Exploring Digital Badging in Higher Education: A Mixed Methods Approach

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EDTC 806 – Research Methods in Education Technology Leadership

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Chapter 1: Introduction

Introduction

Gamification is a popular trend in higher education used to make course content more appealing and engaging. Gamification allows educators to incorporate game elements into a learning environment that will help students learn their course material faster. A popular form of gamification is digital badging, which is implemented across higher educational institutions. Digital badges are symbols or markers of an accomplishment, skill, quality, or interest (Dyjur & Lindstrom, 2017). Digital badges are used in higher education to promote motivation, engagement, and goal setting. In a digital badge, metadata is embedded; this provides information about the issuing institution's name, the date issued, and criteria for earning the badge (Fields, 2015). Students using digital badges can visually document each of their achievements, displaying them on social media and professional networking platforms.

Higher educational institutions have integrated digital badging into various courses and programs across campus, such as first-year experience, career courses, and mentoring programs. Digital badging has been proposed to improve academic requirements to help students better adjust to higher education demands. However, one-third of the students still withdraw from the institution before degree completion (Mah & Ifenthaler, 2019). Research indicates the need for further research to explore the emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation.

Statement of the Problem

Higher educational institutions have been unsuccessful a tackling the issue of low student engagement and career readiness. Higher educational institutions must draw upon research to address retention issues by providing ongoing support and implementing intervention methods (Costello, 2020). For higher education institutions to overcome this issue, it involves identifying and addressing the many difficulties students face by implementing innovative learning technologies. The development of new teaching and learning models has led to educators adapting to learners' needs by creating conditions suitable for developing more promising and modern practices (Campillo-Ferrer et al., 2020). Digital badging, a form of gamification, has been employed by educators as a motivational strategy to improve student engagement and academic performance (Kim et al., 2018).

Digital badging is being implemented in academic and career planning courses to increase student experiences. Although researchers have studied the motivational impact of digital badging on students in higher educational institutions, there is a lack of research exploring emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation. Due to the lack of research, higher education institutions struggle to address retention issues and identify successful intervention techniques.

Purpose

This mixed-methods study explores emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation. The researcher will use qualitative methods to identify what are STEM

students' perceptions towards digital badges. The qualitative data will look closely into how STEM students feel digital badging has impacted their self-esteem and goal setting. The researcher will collect qualitative data to determine how has the perceived confidence level of STEM students changed or improved when applying for internal and external internships. The researcher will then use quantitative data to identify the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation.

Research Questions

The following research questions will help guide this mixed-methods study:

R1: (QL) What are STEM students' perceptions of digital badges?

A. How do STEM students feel digital badging has impacted their self-esteem and goal setting?
B. How has the perceived confidence level of STEM students changed or improved when applying for internal and external internships?

R2: (QN) What is the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation?

R3: (MM) What are the emergent themes between the qualitative data on STEM students' perceptions towards digital badging and the quantitative data on the relationship between digital badging and attitudes towards career readiness and graduation?

Limitations

This study has potential limitations. This study will not represent the whole STEM student population since not all STEM students have the opportunity or have earned digital badges. The researchers' subjective feelings and biases may affect the case study. The qualitative

and quantitative data collection methods used in this study, such as surveys, observations, and interviews, may be time-consuming and challenging to distribute, arrange and collect due to participants' availability and willingness. The study may be difficult to replicate if the sample population is specific to a higher educational institution that uses digital badging. The conclusions drawn from this particular mixed methods study may not be transferable to other higher educational settings.

Chapter 2: Literature Review

Introduction

Gamification has been widely adopted in higher educational institutions. Higher educational institutions provide support services such as digital badging in summer bridge programs, first-year experience courses, and mentoring programs. Students face many challenges, including an academic transition, a social transition, and meeting expectations and perceptions (Mah & Ifenthaler, 2019). Digital badging can help students showcase their achievements and qualifications of specific skills and content. An analysis of varying factors that impact performance and adoption could better help administration and educators understand the unique nuances associated with badge implementation (Stefaniak & Carey 2019). Digital badging offers students support within course-based programs and initiatives on campus, increases motivation, offers micro-credentialing and professional development opportunities. These various opportunities can create an inspiring and competitive environment where students will feel ready to participate enthusiastically. Research has proven the different positive impacts of using gamification through digital badging on students in higher education.

Retention Issues within Higher Education

Higher educational institutions have struggled to improve college graduation and persistence rates. Degree rates suggest it is taking students more time to complete their degrees. Higher educational institutions are responsible for making sure students have the resources needed to have a successful experience. Researchers have started to investigate possible reasons for attrition in higher educational institutions, most notably by examining student-level variables, such as motivation and social engagement (Xiong et al., 2015). Students also face personal and financial issues that may impede their time to completion of a degree. Educational institutions

are encouraged to use popular technology, which can potentially transform student engagement and provide a method to improve retention rates (Price & Kadi-Hanifi, 2011). Student engagement is critical for students' success in college. Higher educational institutions are working to enhance student success initiatives and support services to increase retention and persistence.

Motivation

Gamification is a strategy used in educational settings to increasing engagement by integrating game elements into course material (Dichev & Dicheva 2017). The research on gamification in educational settings has shown promising results of increased student engagement, user retention, and knowledge. Research shows that informing students about the types of digital badges before the learning activity increases student motivation (Zhou et al., 2019). Gamification has increased student engagement and motivation to learn and would encourage a student's desire for success. One way to motivate learning is to use badges to show the completion of knowledge or accomplishment of a social achievement within a community (Costello, 2021). Badges encourage students to continue learning to receive a credential from acknowledging content and skill completion. Intrinsic and extrinsic motivation helps students to find inspiration from within the player or from an external factor outside the individual (Stieglitz et al., 2017). Digital badging systems use points and a leaderboard; this game element motivates students to finish and do better with their peers. Research supports that leaderboards encourage goal-setting behaviors by motivating players to create performance goals that will help them reach the top of the leaderboard (Landers et al., 2017). Implementing gamification into higher educational settings motivates students to perform better while improving behavior and skills to reach their goals.

Micro-credentialing and Professional Development

Digital badging provides students and employees the opportunity to earn micro-credentialing and professional development. Virtual digital badging systems give students and employees the chance to exhibit their accomplishments and abilities. Micro-credentials are attractive to students while using gamification methods; they can earn badges (Mathur et al., 2018). Micro-credentialing programs are recognized and utilized by students, faculty, and employers. A benefit of using micro-credentials is that digital badges contribute to goal setting and career preparation. Students can construct a digital portfolio that they can utilize when applying for internships and job searches. Students can simply share digital badges on their social media and professional networking platforms. Research can help identify whether students with extensive digital portfolios are more successful at gaining employment and reaching success during employment (Mathur et al., 2018). Digital badges offer an attractive and entertaining way for students to earn micro-credentials and professional development experiences, improving academic and career goal setting.

Summary

This literature review has explored research supporting the need, implementation, and experiences of digital badging in higher education. Higher educational institutions are continuously seeking strategies to address issues related to retention and student support services. The implementation of digital badging in higher education courses and initiatives improves student motivation, engagement, self-esteem, and goal setting. Digital badging also offers students the chance to earn micro-credentials and participate in professional development opportunities, which helps them to meet their academic and career goals. Further research is needed to explore the emergent themes between STEM students' perceptions towards digital

badging and the relationship between digital badging and attitudes towards career readiness and graduation.

Chapter 3: Methodology

Introduction

Gamification is being applied across educational settings all over the world. Digital badging is an emergent trend in higher educational institutions that promote student engagement and involvement. Research on digital badges has shown them to be an influential, positive tool used to motivate students (Abramovich &Wardrip, 2016). Digital badges offer students assistance and structure to navigate their higher educational experience effectively.

The study will utilize a mixed-methods convergent parallel design (Creswell & Planko Clark, 2018) whereby the researcher will collect and analyze both quantitative and qualitative data within the same study. Mixed methods research draws on potential strengths of both qualitative and quantitative methods, allowing the researcher to explore diverse perspectives and uncover relationships between the research questions (Shorten & Smith 2017). The use of mixed methods research design in this study identifies emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation. This study will be conducted using surveys, observations, individual interviews of students who have earned digital badges. The data collected from this study will provide insight into digital badging in higher education institutions and future research.

Research Design

For this study, the researcher will conduct a convergent parallel mixed-methods study using qualitative and quantitative data collection methods. Conducting a convergent parallel mixed-methods study will answer the following research questions because it will collect and then analyze two independent strands of qualitative and quantitative data in a single phase

(Creswell & Plano Clark, 2018). Initially, the researcher will begin the study with the qualitative phase, individual interviews of students who have earned digital badges, and observations of students earning badges. Interviews and observations will happen throughout the semester-long study. The second phase will collect quantitative data using surveys. The participants will have to complete the survey to establish the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation. Both of these data collection methods will have equal weight (Creswell & Plano Clark, 2018). The convergence of the qualitative and quantitative data will help to answer the following research questions:

R1: (QL) What are STEM students' perceptions of digital badges?

A. How do STEM students feel digital badging has impacted their self-esteem and goal setting?
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R2: (QN) What is the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation?

R3: (MM) What are the emergent themes between the qualitative data on STEM students' perceptions towards digital badging and the quantitative data on the relationship between digital badging and attitudes towards career readiness and graduation?

The mixed-methods convergent parallel design works best when there is a combination of multiple simultaneous phases. The two strands will be converged and analyzed for convergence, divergence, contraindications, or relationships between the two data sets (Creswell, Plano Clark, 2018). Using the convergent parallel method allows the researcher to develop a better understanding of how the qualitative and quantitative data will explore the emergent themes

between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation**.**

Population and Sample

The population selected by the researcher for both the qualitative and quantitative phases are STEM students who have earned digital badges enrolled at New Jersey City University. The criteria for selecting participants will be based on STEM students who earned a digital badge. This study's target population is STEM students who have earned digital badges during their sophomore and junior years attending college. The quantitative phase participants will be selected using a convenience sample based on participants' convenience and availability (Creswell & Guetterman, 2019). Students will be recruited in the lobby of the science building, where students frequently hang out and attend their courses to encourage students to sign up. Recruitment for both qualitative and quantitative phases will co-occur. The sample size is not limited due to the unknown number of STEM student participants' who have earned digital badges. A non-probabilistic group of STEM students who have earned digital badges will be selected for the qualitative phase (Creswell & Plano Clark, 2018). Depending on the size of the group identified, the sample size will stay the same for both phases of data collection. Having a smaller group to interview should not limit the study. The researcher will also request from the administration access to distribute a survey to identify students who meet the criteria (Appendix A).

Procedure

This study will use a convergent parallel method approach to explore the emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation**.** This study's procedure

will describe the steps needed to seek permissions and approvals, collect data from participants, analyze data, and report findings. The researcher will begin by obtaining Institutional Review Board (IRB) consent. Once the IRB has granted permission, the researcher will request approval from the administration before collecting data (Appendix A). Once the administration authorizes the study and the researcher will request a list of STEM students. The researcher will send out an email (Appendix B) to potential participants' explaining the research and inviting them to participate and complete the consent form.

Once consent forms have been collected and email asking students to complete the survey and sign up for observations or individual interviews via zoom registration link and google form. The first email to recruit students will be sent during the first week of the spring semester, with a request to complete the consent form within 10-days. The second email to students who have elected to complete the survey and sign up for observations or interviews will be sent out four weeks into the semester. This timeline should give the researcher ample time to collect a sample of students who would like to participate by either survey, interview, or observation. If the deadline has passed and participation is low, a reminder and extension will be given to recruiting additional participants for the research study. The researcher aims to have 50 surveys and a minimum of 25 participants for interviews and observations to complete and analyze the data collected.

The qualitative data sources will include individual interviews and observations with STEM students who have earned digital badges. The researcher will conduct 10-13 observations with the student while completing the entire digital badging module. The researcher will refer to the observation checklist (Appendix C) during the observation. The researcher will pay close

attention to the participants' behavior and reactions during the digital badging module. The observations are not video or audio recorded; the researcher will take field notes.

The researcher will conduct 10-13 interviews which will consist of open-ended questions (Appendix D). This approach aims to uncover information about the participants' experiences with digital badging and why they were interested in this activity. Qualitative interviews provide detailed, in-depth descriptions of the study topic, which allow readers to decide the transferability of the outcomes (Merriam, 2002). The researcher will not take notes during the interviews. The interviews will be video and audio record for the researcher to engage with participants fully. Consent was requested during the initial email to recruit participants for the study to allow for video and audio records of these sessions.

The quantitative data source is a survey (Appendix E) to collect demographic information and identify any relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation. The researcher would like to collect 50 surveys to better understand students' opinions and attitudes towards digital badging. Quantitative survey data is easier to compare with other studies using similar questions (Nardi, 2018).

The researcher will need to anticipate possible data collection issues, such as selecting unsuitable participants, acquiring unequal sample sizes, and potential bias. The researcher needs to check if the data collected from both collection methods address the same topic. The quantitative data would be analyzed to support the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation. The qualitative data would examine themes related to student perceptions of their experience with digital badging and how they feel digital badging has impacted their self-esteem and goal setting.

The qualitative and quantitative results will be combined, including cross-tabulation of qualitatively derived groups with quantitative variables, with the products as a matrix relating qualitative themes to qualitative variables (Creswell & Plano Clark, 2018). When the researcher interprets the data, procedures will reflect how the united results will produce a better understanding of the qualitative and quantitative data combined. This would lead to discussing the final results for the mixed methods study. Data analysis issues will be considered and addressed by the researcher. For example, when dealing with issues related to inadequate approaches to link the data. The researcher will need to be careful to no make irrational comparisons of the two results. Another possible issue related to data analysis the research would consider is utilizing insufficient data conversion approaches and inadequate statistics to analyze (Creswell & Plano Clark, 2018). Interpretation issues would need to be considered and addressed by the researcher. Some interpretation issues would include answering opposing findings, not examining mixed methods research questions, giving unequal weight to data (Creswell & Plano Clark, 2018).

Table 1
Research Questions, Data Types and Data Sources

Research Question	Data Type	Data Source
1. What are STEM students' perceptions of digital badges?	QL	Individual Interviews Observations
A. How do STEM students feel digital badging has impacted their self-esteem and goal setting?	QL	Individual Interviews Observations
B. How has the perceived confidence level of STEM students changed or improved when applying for internal and external internships?	QL	Individual Interviews Observations
2. What is the relationship between digital badging and college-level STEM student attitudes towards career readiness and graduation?	QN	Survey
3. What are the emergent themes between the qualitative data on STEM students' perceptions towards digital badging and the quantitative data on the relationship between digital badging and attitudes towards career readiness and graduation?	MM	Individual Interviews Observations Surveys

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Additional Resources from Project #1 & #2

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Appendix A: Letter to Administration

July 10, 2021

Dear Administrator,

My name is Kristina Harb, and I am the Proyecto STEM Grant Assistant and a doctoral student in the Educational Technology Leadership Program at New Jersey City University. There has been an increase in research regarding the implementation of digital badging and student experiences in higher education. I am seeking your permission to conduct a mixed-methods study with NJCU STEM students who have earned digital badges. The study explores the emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation.

Student participation in this study is voluntary and anonymous. I would only need the list of STEM students and their email addresses to invite students to participate. I have included the student recruitment email used to invite students to participate and the consent form for your reference.

If you have any concerns or questions, feel free to contact me by email or phone. You can also contact Dr. Christopher Carnahan at ccarnahan@njcu.edu.

Sincerely,

Kristina Harb

Proyecto STEM, Grant Assistant

New Jersey City University

Email: kharb@njcu.edu

Office: 201-200-2143

Appendix B: Student Recruitment Letter

July 10, 2021

Dear Students,

NJCU has implemented the use of a digital badging system. There has been an increase and interest in research regarding the implementation of digital badging and student experiences. As a result, I will be conducting a mixed-methods research study that explores the emergent themes between students' perceptions towards digital badging and the relationship between digital badging and attitudes towards career readiness and graduation.

Participation in this study is voluntary and anonymous. By completing the online consent form, you agree to complete a survey and participate in observation or interview and allow us to use the data collected in this study. **Please complete the consent form by May 5, 2021, to be eligible to participate.**

If you have any concerns or questions, feel free to contact me by email or phone. You can also contact Dr. Christopher Carnahan at ccarnahan@njcu.edu or the NJCU Institutional Review Board.

Sincerely,

Kristina Harb

Proyecto STEM, Grant Assistant

New Jersey City University

Email: kharb@njcu.edu

Office: 201-200-2143

Appendix C: Observation Checklist

Checklist of Items in Observations

- What behaviors is the student displaying?
- Does the student understand the instructions?
- What is the student's level of focus?
- What is the student's level of comfort?
- Does the student display any facial expressions?
- Did the student earn the digital badge or gave up?
- Did the student have difficulty navigating the digital badging system?

Appendix D: Interview Questions

1. **Introduction**
    a. What is your academic standing at NJCU?
    b. What is your major?
    c. How long have you been using digital badging?
2. **Research Question 1: What are STEM students' perceptions towards digital badges?**
    a. What motivated you to earn a digital badge?
    b. What were some of the benefits you have experienced due to earning a digital badge(s)?
    c. Why would you recommend digital badging to your peers?
3. **Research Question 2: How do STEM students feel digital badging has impacted their self-esteem and goal setting?**
    a. **Did acquiring digital badges improve confidence in approaching STEM faculty members?**
        i. How often do you find yourself approaching STEM faculty?
        ii. How has your self-esteem been improved when you approach STEM faculty?
    b. **What is the confidence level of STEM students when applying for internal and external internships?**
        i. How often have do you apply for internal and external internships?
        ii. What do you feel digital badging has contributed when it comes to applying for internships and goal setting?

Appendix E

1. What is your academic standing at NJCU?

    - Freshman
    - Sophomore
    - Junior
    - Senior

2. How many college credits have you earned at NJCU?
    - 0-30 credits
    - 31-60 credits
    - 61-94 credits
    - 95+ credits

3. What is your cumulative grade point average (CGPA)?
    - 3.5 >4.0
    - 3.0 >3.4
    - 2.5 >2.9
    - 2.0 >2.4
    - <2.0

4. How many digital badges have you earned?
    - 1
    - 2
    - 3
    - 4
    - 5+

5. How many internal internships have you applied for to date?
    - 1
    - 2
    - 3
    - 4
    - 5+

6. Of those internal internships you have applied for, how many have offered you the internship?
    - 1
    - 2
    - 3
    - 4
    - 5+

7. How many external internships have you applied to date?
    - 1
    - 2
    - 3

- 4
- 5+

8. Of those external internships you have applied for, how many have offered you the internship?
   - 1
   - 2
   - 3
   - 4
   - 5+

9. Indicate how much you agree with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Digital badging has provided me with the opportunity to acquire the knowledge and skills needed to apply for internal and external internships.					
Digital badging has allowed me to acquire knowledge and skills, which has strengthened my confidence.					
Digital badging has provided me with the opportunity to acquire the knowledge and skills needed to prepare and plan for my career					
Digital badging provided me with the opportunity to acquire the knowledge and skills needed to stay on track to graduation.					
I would recommend digital badging to my classmates.					