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Abstract

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Keywords

Gamification, engagement, gamified learning

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ABSTRACT

Gamification in education refers to the immersion of game elements and game mechanics to enhance student engagement. Elements of gamification include the use of reward systems, leader boards, social activities, badges, missions, challenges, and aspects of free choice in course design. The aim of this study was to assess the effect of applying a gamification model to a graduate level occupational therapy course in assistive technology (AT). This mixed methods study followed two consecutive cohorts of students (N=63 students, 55 females) in a graduate level occupational therapy program as they participated in a gamified course allowing the students to “choose their own adventure.” Data analysis included pre- and post-course questionnaires, in-course and post-course anonymous feedback, and voluntary post-course focus groups. Thematic analysis indicated a positive response between the gamified approach and student engagement. In addition, test and quiz scores were compared to student scores from a non-gamified version of this course. The test and quiz scores for each of the gamified cohorts were statistically significantly higher than the scores of the non-gamified cohort (1st gamified cohort p=0.012 and 2nd gamified cohort p=0.004). Students, however, felt that gamification should be limited to only one or two courses within an academic program to prevent “saturation” of this approach. This study indicates that an effectively designed gamification course may be a useful addition in an occupational therapy program to improve engagement in course content.

Gamification involves the use of game elements and game mechanics in a non-game context (Deterding et al., 2011). Gamification is different from game-based learning. Game-based learning involves the placement of games into a work or educational system, such as playing a game of "Jeopardy" to quiz students on a particular topic, while gamification turns the entire learning process into a gamified environment (Pivec, 2009; Gerber & Price, 2013). In differentiating from game-based learning, gamification is often referred to as applying a "serious game" in an education environment (Chanut & Lerdpornkulrat, 2016; Hamari et al., 2014). The primary goals of gamification are to improve participation engagement and to facilitate achievement of specific learning goals such as task mastery or improved confidence in new skill sets (Learning, 2015; Koivisto & Hamari, 2014).

Gamification was first documented in 2002 (Learning, 2015; Pelling, 2015) as an approach used within a computer science company to make electronic transactions performed by employees "both enjoyable and fast." The company owners employed gamification elements including leaderboards, tracking transaction speed and accuracy for rewards, and increasing social interaction among the employees. The company owners noted an improvement in employee performance as a result of implementing a gamified model.

Recognizing that students are being raised in an environment of interactive media and video games, academicians used some aspects of gamification as early as 2006 in the classroom environment to address student engagement. While using this approach has gained popularity (Brunsell & Horejsi, 2011; Gonzalez & Area, 2013), limited empirical studies exist measuring the impact that gamification has on student engagement and instruction (Dominguez et al., 2012; Hanus & Fox, 2014; Learning, 2015).

Elements of Gamification

Researchers identified several elements that may be present in an educational environment for it to be considered "gamified" (Dominguez et al., 2012; Kim, 2015; Lee & Hammer, 2011; see Table 1). Research has not yet indicated how many of these elements must be present for success, though a guiding principle arising in gamification is to create an atmosphere in which the participant feels empowered to make selections in how they will achieve course goals (Werbach, 2012). As with other educational strategies, the teacher should be aware of classroom variables such as gender, age, culture, and intellectual level of the students when selecting specific gamification strategies. The teacher must not lose sight of the teaching objectives of the course, and the gamifying concepts in the classroom should be transparent to the students with no hidden agendas (Hamari et al., 2014; Kim, 2015).

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Table 1

Elements, Benefits, and Disadvantages of Gamification

Elements	Benefits	Disadvantages
• Narrative instructions • Progress mechanics (points/badges/leaderboards) • Player control • Immediate feedback • Collaborative learning • Increased challenges and mastery (leveling up) • Social connections	• Increase learner engagement • Improve knowledge absorption and retention • Opportunities for real world applications • Quick feedback • Students may self-identify mastery • Allows for student autonomy	• Less than serious approach • Learning becomes too easy and irrelevant • Requires intense course design • Course flow may become upset with minor distractions • Students lose sight of learning goals with too many rewards • Few empirical studies available for higher education

Potential Benefits and Disadvantages of Gamification

A common rationale for gamifying courses is to enhance student engagement. The literature provides multiple studies regarding predictors of learner engagement in a gamified environment (Hampden-Thompson & Bennett, 2013; Handelsman et al., 2005; McMahon & Portelli, 2004; Poondej & Lerdpornkulrat, 2016). Predictors include learner competence for the course content, the culture and viewpoints of the learners, and the careful selection and design of challenging activities. However, limited studies exist on the impact of gamification on engagement in the classroom (Kim, 2015).

A meta-analysis by Stitzman (2011) found that in 55 studies, undergraduate students in a gamified environment of course work had 20% greater levels of self-efficacy as compared to control groups who received instruction in more traditional formats (*d=.5*). In addition, the meta-analysis investigated the effectiveness of gamification to learning. The meta-analysis also indicated that the groups receiving gamified approaches scored 11% higher scores on tests of declarative knowledge and had retention levels that were 9% higher than those of controls. Recent studies on gamification have found that giving the students a variety of choices in how they wish to achieve the goals of the class can enhance the success of gamification and facilitate student achievement of learning outcomes (Kim, 2015).

Dominguez et al. (2012) explored whether certain elements of gamification had measurable effects on student engagement and performance. They established a large-scale gamification project for an e-learning platform. The course design focused heavily on the use of a leaderboard and having the students compete in a social environment for a top spot in the class. The researchers found that while gamification was successful in improving student engagement, there was not a significant improvement in test

scores. The researchers suggested that flawed mechanics including failure to respond immediately to student feedback and relying too heavily on extrinsic motivation may have affected test scores. They recommended using a variety of approaches that meet the needs of students who desire social interaction as well as those who prefer to work alone or in small groups.

Other authors suggest potential disadvantages of gamification in the classroom. This may include complaints that gamification is a less than serious approach to education and that the course learning becomes too easy and irrelevant (Lee & Hammer, 2011; Rieber, 1996; see Table 1). Dominguez et al. (2012) cautioned that gamifying a classroom requires an immense amount of effort which can result in issues with course flow. Most proponents of gamification warn educators to reduce the amount of external rewards given to the students in the achievement of missions or assignments (Dominguez et al., 2012; Hanus & Fox, 2014; Koivisto & Hamari, 2014; Learning, 2015). While reward is an important part of gamification, the researchers caution that the students may lose sight of the primary goals of the course in favor of a focus on winning the games.

The aim of this study was to determine if modifying a course in a graduate level occupational therapy program to a gamified format would be effective in improving engagement in course content and confidence in new skill sets. This study may also benefit educators interested in applying additional evidenced-based learning methods in their classroom to address engagement.

Methodology

Participants

Participants were a convenience sample of two consecutive cohorts of a graduate level occupational therapy program. There were 32 students in one cohort (female=28) and 31 in the other (female=27). The students were in their final didactic semester prior to initiating their Level II fieldwork experiences. The protocol was approved by the university Institutional Review Board (IRB), and students in both cohorts were aware they were being tracked for the purpose of this study. No student in either cohort refused participation.

University IRB approval was also given to use de-identified retrospective educational data (quiz and test scores) from the previous cohort who experienced the non-gamified version of the course (30 students, female=27) to compare to the scores of students who experienced the gamified format. No personal information was utilized from the non-gamified cohort.

Data Collection Methods

The students were provided a pre-course questionnaire consisting of the Engagement Scale from the Student Interest and Engagement Scales (Mazer, 2013). The Engagement Scale is validated, with 13 items using a “7-point Likert-type scale with bipolar response options (never/very often)” referencing emotional and cognitive interest

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in course content (see Table 2). In completing the pre-course questionnaire, the students were asked how engaged they felt in their previous occupational therapy coursework. The Engagement Scale was also administered as a post-course questionnaire with the students instructed to answer regarding their impression of engagement in the gamified assistive technology (AT) course. To ensure anonymity, the pre-and post-course questionnaires were coded to allow for matching responses without identification of the student. In addition, while the format of the course had been gamified, tests and quizzes remained the same as a previous non-gamified version of this course. All tests scores were calculated out of 100 and objective in nature (multiple choice questions).

At the conclusion of the course, qualitative data were gathered from the Student Perspective of Instructor (SPOI) survey that students are invited to complete for all courses at the end of the semester. The SPOI is embedded into the course learning management system and is anonymous allowing the student to provide feedback with no repercussions from the instructor. Questions are asked regarding the overall effect a course design had on a student with opportunities to provide suggestions for course improvement.

Table 2

Comparison of Pre- Post- Course Questionnaire

Think about how often you engage in the following behaviors in and outside of class:

	Pre	Post
Listened attentively to the instructor in class	3.78	6.25
Gave your teacher your full attention during class	4.92	6.35
Listened attentively to your classmates' contributions during class discussions	5.32	6.14
Attended class	6.56	6.96
Participated during class discussions by sharing your thoughts/opinions	3.89	5.55
Orally participated during class discussions	3.46	6.55
Thought about how you can utilize the course materials in your everyday life	3.78	4.67
Though about how the course material related to your life	4.59	5.37
Thought about how the course material will benefit you in your future career	4.33	6.24
Reviewed your notes outside of class	4.25	4.86
Studied for a test or quiz	3.86	3.54
Talked about the course material with others outside of class	3.97	4.01
Took it upon yourself to read additional material in the course topic area.	3.35	3.65
Mean	4.31	5.39
SD	0.877	

For each cohort, a 30-45-minute voluntary post-course focus group was moderated by an independent interviewer who had no association with the gamified course, allowing the students to freely discuss their opinions regarding the course. A total of 19 students participated in the focus groups, representing 30% of both cohorts. Focus group questions were based on a Scholarship of Teaching and Learning design suggested by Bishop-Clark and Dietz-Uhler (2012; see Table 3).

Table *3*

Focus Group Questions

Post-course focus group questions
1. What did you like least about this course?
2. Compare and contrast your learning experiences in this course to other more traditional courses.
3. Did you encounter any difficulties with this course? If so, what were they?
4. What changes would you offer for this course?
5. Other than the assignments that were time-based, like the volunteer assignments, which assignments did you spend the most and least amount of time completing? About how much time did you spend on them?

Course Design

The gamified course was titled “Technology in Practice” which explored the application of AT in a variety of contexts. This course was provided in the final semester before Level II fieldwork. Previous versions of this course were presented in a traditional format consisting of textbook readings, in-class lecture, two tests, four quizzes and occasional group projects mostly surrounding case studies. In consultation with our university faculty development center, the course was redesigned with a gamified approach to address student engagement. The updated course was themed “Choose Your Own Adventure” with the students placed on a journey to earn badges in a variety of AT areas. Within each badge, students chose specific assignments, or “missions.” to complete to achieve a badge. Each pathway was carefully designed to require the same quantity of effort regardless of badge selection. Final grades were determined by the number of badges earned. Ten badges were developed with the student required to complete a minimum of five to pass the course. Two badges were required while the other eight badges were electives to allow the student to customize a course pathway. The badges and missions were given clever titles to tie in with the course theme (see Table 4).

DOI: 10.26681/jote.2020.040306

Table 4

Examples of AT Course Badges

	Quizmaster (Required): Contained the tests and quizzes for the course
	Techmaster (Required): Contained the in-class lab components of the course. All the elective badges had aspects within this badge. The elective badges explored these areas in greater depth, allowing the student to tailor to his/her interests.
	Wizard of DOS (Elective): Enhanced focus on computer platforms and app design
	AT Go! (Elective): Enhanced focus on seating and wheeled mobility
	Wizard of Scribes (Elective): Enhanced focus on documentation and coverage of AT and AT services

Additional gamification mechanics of the course included:

- *Labs with competitive components*. These labs used collaborative learning in a competitive atmosphere while addressing course objectives. Examples included:
    - *MacGuyver-It:* This activity involved the creation of a piece of AT within an hour using only available components located throughout the classrooms to fulfill the needs of a case study client. The students were judged on excellence in design, durability, and meeting client's needs.
    - *Heigh-Ho, Heigh-Ho, It's Back to Work We Go:* This activity required the students to develop a protocol to address a work rehab client utilizing a BTE Primus RS (rehabilitation AT) located in the lab. The students were judged on the effectiveness and cleverness of the protocol.

- *Competitive "muddy points" quizzes:* These short quizzes were separate from the core quizzes and designed to ensure reading and lecture material was understood. They were often performed in a game show format with prizes and bonuses awarded.
- *Rapid feedback on mission submissions.*
- *Increased mastery via repeated submissions:* Many missions could be returned to the student for editing until all requirements were met.
- *Missions designed to allow the student selective opportunities for social cooperation or solo work.*
- *Easter eggs:* Hidden in the learning management system were several opportunities for students to uncover bonus missions that could be completed for extra credit.

Data Analysis

The variables recorded were two tests and four quizzes that were administered to the non-gamified and gamified cohorts. All tests and quizzes in both gamified and non-gamified formats were delivered in an identical format except one quiz that was delivered to both gamified cohorts using an interactive Kahoot!, a web-based platform utilizing a game-based format to quiz the students. The non-gamified cohort completed the quiz in a standard format using the Canvas Learning Management System. Test and quiz scores of each cohort were averaged, and independent t-tests were performed to compare each cohort to the previous non-gamified cohort. Paired t-tests were also performed to compare the pre- and post-test engagement questionnaires (see Table 2).

Focus groups were performed in December of 2017 and 2018. SPOI data was also collected at the conclusion of the respective semesters. The focus group transcripts were de-identified, with the audio recordings permanently deleted following transcription by a neutral person. A systematic coding process was used to arrange data into themes. SPOI results were coded by three independent reviewers. The codified results were then analyzed for themes related to gamification as noted in the discussion section. Trustworthiness was established by using a neutral party to conduct the focus groups, through prolonged engagement and persistent observation of the subjects in addition to completion of reflective field notes. A journal tracking the two-year study was also maintained. Methodological triangulation was involved in the study through the use of interviews, questionnaires, and SPOI results (Nowell et al., 2017). Each focus group interview was audio recorded and coded, and a thematic analysis was conducted to look for patterns regarding opinions on gamification and engagement.

Results

Pre/Post-Course Questionnaires

There was a statistically significant difference between pre-test (M= 4.31, SD=0.88) and post-test (M=5.39, SD=1.15) ratings on the engagement questionnaire, $t(62)=2.7$, $p=.002$ (see Table 2). The greatest mean change occurred with oral/verbal opportunities in class with an increase of 2.38 points. Out of class activities presented with the least change with an improvement of 0.16. The effect size (d=.6) exceeded the standards for a medium effect (Sawilowsky, 2009).

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Grade Comparison of Non-Gamified to Gamified Formats

As the content of the quizzes and tests were identical over the three-year span, a comparison of test scores was performed. The non-gamified course final scores (M=91.25, SD=1.01) were compared to final scores of the gamified Cohort 1 (M=94.07, SD=3.00) and Cohort 2 (M=94.27, SD= 2.65). Cohort 1 scored 2.76% higher than the cohort who experienced the non-gamified format, $t(60)=1.91$, $p=.012$, $d=1.4$) while Cohort 2 scored 3.02% higher than the non-gamified format $t(59)=1.97$, $p=.004$, $d=1.65$).

Student Perception of Instructor (SPOI)

Analysis of the SPOI comments indicated positive opinions, with 96% of comments positive in nature. Positive themes included the perception of freedom of choice with the "Choose Your Own Adventure" format, speed with feedback and grading, and addressing a variety of learning styles within the missions. Negative comments leaned toward the course being initially too complex (too many options) to manage, and two students felt gamification was not appropriate for graduate learning but did not indicate why.

Post Course Focus Group Interviews

Analysis of the focus group interviews revealed three primary themes of the course: layout/gamification, improved confidence, and having choice/control.

Layout/Gamification

The students noted that the nature of the gamified labs increased their desire to be actively engaged in labs rather than be a passive observer. An appreciation was given for the variety of approaches used in the course including gameshow formats, "beat the clock" activities, and group-based problem-solving. The badge/mission design of the course was also appreciated as students could schedule mission due dates to work around larger projects in other classes, with one student noting, "For the first time I felt I had control of my schedule". The students felt they were able to put more effort into the quality of an assignment rather than feel they were being rushed. One area brought up repeatedly was the course's adherence to the gamification principle of immediate feedback. The students felt unanimously that this feature made the course a highly enjoyable and successful experience:

> Information was presented and explained through PowerPoints, flipped lectures, readings, group work/projects, hands-on activities and labs. This class was also presented in a different format called gamification. I loved it! I liked having the freedom to choose my own assignments and complete them at my pace!

> Cool layout, especially for the final semester where we wouldn't have liked sitting through lectures every week. Assignments were all helpful... feel like I have a good grasp on AT.

> And I like that he utilizes different things. He utilizes different types of technology. He utilizes different ways of learning, hands on activities, games that type of thing throughout the whole class he has always done that as a teacher, but definitely more so in this course.

While several students expressed a positive response to resubmitting assignments to "have a chance to get it right", many of the same students noted they also preferred assignments to be "one and done" without need to revisit the assignment. The students also collectively liked the competitive nature of the labs for awards and bonuses but did not like having competitive events count toward a final grade as they felt, "stressed and not fully rewarded" for their efforts. "I was not really liking the idea of competing with my other classmates for a grade."

Improved Confidence

The students' self-report of improved confidence was threaded throughout the interview responses. Of note was the gamified manner in which the students were exposed to several AT experts through the use of interactive lab experiences with the experts rather than just lecturing and demonstration of their fields of expertise. "I thought that was practical and beneficial and learned so much from their (AT experts) practical experience." One student noted that the gamified experience "Gave me the confidence to approach community contacts and not fear being rejected." Additional students noted:

> He (instructor) helped us get involved in the community, and he also gave structured lectures. I enjoyed the organization of this course. The gamification allowed students to choose which assignments (sic) This was one of my favorite classes of the program! …I went into this class thinking I wouldn't be able to create AT but feel very confident now.

> I am grateful for the field trip opportunities we had for this class. I am so glad we had the chance to go to the elementary school and meet with a school OT and be able to create something for the child. I really enjoyed how hands-on this class was! I learned so much from being able to spend time in a wheelchair, the switch-it-up project, the *MacGuyver* project, the *5 for 5*, and the *Low-Tech Lab*, and others. These were all incredibly useful and will probably be the most memorable activities in the entire program. I am also very appreciative that you invited so many guest speakers for us! …we are very fortunate to have had these opportunities to learn from specialists. I feel I'm ready for Level II.

Choice/Control

A frequent comment from the interview involved the students' perception that the design of the course gave them freedom in designing their path to learning about AT. They felt that allowing them to craft their own path in the course improved their interest and engagement in the subject. The ability to select from missions that were completed solo, in pairs, or in groups was also viewed favorably. The large selection of missions gave

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the students confidence to create a mixture of missions which were in their “safety zone” while allowing them to select new challenges that “gave me permission to fail”. As noted during a focus group session:

> I liked the amount of freedom and choice we were given. It was fun and added another exciting component to be able to pick which assignments we wanted to do… I liked the fact that a lot of the assignments could be done with a partner - this gives us the chance to bounce ideas off of each other and learn from each other's strengths. And thank you for the lightning-fast feedback for assignments!

While most students liked having choice, a few students noted they felt that the choices could be overwhelming. These students noted they were conditioned to being given assignments due on set dates and that having control of their schedule caused increased stress with time management.

Discussion

This study indicates that utilizing a gamified format in a graduate level occupational therapy course may improve engagement in coursework as well as improve self-efficacy of skill sets addressed within the course. Quiz scores in the gamified cohorts were improved as compared to the non-gamified cohort. A positive overall perception of the course was indicated by the SPOI results and focus group interviews. However, engagement in activities that occurred outside of the class, such as required reading, had minimal change as compared to the non-gamified cohort.

A comparison of pre- and post-course questionnaires indicated a statistically significant improvement in the students’ engagement in the gamified format over non-gamified formats. This was confirmed by the anonymous student feedback as well as by the focus groups’ responses. These results mirror the positive effects a gamified approach has had on engagement in other healthcare professions (Brull & Finlayson, 2016). Student involvement in course discussions, interaction during group activities and quality of the missions completed were frequently cited as benefits of using the gamified format. One student stated, “I think this is the best class that I have taken. I think the gamified organization of it really helped facilitate our learning. I learned about different technologies and have it tied into OT with specific populations and diagnoses.”

The gamification format may have benefitted from the timing of this course at the end of the students’ didactic coursework as many students expressed burnout with coursework and stated they were looking forward to beginning fieldwork and graduating. SPOI feedback and focus group interviews indicated the students felt less burnout while engaging in the course. One student noted, “There was no point in the semester where I felt like I was doing assignments that I was miserable working through. I can pick ones I would enjoy rather than someone picking for me.” Instructors may want to consider gamification of courses as a way of increasing engagement and addressing burnout with students in their final semester before Level II fieldwork.

The scores for each gamified cohort were compared to the scores of the non-gamified format. These scores were statistically significantly higher than the scores of the non-gamified cohort. The second gamified cohort also scored higher than the first. This may have been due to improvements in course design (Chanut & Lerdpornkulrat, 2016), individual competence of the students, or the quality of the instructor. In this study, the students may have had greater motivation to perform in the gamified courses, as the points were used to achieve “Gold and Silver” levels toward earning a badge. The badge would then “unlock” (earn) a variety of bonuses for the students. Abramovich et al. (2013) noted this approach may have excellent short-term benefits in motivating a student to perform better. However, the effect may wear off if saturation of the approach occurs.

While the use of the gamified format was an overall successful endeavor across both cohorts, there were several pitfalls in the process. Creating a gamified course requires a significant amount of effort as the course requires a significant amount of scripting and organization. Each part of the course must fit carefully into the other parts. Seamless operation is a necessity to the flow of the operation, leaving little room to vary the course once it begins. A small disruption, such as a guest speaker canceling at the last minute, can cause a significant amount of disruption to the gamified environment.

While students may feel intimidated by the process, careful planning and organization by the educator can quickly allay those feelings, allowing the student to focus on the course content. Providing a “Badge Pathway Tracker” at the beginning of the semester and utilizing immediate feedback at the beginning of the semester seemed to reduce initial anxieties for the students. Most students quickly mastered the mechanics of the gamified atmosphere and gave frequent feedback on improvements in their learning of course content due to their improved engagement in the course:

> Actually it was nice not worrying about grades. Your goal was to pick the assignments you wanted to learn something from so you were doing them with the purpose of learning. I felt like I was spending more time on assignments because I was doing it for the purpose of learning rather than trying to figure out what it was the syllabus wanted and what everybody else is doing.

Care needs to be maintained in course design to manage the amount of choice students have and to be careful not to emphasize the game mechanics of the course over the content. Students noted in the focus groups that, while gamification was a success within this course, they would not recommend having more than one course per term in a gamified format as it would make the approach feel “saturated”. The students also felt that there was the potential to place too much effort on the game and not on the content of the coursework. This feedback is being used to inform enhancements to the course.

Several students noted that the course design did not improve engagement in studying material outside of the class sessions. While the projects and mission design appeared to improve engagement in the active content of the course, improvements in

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engagement may not have carried over into other aspects of the course, such as reading and studying for quizzes. “I did not read the textbook for this class anymore (sic) than I did for other courses.” Another student noted the, “… gamified format allowed me to play with whether to focus on the quiz or work harder on a mission (sic). Most often I chose the mission.”

Implications for Occupational Therapy Education

The mechanics of gamification may adapt well into a variety of course subjects in an occupational therapy program. While this paper focuses on redesigning an entire occupational therapy course, gamification may also be applicable to individual learning modules within a course, keeping in mind the differences in game-based learning versus gamification. Starting with a single learning module within a course may be a feasible method before completely redesigning a course. This will give the instructor the opportunity to play with different mechanics and to provide students a gradual exposure to the approach. Most students in the focus groups noted that the jump to a gamified course was stressful, and they would have preferred to experience gamification in a smaller dose prior to this course.

To maximize the effect of designing a gamified course within an occupational therapy program, it is recommended the occupational therapy educator consider the following areas:

- The educator must determine the overall theme of the learning module. While the learning module does not have to follow a story, there must be an overarching theme or goal for the students to see beyond the course objectives.
- Rules of the “game” must be transparent to the students and must adhere to the theme of the learning module. These rules can vary greatly depending on the content being taught.
- A significant amount of planning is necessary for successful gamification. Gamification is more than just adding games to a learning module. The instructor must plan for any possible direction students may choose and to plan for contingencies for when the game does not play out as planned.
- Gamification should be enjoyable. The primary aim of gamification is improving engagement. If the game is not enjoyable, then engagement may not improve. This does not mean that the course is easy. Several students in the focus group stated they expended greater effort in this course compared to others due to their desire to play the game. Joy can be found in achieving a badge that represents advancement of skills or completion of a project. Joy can also be in the form of immediate feedback and prizes. Using a variety of approaches will aid in sustaining joy.
- Gamification should not appear too frequently in an academic program. Gamification may become less effective if the program is saturated with it.
- Most importantly, do not get lost in the game. Gamification is meant to support the learning objectives, not to replace them. If the effort to sustain the game becomes too burdensome, then the purpose of the course may become too confusing for the students.

Limitations

All data collected was based on two cohorts in the same occupational therapy program taking the same course. It would be beneficial to collect data from an additional university. The pre-/post- questionnaires asked the students to compare their impressions of engagement to the entire program as compared to a single course. This may skew the results as students may have focused on a particular course they either preferred or disliked. Having the students focus on a single course may produce more accurate results. While quiz and test scores showed statistical improvement for both gamified cohorts as compared to the non-gamified cohort, there may be additional factors that may have had an effect on the scores. Additional study is needed to determine if any other factors may have affected the results. While students stated they felt increased confidence in utilizing the course content on fieldwork, this study does not address whether the improved engagement noted had a positive effect on fieldwork performance. A follow-up interview of the students' post-fieldwork as well as analysis of their fieldwork performance scores may be of benefit.

Future Research

Future studies may also consider other variables such as placement of the course in the program. This study took place during the final didactic semester and may have been influenced by factors such as burnout and students focusing on beginning Level II fieldwork. A study focusing on a cohort in the first semester may provide additional information on the effectiveness of gamification. Other beneficial studies could focus on determining saturation levels with the use of gamification in an academic program.

Conclusion

The use of a gamified format in a graduate level occupational therapy program may be of great benefit in improving student engagement in course content. The data indicates a positive effect on student engagement, particularly using gamified mechanics such as choice and immediate feedback. The students also noted improvement in self-confidence with managing the course content and in feeling prepared to apply the course content in Level II fieldwork. A gamified course, though, requires a significant amount of preparation and cannot accommodate much deviation from initial plans. The focus must remain on the course content with a consistent effort to keep students from getting lost in the game mechanics. The format used for these courses resulted in a significant improvement in in-class engagement. However, a gamified approach did not appear to improve outside engagement (reading and preparing for tests) which will require further study and modification of course content. Gamification may be an effective approach with careful and intentional design. However, the use of gamification may lose its effectiveness if it is oversaturated.

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