The Impact of a Gamified Orientation Program on Underrepresented Minority STEM Students

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Research Problem

Many researches addressing the minority disparity in STEM, but few studies covered to solve the challenges about correcting the proportion of underrepresented minorities in the STEM.

Few research using gamified orientation as an avenue to increase retention among underrepresented minority in STEM programs.

Significance of Research Problem

African Americans and Latino students continue to be part of the underrepresented minorities group in the STEM fields (National Science Foundation, 2017).

Past researches revealed that underrepresented minority students fail to advance even when students have intense academic preparation (Bean & Metzner, 1985).

Increasing the number of American university students who complete degrees in STEM fields is of national interest, with the shortfall of several workers capable of filling the available scientific and technical careers threatens United States global competitiveness and national security.

Purpose of the Study

The purpose of this qualitative case study was to explore the benefits of a gamified orientation. The research probes whether those benefits reflected in student behaviors and the retention rates among the underrepresented minority STEM.

Research Questions

The following three research questions guide the study:

Q1. How do underrepresented minority students at a public urban university perceive the impact of a gamified orientation program on their college experience?

Q2. Do underrepresented minority students feel more prepared to finish the STEM Academy program after having participated in a gamified orientation?

Q3. What ways did the gamified orientation affect the creation of communities of practice among the underrepresented minority students?

Existing Research

Mathew (2017) examined academic success and retention of the summer bridge programs offered by many universities for incoming first-year students, as interventions to aid student commitment to excellence, integration with the university's setting, academic expectations, social opportunities, a time of self-discovery, and the preparation to reach potential in the years ahead.

To address the shortage of STEM students, focus directed towards the K-16 STEM education (National Science and Technologies Council, 2013). The research focused on the challenges facing the educational systems to bolster the number of students successfully graduating from the STEM education system (Singer, Nielsen, & Schweingruber, 2012).

A study found that underrepresented minorities experienced barriers to their success in STEM fields during the interviews, expressed the feeling of loneliness, invisible, lack of same-race peers and faculty members, struggling to apply theory to practice, and the lack of access to preparatory courses needed to succeed in STEM fields (Strayhorn, Long, Kitchen, Williams, & Stentz, 2013).

Several studies have found gamification helps learners improve their mentality who approach the idea with positive expectations (Kapp, 2012). Also, McFarland (2017) explored the perspectives of high school teachers who used gamification in their curriculum. Teachers concluded that their students felt greater satisfaction about completing game challenges and achieving to next levels

Research Methodology

The research design is a qualitative exploratory case study. Creswell & Creswell (2018) explain a case study involves the process of understanding a single one or more individuals through multiple types of data collections over some time. For this study, one case explored throughout a period, with various data collection methods that are in line with Creswell & Creswell's definition of the case study.

The philosophical framework that guides this study is the social constructivism worldview. Social constructivism is a typical perspective approach used for qualitative research (Creswell & Creswell, 2018, p. 9), where individuals seek to understand the world around them through the lens of their work and live.

Data Collection

Collected data in case studies provide a different perspective of the research topic (Tellis, 1997). The various data collection sources offer support for the triangulation and validity of the collected evidence (Patton, 2015; Stake, 1995). The study involves four data collection methods, including participant interviews, program coordinator interviews, focus groups, and archival records.

Participant Interviews

The participant interviews were the primary method for data collection in this research. The format of the interviews is semi-structured questions tied to research questions. The focus on the questions is the experience of the orientation game, the impact it has on the college experience, the motivation to pursue and continue the STEM program, and the aspect of the community building.

The interview process starts with the researcher sending emails to individuals who attended the gamified orientation from the roster attendance sheet. The email message included the purpose of the study, including an invitation to schedule a slot to interview through a recorded video session.

Having the interviews with the program coordinator assists with the data triangulation of STEM student interviews.

The open-ended focus group interview helps to explore the group dynamics and to build on the formation of communities of practice.

Survey Instrumentation

The researcher will use the survey developed by Brown (2012), designed to assess enrollment characteristics to predict student persistence and retention. The survey instrument measures student demographics, environmental commitment, learning preferences, institutional commitment, individual aptitude, academic intentions, peer relations, and sense of community (Brown, 2012).

Data Analysis

Yin (1994) states the process of data analysis includes categorizing, examining, and rearranging collected data to address the initial propositions of a study. Patton (2015) defines qualitative data analysis as the procedures related to bringing order, structure, and interpretation to assembled data. The process of finding those themes then led to the process of coding. The researcher approached coding set forth by Bazeley (2014); that coding is not just for reducing the sheer number of data, but to stimulate and expedite analysis by allowing the data to be queried and tested. The goal was to keep returning to the data until emerging patterns and explanations were clear.

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