

Survey Research Proposal

Project #3 Dr. Carnahan

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Description of the study

The purpose of this study will be to gain insight as to how gamification (active learning methodologies) in STEM (science, technology, engineering, and math) courses impacts student perception of self-efficacy in undergraduate STEM courses. STEM students will most likely face some of the most rigorous and challenging coursework during their college years. Many will be successful, however, some will not (Graham, et al., 2013). Students with an “optimistic self-belief in their competence or chances of successfully accomplishing a task and producing a favorable outcome” or self-efficacy (Akbar, 2008) may be more likely to succeed in STEM courses. Is self-efficacy something that can be developed or increased when students engage in gamified course components either during the course or on their own? Gaining insight into the degree of self-efficacy a student possesses as it relates to engagement in gamified elements in STEM courses, may help to better understand the development of self-efficacy in STEM students. This increased self-efficacy through gamification may help students achieve their goals in a STEM field (Graham, et al., 2013).

Participants

Participants will be all currently enrolled STEM students at a mid-size, ethnically diverse, four-year university. This non-probability, convenience sampling of students is best for this initial study because they are available and can be studied (Creswell & Plano-Clark, 2011). The survey will be sent via email to all university professors that teach STEM courses and will be asked to distribute the anonymous surveys to the students who are currently enrolled in their STEM courses.

Issues that may arise could (at minimum) be twofold. Depending on the number of surveys, interviews or other data gathering requests professor (and students) have received and been involved in they may not be interested in another survey, or they do not have time to push it out to their classes. Another issue may be related to the timing of the survey. If the survey falls close to the end of the semester they may be too busy and uninterested to respond to a survey.

Research Questions

How does engagement in gamification (active learning methodologies) in an introductory STEM course help improve self-efficacy* (word choice) of undergraduate, underrepresented STEM students?

Sub-questions would be:

1. (QN) How do student self-perceptions of persistence (self-efficacy) relate to use of gamification in STEM coursework?
2. (QL) Does greater self-efficacy foster student participation in self-guided gamification as a mean to succeed in STEM courses?
3. (MM) How do classes that use gamified components increase self-efficacy?

Need for the study

Retention of all undergraduate students, particularly underrepresented STEM students has been a concern for universities as well as “examining the reasons for low student persistence and retention, and how to increase motivation and retention rates remains a top priority in STEM education” (Graham, et al., 2013, Sithole, et al., 2017). Gamification is a relatively new addition to educational pedagogy and it’s integration into STEM courses as it relates to STEM course engagement needs to be explored in more depth. The inclusion of gamified elements in STEM

courses and encouraging the use of gamification as a way to engage with new material might be a successful way to engage students with challenging STEM content. These areas that could benefit from more research. A study to gain insight as to how gamification in STEM courses relates to a student's perception and development of self-efficacy in undergraduate STEM courses would fill a gap in the literature (Tinton, 2005).

Methodology

In order to adequately describe the complexity of the relationship between gamification and self-efficacy, a convergent mixed method approach seems the best research design to describe this relationship (Creswell & Creswell, 2018). Gathering quantitative and qualitative data at the same time will allow for analyzing qualitative data with support from quantitative data. An instrument that uses quantitative questions with a Likert scale and two open-ended qualitative questions will supply data from student exposure and experience with gamification and their perceptions of self-efficacy.

Descriptions of the type of questions

General demographic questions (non-identifiable) will be asked at the end of the quantitative section (age, major, ethnicity).

The following are some of the quantitative questions that would be asked using a Likert scale for responses: 1=Not at all 2= Somewhat True 3= Neither True or False 4=Moderately True 5=Very True

1. STEM classes I take have gamified (or active learning methods) components (interactive responses, work that involves collaboration through technology).
2. I am currently enrolled in 1 or more STEM classes.

3. I use technology on my own to further understand concepts in class.
4. I can always manage to solve difficult problems if I try hard enough.
5. I am certain I can find a way to get help if I don't understand something in class.
6. I will always find a way to get to class.

Qualitative questions may include:

1. Describe how you would clarify, or understand in more detail, a concept you did not understand in class.
2. What resources do you use on campus to assist STEM students? Can make this QN
3. How have you incorporated them in your study strategies? Can make a list to choose from for QN study

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