicholson (2015) suggests that instead of reward-based gamification, teachers and classroom designers ought to work towards what he defines as "meaningful gamification." He states that "at the heart of meaningful gamification is the humanistic belief that there are some activities people engage in because they have intrinsic or internalized motivations for doing so. This ties in with Organismic Integration Theory, which states that when people act upon these internalized motivations, they will have a more positive outlook toward the activity than if they are doing something due to extrinsic motivation." Meaningful gamification includes some aspects of reward-based games (e.g., choice, informative feedback), but it also includes more abstract elements that are not as easily applied or observed in the classroom setting, such as play, exposition, and reflection. And, instead of fostering social relatedness based on competition, the emphasis needs to be on cooperative gaming that promotes in-person human interactions.

Finally, for long term change, Nicholson stresses that "the long-goal of the gamification system should be to escort a player into deeper engagement with the real-world context and then to leave him or her in the real world. As the player gets more involved in the system, he or she should be spending more time engaged with directly with the real world and less time engaged with the gamification system."

Key References Used in Preparing this Information Resource

Adelman, H. S., & Taylor, L. (2017). *Addressing barriers to learning: In the classroom and schoolwide* – access this new book and for other free resources by going to the Center's homepage at http://smhp.psych.ucla.edu/

Csikszentmihalyi, M. (2014). Intrinsic motivation and effective teaching. In *Applications of flow in human development and education* (pp. 173–187). Springer, Dordrecht. https://doi.org/10.1007/978-94-017-9094-9_8

Deterding, S., Khaled, R., Nacke, L.E., Dixon, D. 2011. Gamification: Toward a Definition. In *CHI 2011 Gamification Workshop Proceedings*, Vancouver, BC, Canada. http://hci.usask.ca/uploads/219-02-Deterding,-Khaled,-Nacke,-Dixon.pdf

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: potential of the concept, state of the evidence. *Review of Educational Research , 74*, 59–109.

Landers R.N., Armstrong M.B., Collmus A.B. (2017). How to use game elements to enhance learning: applications of the theory of gamified learning. In M. Ma & A. Oikonomou (eds), *Serious Games and Edutainment Applications*. Springer, Cham. https://doi.org/10.1007/978-3-319-51645-5_21

Landers, R.N. & Landers, A.K.(2014): An empirical test of the theory of gamified learning: the effect of leaderboards on time-on-task and academic performance. *Simulation Games. 45.* 769-785.

Nicholson, S. (2015). A RECIPE for meaningful gamification. In T. Reiners & L. Wood (eds), *Gamification in education and business* (pp. 1–20). Springer, Cham. https://doi.org/10.1007/978-3-319-10208-5_1

Ryan, R., & Deci, E. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* New York: Guilford.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior, 69,* 371–380. https://doi.org/10.1016/j.chb.2016.12.033

Sources for More Resources – See the Center's Quick Find on *Motivation, Engagement, Re-engagement* – http://smhp.psych.ucla.edu/qf/motiv.htm

Appendix

Nine Major Categories of Game Elements

In a 2014 article, Landers and Landers expand upon the theory of gamified learning by providing applied examples of each of the nine major categories of game elements and linking those elements theoretically to the behavioral and attitudinal constructs they are best predicted to affect. In a 2017 chapter, Lander and colleagues provide the following table.

ATTRIBUTE	THEORY	DEFINITION
Action language	Presence theory	The method and interface by which communication occurs between a player and the game itself
Assessment	The testing effect	The method by which accomplishment and game progress are tracked
Conflict/challenge	Goal-setting theory	The problems faced by players, including both the nature and difficulty of those problems
Control	Self-determination theory	The degree to which players are able to alter the game and the degree to which the game alters itself in response
Environment	Presence theory	The representation of the physical surroundings of the player
Game fiction	The narrative hypothesis	The fictional game world and story
Human interaction	Social constructivism	The degree to which players interact with other players in both space and time
Immersion	Presence theory	The affective and perceptual experience of a game
Rules/goals	Goal-setting theory	Clearly defined rules, goals, and information on progress toward those goals, provided to the player

UCLA Center Note: When games are "reward-based," points, leaderboards, badges, awards, and other related external indicators to reward performance are described as common elements.