

THE RETENTION OF EDUCATION MAJORS:
IMPLICATIONS FROM THE NATIONAL SURVEY OF STUDENT ENGAGEMENT

By

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Hanrui He

February 23, 2022

This study is dedicated to doctoral parents and my daughters

Dear doctoral parents, pursuing a doctoral degree while being a parent is very hard. However, it is ultimately rewarding. Enya and Eliora, I love you very much. When life throws rocks at you, dedication and determination will get you through everything. So, dream big, little ones!

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ABSTRACT

Teacher preparation programs are struggling as the pipeline of potential teachers is shrinking. Student dropout in teacher education programs could negatively impact the programs and exacerbate the current teacher shortage issue. This quantitative study aimed to determine if academic integration, social integration, institutional environment, and technology usage were significant predictors of education majors' intention to return. The study's data came from the 2019 National Survey of Student Engagement (NSSE) and Learning with Technology (LWT) topical module survey. The participants consisted of 431 education majors from U.S. institutions only. The hierarchical binomial logistic regression analysis results revealed that the quality of interaction with faculty is a statistically significant predictor of education majors' intention to return. Implications for the study include guiding teacher education programs in formulating effective student retention intervention plans.

Keywords: Academic integration, social integration, institutional environment, technology usage, education majors, intention to return

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Chapter I

Introduction

Statement of the Problem

Teacher preparation programs are struggling as the pipeline of potential teachers is shrinking (Barth et al., 2016; Partelow & Baumgardner, 2016; Sutcher et al., 2016). The struggle started long before the COVID-19 pandemic. Between 2008-2009 and 2015-2016, the enrollment in teacher preparation programs fell 37.8% (National Center for Education Statistics, 2018). The factors associated with low enrollment ranges from low pay, heavy workload, and difficult parents to unsatisfying working conditions. Considering the challenges and risks of teaching during the pandemic, potential applicants are shying away from the field more than ever. Along with decreased enrollment, student dropout is also a prevalent issue. The U.S. Department of Education (2017) reported that the number of students who completed teacher preparation programs fell by 27.4%.

Student dropout in teacher education programs could negatively impact the programs and exacerbate the current teacher shortage issue (Lin et al., 2016; Sutcher et al., 2016; Voelkle & Sander, 2008). First, the public perceives institutions with high dropout rates as having ineffective teaching and insufficient support to students (Voelkle & Sander, 2008). Second, the issue of student dropout could potentially affect an institution's financial stability and program sustainability (Lin et al., 2016). For instance, Tennessee bases teacher education program funding 100% on its quality; on-time graduation is one quality indicator (Greenberg et al., 2014). If the dropout issue persists, several of the state's teacher preparation programs could risk losing state funding. Third, student dropout and low student enrollment in teacher education programs exacerbate the current teacher shortage issue (Sutcher et al., 2016). Should the issues persist, the

growing demand for certified teachers will outstrip the supply, especially in special education, bilingual education, and subjects like mathematics and science (Sutcher et al., 2016).

The student dropout issue at the institutional level has been studied extensively. The examined factors are social integration, academic integration, personal and institutional characteristics, classroom engagement, motivation, and sense of belonging (Barefoot, 2004; Fike & Fike, 2008; Masika & Jones, 2016; Morrow & Ackermann, 2012; Tinto, 1987). Although the literature focused explicitly on student retention in teacher preparation programs is limited, there are a few robust sets of findings over the past two decades. Hobson et al. (2009) surveyed students from 110 initial teacher preparation providers in England to investigate the factors related to students' withdrawal. The study revealed that male and student teachers over 35 years old were more likely to withdraw from the preparation programs. Lower prior commitment, lack of program support, and a heavy workload were all related to students' withdrawal. Similarly, in investigating the shared characteristics of 50 teacher candidates who either repeat practicum or withdraw from the programs, Stegemann (2013) also found that male and older students experience more difficulty completing the programs and are especially at risk of withdrawing. Factors like management skills, personal and professional dispositions, personal or medical reasons also affect teacher candidates' decisions to repeat or withdraw (Stegemann, 2013). In a recent quantitative study conducted by researchers from Johns Hopkins School of Education, Kim and Corcoran (2017) investigated various factors that affect students' persistence, including engagement, socioeconomic backgrounds, past achievement, college academic performance, and the characteristics of the institution. Through studying a sample of 1,365 preservice teachers from 256 institutions, Kim and Corcoran (2017) found a positive relationship between campus environment engagement and students' persistence in teacher education programs. Furthermore,

students with higher college grades are more likely to persist. Meanwhile, male and minority teacher candidates were still less likely to complete the teacher preparation programs.

Currently, there are several gaps in the literature regarding the pressing student dropout issue in teacher preparation programs. First, voluminous literature exists to examine student retention at the institution level, and only a few dated studies focused on student retention at the program level (Hobson et al., 2009; Kim & Corcoran, 2017; Stegemann, 2013). Second, the few studies on student dropout issues in teacher education mainly investigated factors like students' characteristics, age, and cultural background at the teacher preparation programs level. Thus, there is a sensible need to explore other factors' impact on student dropout in teacher preparation programs, including involvement, a sense of belonging, academic preparation, usage of learning support services, technology integration, and institutional environment. Third, student dropout frameworks are mainly used to guide the study at the institutional level. Thus, employing Tinto's theoretical framework (1987) to guide the study at the program level could deepen the public's understanding of the factors associated with the education major's retention. Lastly, most institutions mainly focus their attention on the recruitment of education majors, and little attention was given to tackling the current education major's retention issue.

Purpose of the Study

While voluminous literature has examined factors related to student retention at the institution level, the purpose of the study is to determine if academic integration-related factors, social integration-related factors, institutional environment, and technology usage were significant predictors of education majors' intention to return. The study used data from the 2019 National Survey of Student Engagement (NSSE) and the topical module Learning with

Technology (LWT) survey. The results from this study can hopefully guide policymakers and college of education leaders in what to do to increase the retention rate of the education majors.

Significance of the Study

The study is significant for examining factors related to education majors' decisions to persist may provide insight into future teachers' supply. According to Kim and Corcoran (2018), "major persistence may be an important factor explaining reduced numbers of education graduates, and subsequently, the shortfall of qualified teachers" (p. 205). This study attempts to build a holistic view of the retention of education majors. It uses education majors' intention to return as a proxy to test the predictability of academic integration-related factors, social integration-related factors, institutional environment, and technology usage. This study could potentially contribute to research investigating education majors' retention by attempting to develop a more sophisticated understanding of the related factors. As current teachers are leaving the profession at an alarming rate (Bryner, 2021) and the nationwide enrollment in teacher preparation programs is dropping rapidly, the study results could guide teacher education programs to formulate effective retention intervention plans.

Chapter II

Review of the Literature

This chapter begins with an introduction of the theoretical frameworks used to guide this study: the sociological dropout framework and the institutional departure model. Following is a discussion of the definition of student retention and how it is measured. The literature review then discusses the various factors the existing literature has claimed to be associated with student retention. The last section discusses the gaps in the literature and the research questions and hypotheses proposed for the study.

Theoretical Framework

This study is guided by both Spady's (1971) sociological dropout process model and Tinto's (1975) institutional departure model. Among the existing frameworks or models, Spady's sociological dropout process model is one of the earliest ones and is fundamentally essential. The model laid the foundation for future student retention frameworks; it points out the role of the institution and highlights an institution's responsibility in tackling the student dropout issue (Aljohani, 2016), which could inspire institutional leaders to attach importance to the organization's overall social environment. Tinto's institutional departure model is a formalized and expanded version of Spady's undergraduate dropout process model (Forsman et al., 2014). It is widely used in various student retention studies. It highlights the importance of social and academic integration in student retention.

Sociological Dropout Framework

Spady's sociological dropout framework is mainly built upon Durkheim's (1897) suicide model. In that model, Durkheim (1897) divided suicide into four types: egoistic suicide, altruistic suicide, anomic suicide, and fatalistic suicide. Spady's (1971) model is mainly rooted in the first

two types, converting them into student motivational retention. Specifically, egoistic suicide refers to actions taken resting from detachment from a community or social context. Meanwhile, the altruistic one drew its results from being overwhelmed by the social group's shared goals and values. It emphasizes the importance of maintaining social ties to increase integration within the social system. Spady further points out that students' interaction with the institutional environment is crucial as it allows students to integrate into the environment socially and make connections. Spady also believes that student relationships with others and normative congruence are all about social integration. Students' grade performance serves as extrinsic rewards that promote intrinsic intellectual development inside the academic integration system. Thus, for a student's retention to occur, the student should integrate into the institution's social and academic domains (Spady, 1971).

Institutional Departure Model

Tinto's (1975) institutional departure model is perhaps one of the most influential and popular models regarding student retention. The model was first proposed in 1975 and finalized in 1993. Even though some view Tinto's institutional departure model as an expanded version of Spady's dropout process model, they differ in perspectives. For instance, Tinto approaches the student dropout issue from an environmental perspective and believes students dropped out of school due to failure to integrate into the institution's social and academic environment.

Academic and social integration often involves an individual's attachment to the intellectual life within the college and social connections outside of the classroom (Karp et al., 2010).

Additionally, Tinto centers the theory on the conditions under which student dropout happens. A student's decision to drop out is directly correlated with the individual's integration into the institution's social and academic systems. Students who are integrated into the institution

socially and academically are more likely to continue in the institution. Thus, an individual's educational experience impacts the continuance in the institution. Furthermore, Tinto recognizes a direct and strong correlation between an individual's commitment and persistence. He emphasizes pre-college factors like family backgrounds, skills, and abilities and their influence on students' goals and commitments upon entering college. While in college, students' institutional experience continues to influence their commitments. Thus, college students who are more committed to achieving educational goals will be more likely to persist. However, it is worth pointing out that Tinto's framework might not apply to community college students. This group of students often have heavy workloads and off-campus obligations; their integration might not be the same as they rarely have time to participate in on-campus activities (Karp et al., 2010).

Student Retention

Hagedorn (2005) divided retention into four types: institutional retention, system retention, retention within a discipline, and retention within a course. The retention of an institution's students to stay in the same institution until graduation is called institutional retention. Hagedorn (2005) defined system retention as the retention of students within the education system. For instance, some students might transfer from one institution to another one in a different state. Thus, it requires a tracking system to measure those students' persistence. The retention within an academic area, major, or discipline is called retention within a discipline (Hagedorn, 2005). For instance, it is common for students to switch between majors within the same institution, department, or specific college that might use the retention within such a type of retention as a measurement. Student retention within a course is another type of retention (Hagedorn, 2005). Course instructors and other program leaders often use such retention to track

students' persistence or course completion. Even though this study centers on student retention at the college or discipline level, past and current literature regarding retention at different levels are reviewed systematically to examine such a topic.

Within the realm of higher education, there are various ways of measuring and understanding retention. First, the state government body mandates institutions to report their graduation rates. Thus, institutions often measure student retention rates by calculating the percentage of students who finished a program or graduated within a specific time (Crawford, 2015; Soldner et al., 2016). For instance, one could determine how many students are retained within the institution by calculating the following semester's re-enrollments. The second method of measuring retention is by examining the factors associated with dropouts to make predictions (Hall et al., 2015; Nakajima et al., 2012; Westrick et al., 2015; Xiong et al., 2015). The predictive factors include precollege and college GPA, motivation, socioeconomic status, and student characteristics. The third method of measuring retention is by investigating factors that might have led some students to directly depart the institution (Morrow & Ackermann, 2012; O'Keeffe, 2013; Wolf et al., 2017). The factors are mostly related to social and academic integration, student backgrounds, and institutional environment. The literature on student retention has reported a realm of frameworks and factors associated with student dropout. Instead of viewing the related factors individually, one should inspect those factors from a systematic approach.

Academic Integration-Related Factors

Academic integration refers to students' various efforts to obtain academic success, including maintaining a decent grade point average (GPA), completing the course, and getting a degree (Woosley & Shepler, 2011). Researchers generally agree that there is a positive

correlation between academic integration and student retention. However, Ishitani (2016) argued that academic integration only significantly impacts first-year college student retention. Its effectiveness diminishes on second-year student retention. Differences in the selected samples, variation in employed statistical techniques, and differences in study length could contribute to the mixed results. Through reviewing the literature, the most studied academic integration-related elements are students' GPA, academic advising, and the usage of learning support services (Batz et al., 2015; Coladarci et al., 2013; Crawford, 2015; DeBerard et al., 2004; Drake, 2011; Haddow, 2013; Nakajima et al., 2012; Reinheimer & McKenzie, 2011; Seirup & Rose, 2011; Soria et al., 2014; Swecker et al., 2013).

GPA

A student's GPA is one of the most often used measurements for academic performance and school success. There is a reasonably extensive number of studies regarding the impact of GPA on college completion. Some reported that an individual's high school GPA is a strong predictor of college success and completion. It is positively associated with first-year college students' GPA. Students with an excellent high school GPA obtained a decent GPA during the first year of college (DeBerard et al., 2004). Moreover, depending on the institution's selectivity, most universities require prospective students to maintain a certain high school GPA for admission.

A student's college GPA is also closely associated with their retention as it has both academic and psychological impacts on students. Maintaining a decent GPA in college is also a significant stressor contributing to a student's decision to withdraw (Seirup & Rose, 2011). For instance, students with low GPAs are mostly placed on academic probation or alert, and they are more likely to drop out (Seirup & Rose, 2011). In a similar study, Nakajima et al. (2012)

discovered that a student's GPA is the strongest predictor for student persistence. Nakajima et al. (2012) concluded that students with higher GPAs are two times more likely to persist through college. Additionally, Nakajima et al. (2012) revealed a positive correlation between a student's goal, self-efficacy, and cumulative GPA. Students with goals and high self-efficacy are more likely to obtain a better GPA. Thus, it becomes a strong predictor of their persistence.

Academic Advising

Academic advising is another factor associated with student retention in higher education. According to the Global Community for Academic Advising (2006):

Academic advising, based on the teaching and learning mission of higher education, is a series of intentional interactions with a curriculum, a pedagogy, and a set of student learning outcomes. Academic advising synthesizes and contextualizes students' educational experiences within the frameworks of their aspirations, abilities, and lives to extend learning beyond campus boundaries and timeframes. (p. 1)

As an advocate for quality academic advising, Drake (2011) stated that advising is not only about clerical work but also more about building relationships with students and helping them reach academic and possibly life goals successfully. Furthermore, academic advisors help students make educational decisions, identify resources, and set tangible goals (Swecker et al., 2013).

Quality advising plays a crucial role in students' persistence, for advisors are like doctors, and students are like patients (Drake, 2011). With the help of the advisors, students would be able to achieve better outcomes. Furthermore, advisors are often one of the few faculties that students could have an opportunity to develop a positive and consistent relationship (Drake, 2011). In a similar study, Swecker et al. (2013) revealed a similar finding but with a different study population. In the study, they used a sample of 363 full-time first-generation students at a

four-year research-based university to investigate the relationship between academic advising and first-generation students' retention. The study aimed to identify a relationship between the retention rates and the number of visits to academic advisors. The study revealed that the possibility of maintaining a student increased by 13% for every visit with an academic advisor (Swecker et al., 2013).

Use of Learning Support Services

Library service is one type of learning support service on campus. The use of an academic library is a form of academic integration that Tinto (1975) proposed. Recently, the role of the academic library played in maintaining students' retention has been studied extensively. For instance, through checking students' logins and library load records, Haddow (2013) discovered that retained students logged into the institution's library database more and borrowed more books than peers who withdrew. Haddow (2013) noted no notable correlations among student socioeconomic background, library use, and retention.

In a similar study, Soria et al. (2013) investigated the library logins and the types of library services and their influence on students' academic performance and retention. Soria et al. (2013) stated that the library has been under the spotlight in the past two decades due to library effectiveness in increasing students' outcomes. After examining students' electronic library access records and actual engagement with librarians and instructional workshop sessions, Soria et al. (2013) revealed that library data usage, journal access, book loaning, and instruction session attendance are statistically significant predictors of students' GPA. Also, there is a significant association between library usage and students' retention from the first year to the second year. In a later study, Soria et al. (2014) maintained that academic libraries face both the internal pressure to demonstrate the value in helping students succeed and the internal pressure to

demonstrate their importance in achieving the institutional goals. In addition to examining the relationship between library usage and students' retention, researchers also systematically examined the relationship between college expenses on the library and students' graduation rate and retention rate. In a more recent study, the researchers examined the academic library's role in predicting student retention through an exploratory study. Instead of looking at students' library usage only, Crawford (2015) analyzed various library expenditures. The study revealed a much stronger correlation between library expenses on each student and retention and graduation rates.

Tutoring service is another type of learning support service on campus. Researchers have provided evidence that effective tutoring services positively impact student retention (Batz et al., 2015; Coladarci et al., 2013; Reinheimer & McKenzie, 2011). Through reviewing the literature, much of the tutoring approaches are peer tutoring. Peer tutoring benefits range from increasing tutee's academic performance, motivation, learning skills, persistence, and retention (Batz et al., 2015; Chen & Liu, 2011; Coladarci et al., 2013; Reinheimer & McKenzie, 2011). Thus, providing tutoring programs on campus becomes one strategy to increase the retention of students who are at risk of dropping out (Reinheimer & McKenzie, 2011). Furthermore, Coladarci et al. (2013) examined the peer tutoring programs at the University of Maine to determine its impact on increasing student GPA and the consecutive semester's retention. The study revealed a statistically significant association between the received hours of tutoring services and students' following semester GPA through regression analysis. Coladarci et al. (2013) also revealed that students who received tutoring services are twice more likely to return.

In a similar study, Batz et al. (2015) also discovered that students who received Biology peer tutoring services regularly performed better in exams than before. Compared to their

struggling peers, those who received peer tutoring services are more likely to complete the course. Lastly, in addition to studying the impact of tutoring services on all college students' persistence, Reinheimer and McKenzie (2011) steered attention to a specific student population: first-year students who have not decided on a major. Gordon (1995) believed that undeclared students are the ones who are usually academically and developmentally unprepared. They are hoping to decide on a major after taking various general education introduction courses. The study revealed a significant relationship between tutoring and undeclared students' retention; however, the impact on students' GPA and time spent to choose a major is not substantial.

Social Integration-Related Factors

Whether students could integrate into an institution's social system primarily affects their persistence (Spady, 1971; Tinto, 1993). According to Rubin et al. (2012), "social integration refers to the quantity and quality of social connections and interactions that people have with others" (p. 498). There are several social integration-related factors well documented in the literature. Under the umbrella of social integration, the most studied factors are involvement (Astin, 1984; Forrester et al., 2018; Miller, 2011), student-faculty interaction (Pascarella, 1980; Schreiner et al., 2011; Trolan et al., 2016), the sense of belonging (Freeman et al., 2007; O'Keeffe, 2013; Strayhorn, 2012; Washor & Mojkowski, 2014), and motivation (Rose, 2011; Slinger et al., 2015; Xiong et al., 2015).

Social Involvement

Past literature revealed that student involvement is one of the main factors that affect students' persistence (Astin, 1984; Forrester et al., 2018; Miller, 2011). According to Astin (1984), "student involvement is the amount of physical and psychological energy that the student devotes to the academic experience" (p. 518). Specifically, Astin (1984) believed that student

involvement is a continuous process that involves the physical and psychological energy a student has invested. It can be measured both quantitatively and qualitatively. Furthermore, student involvement is a significant indicator of educational policy or program effectiveness. As he stated, “students’ outcomes are directly proportional to the quality and quantity of student involvement in that program” (Astin, 1984, p. 519). When students are more involved in the school community, they actively learn to connect within the environment, and thus their likelihood of staying in school increases (Astin, 1984; Roberts & Styron, 2010; Tinto, 1993).

The first type of student involvement encompasses their engagement in collegiate activities and organizations. For instance, Miller (2011) reported that students who frequently use the campus recreation center are more likely to remain there. The participants said that the university recreation centers positively impacted their sense of belonging and school satisfaction. Similar conclusions have been drawn by Forrester et al. (2018), who discovered a significant association between students’ participation in recreational activities and retention. When comparing those involved with recreational sports with other student populations, students involved with recreational sports demonstrated higher retention rates.

The type of involvement is student engagement in academic activities. Astin (1984) maintained that the amount of time an individual spends on academics is positively associated with students’ academic performance and retention. In a recent study, Grillo and Leist (2013) revealed a higher likelihood of persistence when students seek academic support like tutoring services and supplemental instructions. Additionally, some studies discovered that students who frequently used the academic library are more likely to re-enroll in the following semester (Haddow, 2013; Soria et al., 2014).

Interaction with Faculty

Student-faculty interactions can be divided into formal and informal interactions or social and academic interactions (Cotten & Wilson, 2006). In the past few decades, a considerable number of studies on student retention have revealed the association between student-faculty interaction and student outcomes and retention. Students' interactions with all university faculty impact their intent to persist at the university, and there is a need for effective counseling and advising programs to enhance interaction (Wyckoff, 1998).

There is a statistically significant correlation between the amount of student-faculty informal contact and students' academic performance, academic and self-development, and college persistence (Pascarella, 1980). The frequency of student-faculty interactions is significantly associated with students' choice to stay (Lillis, 2011). In Tinto's (1975) words, "the more time faculty give to students, the more likely are students to complete their educations" (p. 697). Moreover, factors like student-faculty contact quality, frequency, scholarly research, personal discussion, and other informal interactions significantly impact students' motivation to learn (Trolan et al., 2016).

Faculty's behaviors, care, and attitudes also affect student retention. For instance, students who interacted with highly emotionally intelligent faculty are more likely to persist than those who interacted with faculty with comparatively lower emotional intelligence (Lillis, 2011). Barnett (2011) found that students' feeling of being heard and valued by faculty predicts a strong sense of academic integration among community college students and their intent to return to college. Similarly, Schreiner et al. (2011) investigated the impact of faculty and staff's attitudes and behaviors on at-risk students' success and persistence. The at-risk students were admitted conditionally into the higher institutions with low test scores. It turned out that most successful

at-risk students often developed a rapport with faculty or staff members on campus; even though the faculty and staff members' characteristics differed, they showed genuine care. Students felt more connected and more willing to persist when the faculty and staff understood students' life realities and made them feel respected regarding their abilities and strength (Schreiner et al., 2011).

Sense of Belonging

A sense of belonging refers to the feelings of being welcomed, cared for, valued, and respected by others within the same community. It also refers to an individual's perception that their personal goals, values, and characteristics match the system and that they are an integral part of the community (Goodenow & Grady, 1993; Hagerty & Patusky, 1995; Washor & Mojkowski, 2014). One of the critical causes of student attrition is that students fail to develop a sense of belonging within the institution. School leaders should create a welcoming and caring community for students to develop a deep sense of belonging and connectedness (O'Keeffe, 2013; Roberts & Styron, 2010). The findings regarding the relationship between the sense of belonging and retention from the past literature are mixed.

Some research supports the findings that a sense of belonging is positively correlated with student attrition (Hunn, 2014; Tas, 2013). For instance, international students and underrepresented students face increased stressors and different issues compared to traditional students. The difficulty of adapting to the new environment, insufficient interaction with university personnel, and other academic challenges contributed to international students' low sense of belonging, ultimately leaving the institution (Tas, 2013). Moreover, a sense of belonging could be challenging for African American students attending predominantly White

institutions. Predominantly White institutions should adopt a mentoring program to assign faculty of color to mentor students of color for their shared experiences (Hunn, 2014).

Meanwhile, some researchers revealed different findings. For instance, Morrow and Ackermann (2012) initially demonstrated a statistically significant association between the sense of belonging and retention. However, when using the sense of belonging in conjunction with motivational attitudes to predict students' persistence, the correlation between a sense of belonging and students' persistence became insignificant (Morrow & Ackermann, 2012). Furthermore, in an attempt to increase student retention by increasing students' sense of belonging, a quasi-experimental pilot study revealed that implementing the intervention to increase students' sense of belonging did not improve student retention significantly, even though the participants' GPA increased (Wolf et al., 2017).

Student Motivation

Motivation plays a vital role in a student's educational trajectory. The impact of motivation on an individual's performance was first theorized by Vroom (1964). Vroom (1964) pointed out that activity outcomes have an essential effect on the individual's decision-making and efforts. In other words, when the outcomes are appealing, the individuals would make more efforts to obtain the results (Vroom, 1964). Even though Vroom's motivation theory is mainly about motivation in the workplace, it provided important implications for researchers to further explore the impact of motivation at school.

Research has generally shown consistent findings that motivation is positively linked to student retention and persistence. For instance, Rose (2011) pointed out that internal and external motivation are positive predictors of student success; student success is also associated with retention rates in nursing education. In a similar study, through studying 6,043 students over

eight semesters to explore the role of motivational factors in predicting college students' retention to the following semester, Slanger et al. (2015) discovered that even though the characteristics of individual motivational factors may vary, student motivational factors are consistently predictive of college students' academic outcomes and their persistence. The motivational factors surveyed were also predictive of GPA and course load capacity (Slanger et al., 2015).

Lastly, there are three types of motivation: intrinsic motivation, extrinsic motivation, and social motivation (Xiong et al., 2015). Students' intrinsic motivation refers to their general interest in the course. Extrinsic motivation is defined as external rewards that motivate students to take the course. Lastly, the motivation to take classes to connect with peers is called social motivation. In the study, Xiong et al. (2015) closely examined the three motivation types and their correlation with student retention. Xiong et al. (2015) found that even though social motivation is not a significant predictor of engagement, the other two types of motivation are statistically strong predictors of student engagement. Moreover, the study also revealed engagement as a strong predictor of student retention.

Institutional Environment

Institutional characteristics are the resulting factors of an institution's outwardly observable features and inward qualities, such as structures, size, distribution of expenditure, ingrained rules, culture, and environment (Calcagno et al., 2008). Researchers mostly agree that there is a positive correlation between institutional characteristics and student retention. One of the seminal studies is Lau's (2003) investigation about institutional factors' influence on student retention. He pointed out that instructional administrators play vital roles in increasing students' retention rates. Furthermore, the institution's appropriate funding, academic support services,

physical facilities availability, and effectiveness in managing diversity could impact students' retention.

A recent study's findings mostly align with Lau's (2003) conclusion. For instance, Chen (2012) studied a sample of 5,762 students who attended a four-year university to investigate the relationship between student and institutional characteristics and retention. The study revealed that when student-level variables are controlled, there is a statistically significant association between institutional expenditure on student services and student dropout. Students from institutions that spend more revenue on student services are less likely to depart from the institutions. It is also worth mentioning that the study did not identify a significant relationship between institutional selectivity control and student dropout. Meanwhile, Schreiner (2009) believed that institutional selectivity is predictive of student retention. In other words, the student retention rate is usually higher in more selective institutions. He also pointed out that having an overall welcoming campus environment increases students' likeliness to return. It is the best predictor for first-year student retention.

In a more recent study, Marsh (2014) investigated the relationship between student and institutional characteristics and retention at four-year higher institutions through utilizing Astin (1993) input-environment-output model as the framework. The study investigated institutional structural variables like institution's mission, status, location, and full-time student enrollment, institutional financial variables include state funding allocations, the expense for instruction, academic support, and student service. The faculty interaction variables include the number of full-time faculty and faculty-student ratio. The research revealed that institutional structural and financial factors have a statistically significant effect on student success. Specifically, the

institutional expenditures on faculty professional development, course design, and instructional technology affect student retention rates (Marsh, 2014).

Technology Usage

Technology preparedness refers to students' competency to utilize basic educational technologies to accomplish goals in learning (Parasuraman, 2000). There is a correlation between students' level of technology preparedness and their retention, especially in online classes. Students with a higher level of technology preparedness are more likely to be engaged and motivated in distance learning, and they often view learning as fun (Nora & Snyder, 2008). Furthermore, the current world is highly digitized, and there is a significant amount of growth in distance education. The future of teacher education depicts a blending learning environment, and most teacher preparation programs already offer face-to-face and online classes. However, even though students are surrounded by technology and are most familiar with popular technology like social media and digital entertainment tools, they do not necessarily possess the needed educational technology competency as assumed by higher education institutions (Packham et al., 2004). Compared to traditional classes, fully online classes have a much higher dropout rate than traditional classes (Bawa, 2016).

In addition to students' technology preparedness, whether higher institution faculty can use technology effectively in their classrooms can also impact students' retention. However, faculty who teach online classes are not necessarily technology literate. According to Packham et al. (2004), it appears that institutions focus more on how to develop and deploy more online courses to increase enrollment quickly, instead of emphasizing the importance of training faculty to use technology in course designs, content delivery, and course assessment to boost retention.

Thus, having technology support infrastructures for faculty and students is crucial in increasing the student retention rate (Packham et al., 2004).

Student Backgrounds

In addition to the impact of academic integration, social integration, institutional environment, and technology usage on retention, previous literature also examined the association between student backgrounds and their retention. The researched factors include student financial situation, and school's fiscal policy (Britt et al., 2017; Chen & John, 2011; McKinney & Burrige, 2015), student ethnicity (Baker & Robnett, 2012; Barbatis, 2010; Hunn, 2014; Palmer et al., 2011), resilience (Cassidy, 2016; Eisenberg et al., 2016; Hartley, 2013; Hwang & Shin, 2018; Morales, 2014), socioeconomic status (Browman et al., 2017; Chen & John, 2011; Morales, 2014; Westrick et al., 2015), and student characteristics (Deary et al., 2003; Laskey & Hetzel, 2011; Raelin et al., 2014; Sawtelle et al., 2012). The following section introduces each one respectively.

Financial Factors

Over the past years, there has been an increased number of students seeking federal and state financial aid to go to college (Baum et al., 2015). However, the inability to manage demands and stress led several students to drop out of college (College Atlas, 2015). Researchers investigated the impact of financial factors on retention from two lenses: financial policy and financial stress from loans. The findings of those investigations mostly align with each other.

First, higher education fiscal policy affects students' persistence. In recent years, there has been a shift in the state's higher education appropriations policy (Chen & John, 2011); it appears that the financial burden is shifted from the taxpayers to students. In other words, importance is placed on student loans more than grants and scholarships. In examining how

financial policy influences students' persistence, Chen and John (2011) discovered a positive relationship between state financial policy and undergraduate persistence. Specifically, when there is a 1% rise in the state need-based tuition aid ratio, the likelihood of remaining in school increases by 2%.

Second, researchers mostly agree that federal student loans influence institutional departure when examining the correlation between financial stress and students' persistence. For instance, McKinney and Burrige (2015) maintained that first-year community college students who received federal student loans are more likely to drop out than peers who did not receive federal financial aid. A more recent study revealed similar findings. Britt et al. (2017) conducted a quantitative study to investigate the relationship between financial stress, debt loads, financial counseling, and student retention rates. The study surveyed 2,475 undergraduate students from a large Midwest public university and utilized a 10-point scale to measure financial stress to understand the participant's perceptions about their current financial situation. Through analyses, Britt et al. (2017) found that students with more self-reported financial loan loads are more likely to drop out. Moreover, students who received financial counseling are more likely to drop out within the following year. Thus, Britt et al. (2017) rationalized that the counseling's timing might be associated with student dropout after counseling.

Ethnicity

Several factors affect underprepared, ethnically diverse students' persistence in college. Barbatis (2010) revealed that internal factors like a sense of responsibility, goal orientation, resourcefulness, determination, cultural and racial self-identification, and faith contributed to their persistence. Having supportive families, being socially involved with institutional organizations, and integrating academically on campus enabled them to persist throughout the

college journey (Barbatis, 2010). However, when it comes to student retention, marginalized students seem to be more vulnerable. Baker and Robnett (2012) believed that precollege experience placed minority students at a disadvantage. Compared to mainstream peers, disadvantaged minority students lack resources like social and cultural capital (Baker & Robnett, 2012).

Marginalized students are also more vulnerable in the field of science, technology, engineering, and mathematics (STEM). Palmer et al. (2011) argued an equity issue of not having enough students of color in STEM. To further investigate factors that might be facilitating STEM minority students' retention and persistence. Palmer et al. (2011) conducted a qualitative study and interviewed six students from a public medium-sized northeastern university with a predominately White student population. Through in-depth interviews, the minority students reported that not having sufficient peer support and failure to build positive academic connections affect their retention and persistence. The participants also mentioned that their high school teachers' high expectations also played an important role. Furthermore, the participants maintained that being involved in STEM activities on and off campus promoted retention and persistence.

Another interesting finding through past literature is that African American students appear to have a higher retention rate than Latino students. Baker and Robnett (2012) surveyed a cohort of students from a research-based university located in California. Through *t*-test and logistic regression analyses, the study revealed that students' experience after enrolling in college has more influence on minority students' retention than precollege factors. Specifically, African American students are more likely to develop social ties and support than Latino students. Latino students are more likely to spend a substantial number of hours working and

fulfilling family obligations, which might have led them to spend less time on campus and commit to academics.

Resilience

Resilience is a type of characteristic asset that refers to one's ability to bounce back, adapt, and persist through facing adversity. In this portion, the review centered on academic resilience mainly. Specifically, academic resilience refers to the increased likelihood of educational success and persistence despite obstacles (Cassidy, 2016).

In the past few decades, researchers looked at student retention through a resilience lens. For instance, Morales (2014) studied 50 minority resilient students from various higher institutions, including public and private universities and community colleges. The purpose was to find out what faculty can do to facilitate the resilience and retention among students with disadvantaged socioeconomic backgrounds. Morales (2014) concluded that faculty should help build students' self-efficacy, guide students to evaluate their strengths and weaknesses realistically, encourage students to seek help when needed, and explain the impact of academic success on their future economic security.

Similarly, Hartley (2013) investigated the relationship between interpersonal resilience, intrapersonal resilience, and mental health and how those factors are associated with students' academic and social connections at schools. Through studying a sample of 121 students with mental health issues, the study revealed that inter and intrapersonal resilience are statistically significantly associated with students' mental health. Thus, using a resilience framework to help students develop their resilience in facing adversities might improve academic persistence. In a similar study, Eisenberg et al. (2016) also proposed that increasing students' resilience and mental health might be a potential strategy to increase retention. The study aimed to determine

what an institution's health providers and professional student organizations can help mediate the problem of low student persistence rates and high rates of students with mental health issues.

Eisenberg et al. (2016) further concluded that increasing students' resilience and mental health will increase student retention rates.

In a more recent study, researchers steered attention to the characteristics of nursing students who displayed a high level of resilience in academics. Nursing students with a high level of academic resilience showed good interpersonal skills and had high academic scores and high satisfaction toward the major (Hwang & Shin, 2018). It is concluded that high academic resilience makes students less likely to discontinue their studies.

Socioeconomic Status

Findings of how a student's socioeconomic status affects their persistence are mixed. The differences in study samples and approaches might contribute to the mixed results. For instance, Chen and John (2011) revealed that students' social and economic status is also positively related to students' opportunity to persist. The study showed substantial persistence gaps between students with high socioeconomic status and those with low socioeconomic status in a controlled study. Specifically, students with high social-economic status are 55% more likely to persist than peers with low social-economic status. In a similar study, Morales (2014) pointed that the more troubling notion is that even when students exhibit similar academic abilities, students from disadvantaged socioeconomic backgrounds have significantly lower degree completion rates than their peers with similar intellectual abilities.

However, contrary to the notion that students from socioeconomically disadvantaged backgrounds are more likely to drop out, Browman et al. (2017) argued that many students from disadvantaged socioeconomically backgrounds managed to persist through in the face of various

hurdles. Browman et al. (2017) rationalized that those students who continued believed that academic persistence or completing a degree increases the likelihood of upward socioeconomic mobility. In another similar study, Westrick et al. (2015) also revealed that a student's socioeconomic status is a weak predictor of student persistence.

Student Characteristics

Student characteristics include their demographic information, social background, and personal traits. Those elements have various extents of influence on student retention. By exploring the relationship between student characteristics and retention, past literature centered mainly on the impact of a student's personality traits on retention. Researchers mostly agree that certain personality traits affect a student's persistence positively. The relevant student retention literature investigated student characteristics, including self-efficacy, agreeableness, introversion, and conscientiousness. (Laskey & Hetzel, 2011; Raelin et al., 2014; Sawtelle et al., 2012).

First, the finding on self-efficacy's effect on student retention generally aligns with each other. According to Raelin et al. (2014), "self-efficacy is an individual's perceived level of competence or the degree to which she or he feels capable of completing a task" (p. 602). Both Raelin et al. (2014) and Sawtelle et al. (2012) stated that personality traits like self-efficacy are crucial to retention. Specifically, Raelin et al. (2014) noted that STEM students with enhanced academic self-efficacy are critical to retention.

Second, students who are agreeable, introverted, and conscientious are more likely to persist. For instance, when comparing with students with the characteristics of irritability and selfishness, students with a high level of agreeableness are more likely to complete the program (Deary et al., 2003). Students who display the personality trait of introverts are more likely to persist because they are less likely to be distracted than peers (McLaughlin et al., 2008).

Moreover, conscientiousness is also one predictor of engineering student retention (Hall et al., 2015). However, it is worth noting that the referenced studies were conducted at the individual discipline levels. They might have a limited degree of generalizability. Future research could investigate whether the described personality traits have a similar effect on all students regardless of their major.

Lastly, even though some studies did not find the direct relationship between personality traits and retention, researchers still built indirect connections. For instance, Laskey and Hetzel (2011) examined 115 at-risk students' profiles to identify the personality factors that might impact students' success. Those at-risk students were the ones conditionally enrolled into the program due to having an ACT score lower than 20 and a less than 2.0 GPA. The study mainly investigated the five domains of factors: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Interestingly, the study found that conscientious and agreeable students had an increased likelihood of using tutoring services to improve GPA. Accordingly, students with a better GPA were more likely to be retained.

Gaps in the Literature

Despite the growing body of knowledge about student retention in the realm of higher education, several gaps and shortcomings still exist given a close look at the literature. First, there are extensive and intensive studies on student retention at the institutional level, but the research at individual discipline levels remains limited. Specifically, there is scant research that has investigated the dropout issue in teacher preparation programs. Second, limited previous studies have mostly exclusively focused on the reasons that might have caused low enrollment in teacher preparation programs and the impact of factors like age, gender, commitment, skills, and student backgrounds on student retention. Thus, there is a need to steer the attention to factors related to

teacher education program students' social, academic, and technological integration. Finally, prior research on student retention in teacher preparation programs is primarily exploratory. Student retention is a longitudinal and complicated process of trying to help more students to persist. Thus, there is a need for a systematic study to delve deeper into the topic.

Research Questions and Hypotheses

The study proposed to test the relationship between education major' retention and factors such as academic integration, social integration, technology integration, and institutional environment. The study sought to address the following four questions:

1. Are the academic integration-related factors significant predictors of education majors' intention to return?
2. Are the social integration-related factors significant predictors of education majors' intention to return after accounting for academic integration-related factors?
3. Is institutional environment a significant predictor of education majors' intention to return after accounting for academic and social integration- related factors?
4. Is technology usage a significant predictor of education majors' intention to return after accounting for academic integration- related factors, social integration- related factors, and institutional environment?

The following hypotheses are proposed in this study:

1. Social integration-related factors are significant predictors of education majors' intention to return.
2. Academic integration-related factors are significant predictors of education majors' intention to return after accounting for academic integration-related factors.
3. Institutional environment is a significant predictor of education majors' intention to

return after accounting for academic and social integration- related factors.

4. Technology usage is a significant predictor of education majors' intention to return after accounting for academic integration- related factors, social integration-related factors, and institutional environment.

Chapter III

Methodology

This quantitative study explored the extent of the effect that social integration-related factors, academic integration-related factors, institutional environment, and technology usage have on education majors' persistence. The dependent variable is education majors' intention to return next year. The independent variables are social integration-related factors, academic integration-related factors, institutional environment, and technology usage. The quantitative study used data from the 2019 NSSE core survey and LWT topical survey. The NSSE score survey and LWT topic survey were conducted mainly in the United States and Canada. Data are available to the public through the Indiana University School of Education Center for Postsecondary Research with a request and a fee (see Appendix A). This chapter will introduce a data background description, descriptions of the survey participants, data preparation, statistical procedure, and testing of assumptions.

Data Source

Core Survey: NSSE 2019

The National Survey of Student Engagement is an online survey administered and assessed by Indiana University School of Education Center for Postsecondary Research. The survey serves as a tool to measure first-year or senior college students' engagement. The survey has ten indicators, and they are categorized into four themes: academic challenge, learning with peers, experiences with faculty, and campus environment (Brckalorenz & Gonyea, 2014). The theme of the academic challenge includes engagement indicators like higher-order learning, reflective and integrative learning, learning strategies, and quantitative reasoning (Brckalorenz & Gonyea, 2014). The theme of learning with peers includes engagement indicators like

collaborative learning and discussion with diverse others (Brckalorenz & Gonyea, 2014). The theme of experiences with faculty includes engagement indicators like student-faculty interaction and effective teaching practices (Brckalorenz & Gonyea, 2014). The last theme of campus environment includes engagement indicators like quality of interactions and supportive environment (Brckalorenz & Gonyea, 2014).

Respondents

The NSSE 2019 core survey was sent out to 504 U.S. institutions, 19 Canadian institutions, and eight institutions in other countries. Among the surveyed population, a total of 281,136 students from the U.S. institutions responded. Moreover, about 46% of the respondents were first-year students, and about 54% of them were seniors (NSSE, 2019). When it comes to student characteristics, 34% are male, 66% are female. In addition, 64% are White, 9% are African American, 1% are American Indian, 5% are Asian, less than 1% are Native Hawaiian/other Pacific Islander, about 13% are Hispanic/Latino, 4% are multiracial, and about 3% are foreign or nonresident aliens. Regarding enrollment status, 89% of the students are full-time, about 11% are not full-time (NSSE, 2019).

Survey Instrument Design

The survey is administered annually in an online format, and a total of 40 questions are included in the survey. In the survey, five categories of information are collected. First, the survey asks students about their participation in educationally purposeful activities in their institution. Second, it asks students about their experience with institutional requirements and the challenging nature of the coursework. The survey also asks students about their perceptions of the institutional environment and their estimates of personal and academic growth since the

beginning of college. At last, the survey collects the users' background and demographic information.

NSSE 2019 Data Collection

The NSSE surveys not only first-year but also senior undergraduate students. The participating institutions abide by the institutional participation agreement. The agreement outlines the necessary institutional review board (IRB) regulations for recruiting and protecting human participants. When recruiting participants, the presurvey announcement is usually sent prior to the start of data collection. Then email and regular mails through the United States Postal Services (USPS) are used to send out recruitment information. In the email, individualized survey links are included. The survey link and necessary credentials needed to log in are included in the mail. Some institutions could send additional messages to potential participants before the closing survey date to improve the response rates.

Topical Module: LWT 2019

The LWT survey is a topical module survey often accompanied by the core survey NSSE. The purpose of this topical module is to example the role of technology in student learning, and the purpose is to understand how technology is related to students' learning. The survey incorporates five main questions, and each question is accompanied by sub-questions (see Appendix B). Among the NSSE 2019 participating institutions, 24 U.S., Canadian, and other international institutions participated in the learning with technology topical module survey.

Description of Study Participants

Initially, the study participants included the 447 education majors who participated in both the NSSE core survey and the LWT topical module survey in 2019. However, among those education majors, 14 participants who did not complete the LWT portion of the survey were

removed. One participant who did not answer the question associated with the dependent variable is also removed. Furthermore, one case with a studentized value greater than 3 was also removed as an outlier. Thus, as a result, a total of 431 participants were included in the data analysis. A detailed explanation can be found in Chapter 4.

The demographic characteristics of the 431 study participants are presented in Table 1. Of the participants, 15.3 % are male, 84.5 % are female. Of the study participants, 73.5 % are White, 1.9 % are Black, 0.5 % are Asian, 0.2 % are Native Hawaiian or Pacific Islander, 0.5 % are American Indian or Alaska Native, and 4.6 % are Hispanic Origin. The participants are also classified by their reported specific education major (see Table 1). Of the 431 participants, 4.9% major in general education, 0.5% major in business education, 6.7% of the participants major in early childhood education, and 42% major in elementary and middle school education. 7% of the participants major in mathematics education, 11.4% of the participants major in music or art education, 2.8% of the participants major in physical education, 1.4% of the participants major in secondary education, 1.9% of the participants reported that they major in social studies education, and 7% of the participants said they major in special education.

The study participants are also grouped by their age and current year of study (see Table 1). In the study, 89.6% of the participants are 19 years old or younger, and 6.3% are between 20 and 23 years old. 1.2% of the participants reported their age as between 24 and 29 years old. 1.9% of the participants are between 30 and 39 years old. Moreover, only 0.7% of the participants reported their age between 40 and 55 years old. Finally, 88.6% of the study participants are first-year students, 8.8% are sophomores, 1.4% are juniors, and 0.7% are senior students.

Table 1*Demographic Characteristics of the Participants*

Demographic	Frequency	Percentage
Gender		
Male	66	15.3
Female	364	84.5
Unknown	1	0.2
Race		
White	317	73.5
Black	8	1.9
Asian	2	0.5
Native Hawaiian or Pacific Islander	1	0.2
American Indian or Alaska Native	2	0.5
Hispanic Origin	20	4.6
Multiracial	5	1.2
Other	36	8.3
Majors		
Education(general)	21	4.9
Business education	2	0.5
Early childhood education	29	6.7
Elementary, middle school education	181	42.0
Mathematics education	30	7.0
Music or art education	49	11.4
Physical education	12	2.8
Secondary education	6	1.4
Social studies education	8	1.9
Special education	30	7.0
Other education	63	14.6
Age		
19 or younger	386	89.6
20-23	27	6.3
24-29	5	1.2
30-39	8	1.9
40-55	3	0.7
Other	2	0.5
Year of Study		
Freshman	382	88.6
Sophomore	38	8.8
Junior	6	1.4
Senior	3	0.7

Note. $N = 431$.

Data Preparation

Phakiti (2010) recommends that researchers check and organize the data as the first step of data preparation. The purpose of organizing and preparing the data is to ensure its completeness and accuracy before running statistical tests and making inferential statistical conclusions. The data preparation in this portion includes a preliminary analysis and the operationalization of variables.

Preliminary Analysis

Conducting preliminary analysis is necessary as it checks the data for accuracy and completeness. To ensure the study's data is ready for further analysis, it is necessary to first check whether there are participants with incomplete data, and the missing data should either be reported or deleted. It is also necessary to check whether outliers that could potentially affect the results exist in the data set, and a decision of inclusion or exclusion should be carefully made. Then, the key features of the data should be identified and summarized. The researchers should also check the reliability of measures (Blischke et al., 2011) and estimate its internal consistency (Vaske et al., 2017). One can do so by checking the value of Cronbach's alpha.

Operationalization of Variables

The current variables selected in this chapter are based on the findings from prior research. In general, the study's dependent variable is education majors' intention to return, and there is one survey question related to it. The study's independent variables are divided into four categories: academic integration-related factors, social integration-related factors, institutional environment, and technology usage. Under each category, items relating to each survey question are listed. See the research matrix for more details on research questions, variables, and survey question alignment (see Table 2).

Table 2*Research Matrix*

Research Question(s)	Variable Levels	Item #	Code Name	Variable Name in Study
RQ1: Are academic integration- related factors significant predictors of education majors' intention to return?	Academic integration level of factors	Q1a	Askquest	Academic involvement
		Q1b	Drafts	
		Q1e	CLaskhelp	
		Q1f	CLexplain	
		Q1g	CLstudy	
		Q1h	CLproject	
		Q9a	LSreading	
		Q9b	LSnotes	
		Q9c	LSsummary	
		Q15a	tmprep	Academic preparation
		Q25	grades	Grades
		Q13b	QIadvisor	Academic advising
RQ2: Are social integration-related factors significant predictors of education majors' intention to return after accounting for academic integration-related factors	Social integration level of factors	Q15b	Tmcocurr	Social involvement
		Q13c	QIfaculty	Interaction with faculty
RQ3: Is institutional environment a significant predictor of education majors' intention to return after accounting for academic and social integration-related factors	Institutional environment	Q14a	empstudy	Institutional environment
		Q14b,	SEacademic	
		Q14c	SElearnsup	
		Q14d	SEdiverse	
		Q14e,	SEsocial	
		Q14f,	SEwellness	
		Q14g	SEnonacad	
		Q14h	SEactivities	
		Q14i	SEevents	
		LWT5a	TEC05a	
		LWT5b	TEC05b	
		LWT5c	TEC05c	
		LWT5d	TEC05d	
RQ4: Is technology usage a significant predictor of education majors' intention to return after accounting for academic integration-related factors, social integration-related factors, and institutional environment?	Technology usage	LWT1a	TEC01a	Technology usage
		LWT1b	TEC01b	
		LWT1c	TEC01c	
		LWT1d	TEC01d	
		LWT1e	TEC01e	
		LWT2	TEC02	
		LWT3a	TEC03a	
		LWT3b	TEC03b	

Research Question(s)	Variable Levels	Item #	Code Name	Variable Name in Study
		LWT3c	TEC03c	
		LWT3d	TEC03d	
		LWT3e	TEC03e	
		LWT3f	TEC03f	
		LWT3g	TEC03g	
		LWT4a	TEC04a	
		LWT4b	TEC04b	
		LWT4c	TEC04c	
		LWT4d	TEC04d	
		LWT4e	TEC04e	
	Education majors' intention to return (Criterion Variable)	Q20	returnexp	Education majors' intention to return

Dependent Variable: Education Majors' Intention to Return

The associated survey item used to measure education major's intention to return is "Do they intend to return to the institution next year?" The participants could choose 0 to indicate that they do not intend to return, 1 to indicate that they do intend to return, and 9 to indicate that they are not sure whether they would return to the institution next year. However, since running a binomial logistic regression requires the dependent variable to be dichotomous, there is a need to recategorize the participants who were unsure if they would return to the institution next year with those who indicated that they would not return.

Independent Variable: Academic Integration-Related Factors

Based on prior literature, factors closely related to academic integration include academic involvement, academic preparedness, grades, and academic advising. As shown in the matrix, each factor utilizes one or more survey question items. The following section briefly introduces each factor's related questions and measurement.

Academic Involvement. There are nine related survey questions and they are measured on a 4-point Likert scale. The scales of 1 to 4 represents *never*, *sometimes*, *often*, and *very often*, respectively. The nine questions are:

1. During the current school year, about how often have you asked questions or contributed to course discussions in other ways?
2. During the current school year, about how often have you prepared two or more drafts of a paper or assignment before turning it in?
3. During the current school year, about how often have you asked another student to help you understand course materials?
4. During the current school year, about how often have you explained course material to one or more students?
5. During the current school year, about how often have you prepared for exams by discussing or working through course material with other students?
6. During the current school year, about how often have you worked with other students on course projects or assignments?
7. During the current school year, about how often have you identified key information from reading assignments?
8. During the current school year, about how often have you reviewed your notes after class?
9. During the current school year, about how often have you summarized what you learned in class or from course materials?

Academic Preparation. The associated survey item used is "About how many hours do you spend in a typical seven-day week preparing for class (studying, reading, writing, doing

homework or lab work, analyzing data, rehearsing, and other academic activities)?" An 8 point Likert scale measures this survey item, the scale 1 representing 0 hours per week, 2 representing 1 to 5 hours per week, 3 representing 6 to 10 hours per week, 4 representing 11 to 15 hours per week, 5 representing 16 to 20 hours per week, 6 representing 21 to 25 hours per week, 7 representing 26 to 30 hours per week, and 8 representing more than 30 hours per week.

Grades. The survey item used to measure grades is "What have most of your grades been up to now at this institution." An 8-point Likert scale measures the item. The scale of 1 represents a grade of C minus or lower, 2 represents a grade of C, 3 represents a grade of C plus, 4 represents a grade of B minus, 5 represents a grade of B, 6 represents a grade of B plus, 7 represents a grade of A minus, and finally, 8 represents a grade of A.

Academic Advising. The survey item used for academic advising is "Indicate the quality of your interactions with academic advisors at your institution." The item is measured by an 8-point Likert scale. The scale ranges from poor to not applicable, with 1 representing a poor quality of academic advising (see Appendix C for details).

Independent Variable: Social Integration-Related Factors

Factors related to social integration include social involvement and interaction with faculty. Each factor utilizes one NSSE survey question item. This section provides a thorough description of the survey item associated with each variable. It also includes an explanation of the measurement.

Social involvement. The aligned NSSE survey item is "About how many hours do you spend in a typical seven-day week participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)?" An 8-point Likert scale measures this survey item. With 1 representing 0 hour per week, 2

representing 1 to 5 hours per week, 3 representing 6 to 10 hours per week, 4 representing 11 to 15 hours per week, 5 representing 16 to 20 hours per week, 6 representing 21 to 25 hours per week, 7 representing 26 to 30 hours per week, and 8 representing more than 30 hours per week.

Interaction with Faculty. The survey item used for interaction with faculty is "Indicate the quality of your interactions with faculty at your institution." The item is measured by an 8-point Likert scale, with 1 representing *poor*, and the last number representing not applicable. See Appendix C for details.

Independent Variable: Institutional Environment

Besides the influence of social integration, academic integration, and technology integration on student retention, the institution's environment also plays an important role. The institutional environment is related to nine NSSE survey items and four LWT survey items in the study. A 4-point Likert scale measures all survey items. The four LWT survey questions can be found in Appendix B. The nine NSSE survey questions include the following:

1. How much does your institution emphasizes spending a significant amount of time studying and on academic work?
2. How much does your institution emphasizes providing support to help students succeed academically?
3. How much does your institution emphasizes using learning support services?
4. How much does your institution emphasizes encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)?
5. How much does your institution emphasizes providing opportunities to be involved socially?
6. How much does your institution emphasizes providing support for your overall wellbeing

(recreation, health care, counseling, etc.)?

7. How much does your institution emphasizes helping you manage your non-academic responsibilities (work, family, etc.)?
8. How much does your institution emphasizes attending campus activities and events (performing arts, athletic events, etc.)?
9. How much does your institution emphasizes attending events that address important social, economic, or political issues?

Independent Variable: Technology Usage

Technology usage is another variable associated with students' retention, especially in online classes (Bawa, 2016; Packham et al., 2004). Moreover, it appears that students with a higher level of technology preparedness are more likely to be engaged and motivated in distance learning (Nora & Snyder, 2008). In this study, the factor of technology usage is related to a total of 18 LWT survey items (see Appendix B). A 4-point Likert scale was used to investigate the role of technology in student learning, understanding, and communication.

Statistical Procedure

Ordinal logistic regression and binomial logistic regression are the two main types of logistic regression, and logistic regressions are often used to predict a criterion variable with several predictor variables (Stoltzfus, 2011). Given the methodological consideration, hierarchical binomial logistic regression is the most fitting way to examine the data. The study used independent variables such as academic integration-related factors, social integration-related factors, institutional environment, and technology usage to predict whether education majors will return to the institution next year.

Steps for Hierarchical Binomial Logistic Regression

According to Sperandei (2014), the first step is to ensure the assumptions are met when applying binomial logistic regression, which is explained below. The next step is to enter a set of variables predictors in a set of blocks (see Table 3). In this study, the academic integration-related factors are entered in Block 1. Then, the social integration-related factors are added to Block 2, the variable institutional environment is added to Block 3, and the variable technology usage is added to Block 4. It is important to note that the block in the regression is cumulative in nature. After performing the hierarchical binomial logistic regression analysis to ascertain the effects of independent variables on education majors' intention to return, the next few steps are interpreting the output, determining whether the model is statistically significant, and identifying the statistically significant explanatory variables. The $p < 0.05$ level were used for statistical significance.

Table 3

Hierarchical Logistic Regression Model

Model	Predictor Variables
1	Academic integration-related factors (Academic involvement, academic preparation, grades, academic advising)
2	Academic integration-related factors (Academic involvement, academic preparation, grades, academic advising), social integration-related factors (Social involvement, interaction with faculty)
3	Academic integration-related factors (Academic involvement, academic preparation, grades, academic advising), social integration-related factors (Social involvement, interaction with faculty), institutional environment
4	Academic integration-related factors (Academic involvement, academic preparation, grades, academic advising), social integration-related factors (Social involvement, interaction with faculty), institutional environment, technology usage

Advantages of Hierarchical Binomial Logistic Regression

A hierarchical logistic regression is a better fit for large data set with group structure and a dichotomous dependent variable as it allows researchers to apply the usual logistic regression model within each context (Wong & Mason, 1985). In this study, by utilizing the method of hierarchical logistic regression analysis, a usual logistic regression model can be tested within four different contexts. As a powerful statistical tool, logistic regression analyzes the impact of more than one explanatory variable on the dependent variable simultaneously (Schober & Vetter, 2021). According to Sperandei (2014), "separately testing each independent variable against the response variable introduces bias into the research, performing multiple tests on the same data inflates the alpha, thus increasing Type I error rates while missing possible confounding effects" (p. 12). Thus, compared to other similar statistical approaches, logistic regression helps avoid confounding effects by analyzing all the independent variables together.

Testing of Assumptions

Before conducting the hierarchical binomial logistic regression, the study checked whether the following seven assumptions are met. The first assumption is that the dependent variable is dichotomous (Park, 2013). In the study, the dependent variable is students' intention to return the next year, measured with two outcomes: "yes" or "no". The second assumption is that the data have one or more independent variables measured on either a continuous or nominal scale (Park, 2013). In the study, the independent variables of academic integration, social integration, technology integration, and institutional environment are measured at ordinal levels with a Likert scale. Third, it is assumed that there is an independence of observations, the dichotomous dependent variable education majors' intention to return and all the listed independent variables are mutually exclusive (Park, 2013). Fourth, the assumption that the

sample size is appropriate was checked. When there are only a few cases, the reliability of estimates diminishes significantly (van Smeden et al., 2019). Fifth, the researcher checked if there is a linear relationship between the dependent and independent variables (Park, 2013). Lastly, whether the data show multicollinearity and has outliers was checked as well (Stoltzfus, 2011).

Delimitations and Assumptions

This proposed study has several delimitations. The boundaries the researchers set to frame the research are called delimitations (Barros-Bailey & Saunders, 2012). The delimitations of this study included three parts. First, the study only addressed first-year college education majors' retention issues. Second, the study relied on frameworks (Spady, 1971; Tinto, 1975) developed to explain the phenomenon of student dropout and student retention. Third, this study did not investigate variables that concern students' characteristics, demographic backgrounds, financial situation, and motivation. However, those variables are believed to impact students' persistence (Britt et al., 2017; McKinney & Burrige, 2015; Morrow & Ackermann, 2012).

The study has several assumptions. First, it is assumed that the study's sample sizes are representative of the population. The systematic sampling method will vastly decrease the likelihood of obtaining a clustered sample (Etikan & Bala, 2017). Second, it is assumed that the respondents answered the survey questions truthfully. At last, it is assumed that the researcher's personal bias and values did not interfere with the data preparation and analysis process.

Chapter IV

Data Analysis and Results

Several statistical steps were taken before running the main analysis after obtaining the IRB approval (see Appendix D). The first section explains the cleaning and organizing of the data. Reliability tests were run for factors associated with multiple survey items to check the instrument's internal consistency. The second section describes the descriptive statistics for the study's variables. The third section discusses the assumptions that need to be considered to run binomial logistic regression. The last section presents the hierarchical binomial logistic regression results.

Validity and Reliability

As Vaske et al. (2017) pointed out, Cronbach's alpha is used to estimate internal consistency and scale reliability in multi-item scales. Based on the findings in past literature, the study used eight variables, which include academic involvement, academic preparation, grades, academic advising, social involvement, interaction with faculty, institutional environment, and technology usage. For variables associated with multiple survey items, the study checked the value of Cronbach's alpha. The purpose is to ensure the consistency and reliability of the used multi-item scales in this study. As shown in Table 4, the value of Cronbach's alpha for academic integration is 0.728, which is considered to have an acceptable internal consistency (Tavakol & Dennick, 2011). The value of Cronbach's alpha for the institutional environment is 0.873, which has a good internal consistency (Tavakol & Dennick, 2011). The value of Cronbach's alpha for technology usage is 0.810, which has a good internal consistency (Tavakol & Dennick, 2011).

Table 4*Results of Reliability Analysis for Variable with Multiple Items*

Variable	Item	Cronbach's Alpha
Academic Involvement	Askquest, Drafts, CLaskhelp, CLstudy, CLproject, LSreading, LSnotes, LSsummary	.728
Institutional Environment	Empstudy, SEacademic, SEdiverse, SEsocial, SEwellness, SENonacad, SEactivities, SEevents, TEC05a, TEC05b, TEC05c, TEC05d	.873
Technology Usage	TEC01a, TEC01b, TEC01c, TEC01d, TEC01e, TEC02, TEC03a, TEC03b, TEC03c, TEC03d, TEC03e, TEC03f, TEC03g, TEC04a, TEC04b, TEC04c, TEC04d, TEC04e	.810

Descriptive Analysis

As an initial part of data analysis, descriptive statistics provide the study a foundation to run inferential statistical tests and make inferential statistical conclusions (Kaur et al., 2018). To better understand the survey data, this study conducted a descriptive analysis on all variables to gather each variable's ranges, means, and standard deviations. See Table 5 for details.

Table 5*Summary of Descriptive Analysis of Variables Considered*

Variable	<i>N</i>	Min	Max	<i>M</i>	<i>SD</i>
Academic Involvement	431	1.44	4	2.72	0.478
Academic Preparation	431	2	8	4.39	1.516
Grades	430	1	8	6.58	1.583
Academic Advising	416	1	7	5.54	1.457
Social Involvement	430	1	8	2.32	1.387
Interaction with Faculty	424	1	7	5.54	1.231
Institutional Environment	431	1.31	4	2.83	0.538
Technology Usage	429	1.41	4	2.59	0.429
Intention to Return	431	0	1	0.93	0.251

Dependent Variable: Education Major's Intention to Return

When asked the education majors whether they would return to the institution next year, among 431 participants, 93.3% of them reported that they are returning next year, and only 6.7% indicated that they would not return to the institution next year. In order to keep the dependent variable dichotomous, the 17 participants who were unsure about their returning were grouped with participants who clearly indicated they would not return to the institution in next year. The rationales were provided in the testing of assumption section, which is located in the data analysis and results chapter.

Independent Variable: Academic Integration-Related Factors

Four variables were used to measure students' academic integration. They are academic involvement, academic preparation, grades, and academic advising. The following sections briefly summarize the response rate of each question under various variables. A summary of the response to each survey question is listed in the following tables.

Academic Involvement

A total of nine questions (Q1a-Q1h, and Q9a-Q9c) from the survey were used to measure the academic involvement variable (see Table 6). A total of 23.7% of the sampled education majors said they very often asked questions or contributed to course discussions. Meanwhile, only 3% of sampled education majors said they never did so. And 17.2% reported that they very often prepared two or more drafts of a paper or assignment before turning it in, while 15.5% of education majors said they never did that. And 20.2% of sampled education majors reported that they very often asked another student to help understand course materials; meanwhile, 7% of sampled education majors said they never did it. A total of 19.5% of education majors reported explaining the course materials to others very often, while 6% of education majors said they

never did so. There were 15.3% of education majors reported that they very often prepared for exams by discussing or working with others, and 14.4% of education majors said they never did so. A total of 13.7% of education majors reported working with others on course projects, while 5.6% reported never. About 30.4% of education majors stated that they very often identified the key information from reading assignments, and 0.7% reported they never did so. Interestingly, only 26.2% of education majors revealed that they very often reviewed notes after class, 3.2% of education majors reported they never did so. Lastly, 19.7% of education majors said that they very often summarized what they learned in class or from course materials, while 5.6% of education majors reported they rarely did so.

Table 6

Survey Response Frequency for Academic Involvement

Survey	Response Frequency/Percentage			
Item	Never	Sometimes	Often	Very Often
Q1a	13 (3%)	160 (37.1%)	153 (35.5%)	102 (23.7%)
Q1b	67 (15.5%)	157 (36.4%)	133 (30.9%)	74 (17.2%)
Q1e	30 (7%)	150 (34.8%)	162 (37.6%)	87 (20.2%)
Q1f	26 (6%)	147 (34.1%)	174 (40.4%)	84 (19.5%)
Q1g	62 (14.4%)	160 (37.1%)	142 (32.9%)	66 (15.3%)
Q1h	24 (5.6%)	192 (44.7%)	155 (36%)	59 (13.7%)
Q9a	3 (0.7%)	95 (22%)	202 (46.9%)	131 (30.4%)
Q9b	14 (3.2%)	148 (34.3%)	155 (36%)	113 (26.2%)
Q9c	24 (5.6%)	146 (33.9%)	175 (40.6%)	85 (19.7%)

Academic Preparation

One NSSE survey item (Q15a) was used to measure the variable academic preparation. The participants were asked how many hours they spent preparing for class in a typical 7-day week. Among the 431 education majors, 3.5% of the sampled students said they

spent more than 30 hours preparing for class. Meanwhile, 9.7% of the sample education majors reported spending only 1 to 5 hours preparing for class.

Grades

There is a reasonably extensive number of studies on the impact of GPA on college completion (Nakajima et al., 2012; Seirup & Rose, 2011). One NSSE survey question (Q25) was used to check participants' grades in the study. The education majors were asked what most of their grades have been up to; 29.5% of the sampled education majors reported that their grades were mostly A. At the same time, 1.4% of the sampled education majors said that their grades were mostly C- or lower.

Academic Advising

The crucial role that academic advising plays in student success and retention cannot be over-stressed. In the study, one NSSE question (Q13b) was used to measure the variable academic advising. The participants were asked to report the quality of their interaction with their academic advisors. A total of 32.9% of the sampled education majors reported that interaction with academic advisors was excellent. Only 1.6% of the sampled education majors reported that their interaction with academic advisors was poor in quality.

Independent Variable: Social Integration-Related Factors

Social Involvement

Social involvement is believed to be one of the main indicators of social integration, for it involves the amount of physical and psychological energy students invest in school (Astin, 1984; Forrester et al., 2018; Miller, 2011). In this study, one NSSE survey item (Q15b) was used to measure the variable social involvement. The participants were asked how much time they spent participating in co-curricular activities such as fraternity, sorority, and other organizations. A

total of 1.4 % of the sampled education majors said they spent more than 30 hours on co-curricular activities. Meanwhile, 29.5 % of the sampled education majors said they did not spend any time on such events.

Interaction with Faculty

Regardless of the format of interaction, formal or informal interactions between students and faculty are believed to be closely connected to students' persistence (Lillis, 2011; Trolan et al., 2016). In this study, one NSSE question (Q13c) was used to measure the variable interaction with faculty. The participants were asked to indicate the quality of their interaction with faculty. Among the sampled education majors, 22.5% of them reported the interaction with faculty was excellent. Meanwhile, only 1.2% of them reported that their interaction with faculty was poor in quality.

Independent Variable: Institutional Environment

A total of nine NSSE survey questions (Q14a-Q14i) were used to measure the variable institutional environment. Among the 431 education majors, 34.6% reported that their institution emphasized every much on spending a significant amount of time studying and on academic work. A total of 35.3% of the sampled education majors reported that their institution very much emphasized providing support to help students succeed academically. And 40.1% of the sampled education majors said their institutions very much emphasize using learning support services such as tutoring services and writing centers on campus. A total of 21.3% of the education majors stated that their institutions emphasize very much encouraging contact among students from diverse backgrounds. There were 33.9% of the students reported that their institutions very much emphasize providing students with opportunities to be involved socially. Furthermore, about 34.3% of the education majors said their institutions very much emphasize supporting

students' wellbeing. That support includes health care and counseling. Furthermore, only 13.2% of the education majors reported that their institutions emphasize helping students manage their non-academic responsibilities very much. Lastly, about 31.8% of the education majors said that their institutions emphasize very much encouraging students to attend events that address important social, economic, or political issues (see Table 7).

Table 7

Survey Response Frequency for Institutional Environment

Survey Item	Response Frequency/Percentage			
	Never	Sometimes	Often	Very Often
Q14a	2 (0.5%)	59 (13.7%)	221 (51.3%)	149 (34.6%)
Q14b	7 (1.6%)	81 (18.8%)	191 (44.3%)	152 (35.3%)
Q14c	20 (4.6%)	71 (16.5%)	167 (38.7%)	173 (40.1%)
Q14d	49 (11.4%)	145 (33.6%)	145 (33.6%)	92 (21.3%)
Q14e	18 (4.2%)	90 (20.9%)	177 (41.1%)	146 (33.9%)
Q14f	22 (5.1%)	87 (20.2%)	174 (40.4%)	148 (34.3%)
Q14g	73 (16.9%)	171 (39.7%)	129 (29.9%)	57 (13.2%)
Q14h	22 (5.1%)	95 (22%)	174 (40.4%)	137 (31.8%)
Q14i	50 (11.6%)	183 (42.5%)	140 (32.5%)	58 (13.5%)
LWT5a	46 (10.7%)	169 (39.2%)	162 (37.6%)	52 (12.1%)
LWT5b	31 (7.2%)	120 (27.8%)	176 (40.8%)	102 (23.7%)
LWT5c	38 (8.8%)	156 (36.2%)	150 (34.8%)	85 (19.7%)
LWT5d	35 (8.1%)	135 (31.3%)	160 (37.1%)	99 (23%)

A total of four LWT survey questions (LWT5a-LWT5d) were used to investigate the institution's emphasis on technology. Only 12.1% of the sampled education majors said their institutions emphasize teaching very much with new, cutting-edge technologies. A total of 23.7% of sampled education majors said their institutions emphasize providing technology to help

students learn, study, or complete course work. When it comes to how much their institutions emphasize teaching students how to use available technologies to learn and study, only 19.7% of the sampled students said very much. At last, the education majors were asked the amount of emphasis their institutions placed on providing support with the use of technology, 23% of the sampled education majors said there was very much emphasis, and 8.1% said the emphasis was very little (see Table 7).

Independent Variable: Technology Usage

A total of 18 items (TEC01-TEC04) from the learning with technology topical module survey were used to measure the association between technology usage and education majors' intention to return. The education majors were asked to answer the questions, including how much technology contributed to their understanding of course materials and ideas, how often they have used particular technology, and how often they have used technology to communicate with university personnel. Thus, this section discussed the response rate and percentage in three categories.

When it comes to technology's contribution to education majors' learning, studying, and assignments completion, about 42% of the sampled education majors said technology contributed largely to their understanding of the course materials and ideas, 34.7% of the education majors reported that technology contributed very much to the demonstration of their understanding of the course content. There were 56.1% of education majors reported that technology contributed very much to independent learning. There were 29% reported that technology contributed largely to academic collaboration with other students. There were 17.2% of education majors revealed that technology distracts them from completing coursework very

much. Only 15.1% of the education majors stated that their courses improved their understanding and use of technology very much (see Table 8).

Table 8

Survey Response Frequency for Technology Usage

Survey Item	Response Frequency/Percentage			
	Never	Sometimes	Often	Very Often
LWT1a	6 (1.4%)	55 (12.8%)	185 (42.9%)	181 (42%)
LWT1b	10 (2.3%)	75 (17.4%)	193 (45.3%)	148 (34.7%)
LWT1c	1 (0.2%)	40 (9.3%)	144 (33.4%)	242 (56.1%)
LWT1d	37 (8.6%)	102 (23.7%)	164 (38.1%)	125 (29%)
LWT1e	53 (12.3%)	148 (34.3%)	152 (35.3%)	74 (17.2%)
LWT2	50 (11.6%)	176 (40.8%)	135 (31.3%)	65 (15.1%)
LWT3a	70 (16.2%)	173 (40.1%)	103 (23.9%)	82 (19%)
LWT3b	161 (37.4%)	100 (23.2%)	51 (11.8%)	28 (6.5%)
LWT3c	295 (68.4%)	103 (23.9%)	20 (4.6%)	8 (1.9%)
LWT3d	50 (11.6%)	117 (27.1%)	138 (32%)	123 (28.5%)
LWT3e	204 (47.3%)	145 (33.6%)	50 (11.6%)	27 (6.3%)
LWT3f	207 (48%)	116 (26.9%)	61 (14.2%)	42 (9.7%)
LWT3g	43 (10%)	137 (31.8%)	138 (32%)	110 (25.5%)
LWT4a	7 (1.6%)	53 (12.3%)	91 (21.1%)	278 (64.5%)
LWT4b	39 (9%)	148 (34.3%)	119 (27.6%)	120 (27.8%)
LWT4c	21 (4.9%)	138 (32%)	145 (33.6%)	124 (28.8%)
LWT4d	84 (19.5%)	169 (39.2%)	96 (22.3%)	79 (18.3%)
LWT4e	76 (17.6%)	189 (43.9%)	88 (20.4%)	76 (17.6%)

The survey (LWT 3a-LWT3g) asked students how often they have used e-books, online portfolios, blogs, collaborative editing software, multimedia software, social networking, and mobile computing. About 19% reported they use e-books very often, only 6.5% have used online portfolios very often, but 20.4% of the education majors reported that they do not know what online portfolios or e-portfolios are. Furthermore, 1.9% of the education majors reported that they use blogs very much, 28.5% of them use collaborative editing software such as Google

Docs very much, only 6.3% of the education majors use multimedia software such as drawing, audio, or video production. Surprisingly, only 9.7% of the education majors reported that they use social networking such as Facebook or Twitter very often. And 25.5% of them stated that they use mobile computing (see Table 8).

Lastly, when it comes to using technology to communicate with students, academic advisors, faculty, student service staff, and other administrative staff and offices, 64.5% of surveyed education majors reported that they have very often used technology to communicate with students, 27.8% reported that they had used technology with academic advisors very often, 28.8% of the students said they used technology to communicate with faculty very often. There were about 18.3% of the students stated that they had used technology to communicate with student services staff very often. Lastly, 17.6% of the surveyed education majors reported that they have very often used technology to communicate with other administrative staff and offices.

Testing of Assumptions

Before conducting the hierarchical binomial logistic regression analysis, the study tested seven assumptions. The assumptions are (a) the dependent variable is dichotomous, (b) the independent variables are continuous, (c) there should be independence of observations, (d) the sample size is adequate, (e) the assumption of linearity, (f) there is no multicollinearity issue, and (g) there is no potentially influential outlier. The following section discusses the results for each assumption.

Dichotomous Dependent Variable

The first assumption required the dependent variable to be dichotomous. In this study, the dependent variable is education majors' intention to return to the institution next year. The survey initially provided participants with three choices: yes, no, and not sure. In this study, out of 431

participants, a total of 17 students picked the choice of not sure. The researcher categorized those 17 students into students who do not intend to return to the institution next year. The primary rationale is that in order to run binomial logistic regression, the dependent variable needs to be dichotomous. Thus, there is a need to recategorize the participants who were unsure if they would return to the institution next year.

Continuous Independent Variable

In binomial logistic regression, it is assumed that the data have one or more independent variables measured on either a continuous or nominal scale. The study has a total of nine independent variables: academic involvement, academic preparation, GPA, academic advising, use of learning support services, social involvement, interaction with university personnel, institutional environment, and technology usage. All the independent variables were measured by Likert scales. Even though Likert scales are ordinal, it is acceptable to treat them as continuous variables in social sciences (Kinnear & Taylor, 1991; Malhotra, 1996). Thus, in this study, the Likert scales are treated as continuous variables to conduct the hierarchical binomial logistic regression analysis.

Independence

The third assumption that there should be independence of observations on the dependent variable was met. In the case of this study, the participants could either choose to return to the institution next year or not return to the institution next year. This confirms that the categories are mutually exclusive (Menard, 2010).

Adequate Sample Size

In regression, when there are only a few cases, the reliability of estimates diminishes significantly (van Smeden et al., 2019). The assumption that the sample has a minimum of 15

cases per independent variable is met. The study includes a total of 431 participants, and it is above this limit based upon the nine independent variables in the study.

Linearity

The assumption of linearity is not violated. To confirm the assumption, the study ran the Box-Tidwell (1962) test to examine the linearity between the continuous variables and the logit of the dependent variable. Before running the Box-Tidwell procedure, natural log transformation of all continuous independent variables was created, and interaction items for each continuous independent variable and their respective natural log transformed variables were also created. Since there are eight terms in this model, the p -value at which statistical significance is divided by the number of terms in the model. The new level at which statistical significance would be accepted is when p is less than 0.00625. The Box and Tidwell results showed that the eight continuous variables were linearly related to the logit of the dependent variable because all p -values were greater than 0.00625 (see Table 9).

Table 9

Box and Tidwell Procedure Results

Interaction Terms	<i>B</i>	<i>S.E.</i>	Wald	<i>df</i>	<i>p</i>	<i>OR</i>
Academic Involvement by In_Academic Involvement	.802	4.076	.039	1	.844	2.231
In_Academic Preparation by Academic Preparation	-.238	.721	.109	1	.742	.788
In_Grades by Grades	.771	.629	1.501	1	.221	2.162
In_Academic Advising by Academic Advising	-.832	.590	1.985	1	.159	.435
In_Social Involvement by Social Involvement	-.380	.420	.821	1	.365	.684
In_InteractionWithFaculty by Interactions with Faculty	.510	.742	.472	1	.492	1.665
In_Institutional Environment by Institutional Environment	-.107	3.986	.001	1	.979	.898
In_Technology Usage by Technology Usage	-4.090	4.508	.823	1	.364	.017
Constant	-9.604	15.242	.397	1	.529	.000

Absence of Multicollinearity

The assumption that the data showed no multicollinearity was met. According to Kline (2005), there is a multicollinearity problem when the Tolerance and Variance Inflation Factor (VIF) value is greater than 10. Through an inspection of VIF, none of the VIF values for the predictor variables in the study were greater than five (see Table 10).

Table 10

Assessment of Multicollinearity

Model 1	Variables	VIF
	Academic involvement	1.257
	Academic preparation	1.047
	Grades	1.103
	Academic advising	1.629
	Social involvement	1.046
	Interactions with faculty	1.577
	Institutional Environment	1.436
	Technology usage	1.473

Potentially Influential Outliers

In logistic regression, the data set should have no significant outliers. To detect outliers, a casewise diagnostic analysis was run. Twenty cases with standard residential ± 2 standard deviations are shown. As Mertler and Vannatta Reinhart (2017) recommended, outliers with studentized residual values smaller than 3 should be kept. Thus, out of the 20 outliers, 19 outliers are kept in the analysis, and one case with a studentized residual value greater than 3 was removed from data analysis. See Table 11 for the results of the casewise diagnostic analysis.

Table 11*Casewise Diagnostic Test for Outliers*

Case	ZResid	SResid
19	-3.665	-2.349
24	-5.190	-2.594
31	-2.481	-2.029
33	-5.111	-2.581
45	-3.684	-2.335
93	-2.621	-2.072
128	-4.605	-2.505
137	-3.155	-2.216
240	-2.885	-2.150
265	-4.208	-2.461
273	-2.960	-2.153
301	-3.754	-2.355
303	-3.508	-2.312
324	-5.889	-2.684
325	-4.366	-2.477
336	-2.422	-2.054
342	-3.124	-2.213
363 ^a	-9.638	-3.019
379	-2.425	-2.084
402	-4.078	-2.426

^a Indicates the case with a studentized residual value greater than 3.

Hierarchical Binomial Logistic Regression Results

Generally speaking, the study used the hierarchical binomial logistic regression technique to ascertain the relationship between academic integration-related factors, social integration-related factors, institutional environment, technology usage, and education majors' intention to return to the institution next year. Precisely, by running the hierarchical binomial logistic regression, one can determine whether the models get better at predicting education majors'

intention to return. That is, whether the added variables explain a statistically significant greater amount of the variation in the dependent variable variables.

There are four logistic regression models in the hierarchical binomial logistic regression, and they are labeled as Model 1, Model 2, Model 3, and Model 4. It is imperative to know that those models are not just the added variables. Each model includes all the entered variables from the previous model. For instance, Model 1 contains four independent variables: academic involvement, academic preparation, grades, and academic advising. In Model 2, the social involvement and interaction with faculty are added to the previous model. Then in Model 3, the institutional environment variable is added to the previous model. And finally, in Model 4, the variable technology is added to the previous model (see Table 3).

Model 1

In the first model (Block 1), the entered independent variables were academic involvement, academic preparation, academic advising, and grades. The binomial logistic regression model was tested to ascertain the relationship of three academic integration-related factors, X_1 , X_2 , and X_3 , to the binary response variable Y in a model log. In the equation, X_1 refers to academic involvement, X_2 refers to academic preparation, and X_3 refers to academic advising. The slope coefficient β refers to the change in log odds for every one unit of increase in the independent variables. The logistic regression equations are listed below.

$$\text{Logit}(p) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + a \quad (1)$$

$$\text{Logit}(p) = -0.442X_1 + 0.211X_2 + 0.167X_3 + 0.425X_4 - 0.196 \quad (2)$$

The logistic regression model was statistically significant, $\chi^2(4) = 17.645$, $p < .05$. It explained 11.2 % (Nagelkerke R^2) of the variance in education majors' intention to return and correctly classified 100 % of cases. The Hosmer and Lemeshow goodness of fit test shows that

Model 1 is not a poor fit ($p = 0.882$). Academic advising was statistically significant among the five predictor variables at $p < 0.001$. However, the other three predictor variables, academic involvement, academic preparation, and grades, were not statistically significant, $p_{academicinvolvement} = 0.326$, $p_{preparation} = 0.138$, and $p_{grades} = 0.153$, respectively. Moreover, the odds ratio for academic advising indicates that every unit increase in academic advising is associated with a 52.9% increase in the odds of having education majors return to the institution next year. See Table 12 through Table 16.

Table 12

Model 1: Omnibus Tests of Model Coefficients

		Chi-square	df	p
Step 1	Step	17.645	4	0.001*
	Block	17.645	4	0.001*
	Model	17.645	4	0.001*

Note. * Indicates significance at the $p < 0.05$ level

Table 13

Model 1: Hosmer and Lemeshow Test

Step 1	Chi-square	df	p
	3.717	8	.882

Table 14

Model 1: Nagelkerke R Squared

Step 1	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
	175.827	0.042	0.112

Table 15*Model 1: Classification Table*

Step 1	Retention	No	0	26	0
		Yes	0	382	100
Overall Percentage					93.6

Table 16*Model 1: Variables in Equation*

		<i>B</i>	S.E.	Wald	<i>df</i>	<i>p</i>	<i>OR</i>
Step 1 ^a	Academic involvement	-.442	.450	.965	1	.326	.643
	Academic Preparation	.211	.142	2.199	1	.138	1.235
	Grades	.167	.117	2.045	1	.153	1.182
	Academic advising	.425	.127	11.251	1	< .001*	1.529
	Constant	-.196	1.372	.020	1	.887	.822

Note. Variable(s) entered on step 1: Academic involvement, academic preparation, grades, academic advising. * Indicates significance at the $p < 0.05$ level.

Model 2

In the second model (Block 2), in addition to the independent variables entered in the first model (academic involvement, academic preparation, Grades, and academic advising), two new independent variables from the category of academic integration were entered, they are social involvement and interaction with faculty. The binomial logistic regression model was tested to ascertain the relationship of three academic integration-related factors, X_1 , X_2 , X_3 , X_4 , and X_5 to the binary response variable Y in a model log. The social involvement is labeled as X_5 , and interaction with faculty is labeled as X_6 . The binomial logistic regression was performed to ascertain the effects of academic involvement, academic preparation, grades, academic advising, social involvement, and interaction with faculty on the likelihood that education majors' intention to return. The logistic regression equations are listed below.

$$\text{Logit}(p) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + a \quad (3)$$

$$\text{Logit}(p) = -0.448X_1 + 0.267X_2 + 0.075X_3 + 0.202X_4 - 0.161X_5 + 0.457X_6 - 0.611 \quad (4)$$

The logistic regression model was statistically significant, $\chi^2(6) = 26.097$, $p < .05$. It explained 16.4% (Nagelkerke R^2) of the variance in education majors' intention to return and correctly classified 93.9 % of cases. Block 2 model is a significant improvement to the Block 1 model (Block $p = 0.015$). Furthermore, the Hosmer and Lemeshow goodness of fit test shows that Model 2 is not a poor fit ($p = 0.844$). Of the six predictor variables, interaction with faculty was statistically significant at $p = 0.012$. Specifically, the odds ratio for interaction with faculty indicates that every unit increase in interaction with faculty is associated with a 58% of the increase in the odds of having education majors return to the institution next year. However, the other five predictor variables, academic involvement, academic preparation, grades, academic advising, and social involvement were not statistically significant, $p_{\text{academicinvolvement}} = 0.348$, $p_{\text{preparation}} = 0.073$, $p_{\text{grades}} = 0.557$, $p_{\text{academicadvising}} = 0.213$, and $p_{\text{socialinvolvement}} = 0.245$, respectively (see Table 17-Table 21).

Table 17

Model 2: Omnibus Tests of Model Coefficients

		Chi-square	df	p
Step 1	Step	8.452	2	.015
	Block	8.452	2	.015
	Model	26.097	6	.000214

Table 18

Model 2: Nagelkerke R Squared

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
1	167.375	.062	.164

Table 19*Model 2: Hosmer and Lemeshow Test*

Step	Chi-square	df	p
1	4.146	8	.844

Table 20*Model 2: Classification Table*

			Predicted		Percentage Correct
			Do you intend to return to this institution next year?		
	Observed		No	Yes	
Step 1	Do you intend to return to this institution next year?	No	1	25	3.8
		Yes	0	382	100.0
Overall Percentage					93.9

Note. The cut value is .500

Table 21*Model 2: Variables in the Equation*

		B	S.E.	Wald	df	p	OR
Step 1 ^a	Academic Involvement	-.448	.477	.881	1	.348	.639
	Academic preparation	.267	.149	3.225	1	.073	1.306
	Grades	.075	.127	.346	1	.557	1.078
	Academic advising	.202	.162	1.549	1	.213	1.224
	Social Involvement	-.161	.138	1.350	1	.245	.851
	Interactions with faculty	.457	.181	6.385	1	.012*	1.580
	Constant	-.611	1.393	.192	1	.661	.543

Note. Variable(s) entered on step 1: Social involvement, interactions with faculty. * Indicates significance at the $p < 0.05$ level.

Model 3

In the third model (Block 3), in addition to the independent variables entered in the first model (academic involvement, academic preparation, GPA, and academic advising) and the second model (social involvement and interaction with faculty), one new independent variable institutional environment was entered, and it is labeled as X_7 in the equation. The binomial logistic regression model was tested to ascertain the relationship of three academic integration-related factors of X_1 , X_2 , X_3 , social integration-related factors X_4 , X_5 , X_6 , and institutional environment X_7 to the binary response variable Y in a model log. That is to say, the binomial logistic regression was performed to ascertain the effects of academic involvement, academic preparation, grades, academic advising, social involvement, interaction with faculty, and institutional environment on the likelihood that education majors' intention to return. The logistic regression equations are listed below.

$$\text{Logit}(p) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + a \quad (5)$$

$$\text{Logit}(p) = -0.602X_1 + 0.257X_2 + 0.072X_3 + 0.168X_4 - 0.175X_5 + 0.470X_6 + 0.464X_7 - 1.263 \quad (6)$$

The logistic regression model was statistically significant, $\chi^2(8) = 27.101$, $p < .05$. It explained 17% (Nagelkerke R^2) of the variance in education majors' intention to return and correctly classified 93.9% of cases. The Hosmer and Lemeshow goodness of fit test shows that Model 3 is not a poor fit ($p = 0.991$). Of the seven predictor variables, interaction with faculty was statistically significant at $p = 0.011$. Specifically, the odds ratio for interaction with faculty indicates that every unit increase in interaction with faculty is associated with a 60% of the increase in the odds of having education majors return to the institution next year. However, the other six predictor variables, academic involvement, academic preparation, grades, academic advising, social involvement, and institutional environment were not statistically significant,

$p_{academicinvolvement} = 0.225$, $p_{preparation} = 0.081$, $p_{grades} = 0.570$, $p_{academicadvising} = 0.311$, $p_{socialinvolvement} = 0.198$, and $p_{institutionalenvironment} = 0.315$, respectively. Compared with the Block 2 model, the Block 3 model is not a significant improvement (Block $p = 0.316$). See Table 22 through Table 26 for details.

Table 22

Model 3: Omnibus Tests of Model Coefficients

		Chi-square	df	p
Step 1	Step	1.004	1	.316
	Block	1.004	1	.316
	Model	27.101	7	<.001*

Table 23

Model 3: Nagelkerke R Squared

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
1	166.371	.064	.170

Table 24

Model 3: Hosmer and Lemeshow Test

Step	Chi-square	df	p
1	1.610	8	.991

Table 25

Model 3: Classification Table

			Predicted		Percentage Correct
			Do you intend to return to this institution next year?		
Observed			No	Yes	
Step 1	Do you intend to return to this institution next year?	No	1	25	3.8
		Yes	0	382	100.0
	Overall Percentage				93.9

Table 26*Model 3: Variables in the Equation*

		<i>B</i>	<i>S.E.</i>	Wald	<i>df</i>	<i>p</i>	<i>OR</i>
Step 1 ^a	Academic involvement	-.602	.496	1.474	1	.225	.548
	Academic preparation	.257	.148	3.038	1	.081	1.293
	Grades	.072	.127	.322	1	.570	1.075
	Academic advising	.168	.166	1.026	1	.311	1.183
	Social involvement	-.175	.136	1.653	1	.198	.840
	Interactions with faculty	.470	.185	6.465	1	.011*	1.600
	Institutional Environment	.464	.461	1.009	1	.315	1.590
	Constant	-1.263	1.545	.669	1	.414	.283

Note. Variable(s) entered on step 1: Institutional environment. * Indicates significance at the $p < 0.05$ level.

Model 4

In the fourth model (Block 4), in addition to the independent variables entered in the first model (academic involvement, academic preparation, GPA, and academic advising), the second model (social involvement and interaction with faculty), and the third model (institutional environment), one new independent variable technology usage was entered. In the equations, technology usage is labeled as X8. The binomial logistic regression model was tested to ascertain the relationship of three academic integration-related factors of X₁, X₂, X₃, social integration-related factors X₄, X₅, X₆, institutional environment X₇, and technology usage X₈, to the binary response variable Y in a model log. In other words, the binomial logistic regression was performed to ascertain the effects of academic involvement, academic preparation, grades, academic advising, social involvement, interaction with faculty, institutional environment, and technology usage on the likelihood that education majors' intention to return. The logistic regression equations are listed below.

$$\text{Logit}(p) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + a \quad (7)$$

$$\text{Logit}(p) = -0.557X_1 + 0.258X_2 + 0.069X_3 + 0.178X_4 - 0.173X_5 + 0.467X_6 + 0.513X_7 - 0.161X_8 - 1.123 \quad (8)$$

The logistic regression model was statistically significant, $\chi^2(8) = 27.161$, $p < .05$. It explained 17.1 % (Nagelkerke R^2) of the variance in education majors' intention to return and correctly classified 93.9% of cases. The Hosmer and Lemeshow goodness of fit test shows that Model 4 is not a poor fit ($p = 0.925$). Of the eight predictor variables, interaction with faculty was statistically significant at $p = 0.012$. Specifically, the odds ratio for interaction with faculty indicates that every unit increase in interaction with faculty is associated with a 59.5% of the increase in the odds of having education majors return to the institution next year.

However, the other seven predictor variables, academic involvement, academic preparation, grades, academic advising, social involvement, institutional environment, and technology usage were not statistically significant, $p_{\text{academicinvolvement}} = 0.291$, $p_{\text{preparation}} = 0.080$, $p_{\text{grades}} = 0.591$, $p_{\text{academicadvising}} = 0.297$, $p_{\text{socialinvolvement}} = 0.205$, $p_{\text{institutionalenvironment}} = 0.309$, and $p_{\text{technologyusage}} = 0.806$, respectively. When compared with the Block 3 model, Block 4 is not a significant improvement (Block $p = 0.806$). See Table 27 through Table 31 for details.

Table 27

Model 4: Omnibus Tests of Model Coefficients

		Chi-square	df	p
Step 1	Step	.060	1	.806
	Block	.060	1	.806
	Model	27.161	8	.001

Table 28

Model 4: Nagelkerke R Squared

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
1	166.311	.064	.171

Table 29*Model 4: Hosmer and Lemeshow Test*

Step	Chi-square	df	p
1	3.150	8	.925

Table 30*Model 4: Classification Table*

		Predicted		
		Do you intend to return to this institution next year?		
	Observed	No	Yes	Percentage Correct
Step 1	Do you intend to return to this institution next year?	No	1	25
		Yes	0	382
	Overall Percentage			93.9

Table 31*Model 4: Variables in the Equation*

		B	S.E.	Wald	df	p	OR
Step 1 ^a	Academic involvement	-.557	.527	1.115	1	.291	.573
	Academic preparation	.258	.147	3.055	1	.080	1.294
	Grades	.069	.128	.288	1	.591	1.071
	Academic advising	.178	.170	1.087	1	.297	1.194
	Social involvement	-.173	.136	1.609	1	.205	.841
	Interaction with faculty	.467	.185	6.386	1	.012*	1.595
	Institutional environment	.513	.504	1.034	1	.309	1.670
	Technology usage	-.161	.655	.060	1	.806	.851
	Constant	-1.123	1.651	.463	1	.496	.325

Note. Variable(s) entered on step 1: Technology usage. * Indicates significance at the $p < 0.05$ level.

Summary and Comparison of the Models

Table 32 shows that the tested logistic regression models in this study are all statistically significant in predicting the persistence among education majors. Specifically, the four models explained 11.2%, 16.4%, 17%, and 17.1% of the variation in education majors' persistence, respectively. When comparing Model 2 to Model 1, the increase of explained variation is statistically significant. However, when comparing the Model 3 with Model 2, the increased explained variation of 0.6% is not statistically significant. Finally, when comparing Model 4 to Model 3, the increased 0.1% of the explained variation was considered not statistically significant. Overall, the variable interaction with faculty is a statistically significant predictor across all models.

Table 32

Hierarchical Logistics Regression Model Summary

	Model 1		Model 2		Model 3		Model 4	
	<i>OR</i>	<i>p</i>	<i>OR</i>	<i>p</i>	<i>OR</i>	<i>p</i>	<i>OR</i>	<i>p</i>
Academic integration								
Academic involvement	0.643	0.326	0.639	0.348	0.548	0.225	0.573	0.291
Academic preparation	1.235	0.138	1.306	0.073	1.293	0.081	1.294	0.080
Grades	1.182	0.153	1.078	0.557	1.075	0.570	1.071	0.591
Academic advising	1.529	0.001*	1.224	0.213	1.183	0.311	1.194	0.297
Social integration								
Social involvement			0.851	0.245	0.840	0.198	0.841	0.205
Interaction with faculty			1.580	0.012*	1.600	0.011*	1.595	0.012*
Institutional environment								
					1.590	1.590	1.670	0.309
Technology usage								
							0.851	0.806
Model <i>p</i> -Value		0.001*		< 0.001*		< 0.001*		< 0.001*
Nagelkerke R^2		0.112		0.164		0.17		0.171
Block <i>p</i> -Value		0.001*		0.015*		0.316		0.806

Note. * Indicates significance at the $p < 0.05$ level.

Chapter V

Conclusions, Implications, and Recommendations

Education majors' persistence in teacher education programs is a pressing issue that should be addressed promptly. As reviewed in the literature, students' persistence is primarily affected by their level of social and academic integration into institutions. This chapter first discusses the study conclusions, organized by the study's four research questions. Whether the findings align with previous research is also discussed. It then discusses whether the findings support the used framework. Furthermore, this chapter presents the implications for teacher preparation programs and the study's limitations. Finally, recommendations for future research are made.

Conclusions

Research Question 1: Academic Integration-Related Factors

Academic integration involves students' various efforts to obtain academic success. Those efforts include maintaining a satisfactory GPA, finishing courses, and obtaining a degree. Both Spady (1971) and Tinto's (1975) frameworks emphasized the seminal role academic integration plays in increasing students' persistence at school, and numerous study findings showed a positive association between students' GPA, academic advising, and students' persistence (Drake, 2011; Nakajima et al., 2012; Seirup & Rose, 2011; Swecker et al., 2013). In this study, four academic integration-related factors were investigated. They are academic involvement, academic preparation, grades, and academic advising. The logistic regression analysis revealed that academic involvement, preparation, and grades are not statistically significant predictors of education majors' intention to return.

In response to Research Question 1, not all academic integration-related factors significantly predict education majors' intention to return. In this study, only the variable of academic advising made a statistically significant contribution to the model. The finding is consistent with the research that found that quality academic advising plays an essential role in students' persistence (Drake, 2011; Swecker et al., 2013). Past literature generally revealed that academic advising plays a critical role in student retention as students and faculty are given the opportunity to form a positive and consistent relationship (Drake, 2011; Swecker et al., 2013). In this study, students who reported a high quality of interaction with academic advisors are more likely to return to the institution next year. It is worth pointing out that Swecker et al. (2013) emphasized the association between the number of visits with an academic advisor and students' likelihood of persistence. This study stresses the quality of interaction with academic advisors. Lastly, it is worth noting that academic advising was no longer a significant predictor of education majors' intention to return after accounting for other variables. The possible explanation is that advisors are often one of the few faculty members with which students have an opportunity to develop a positive and consistent relationship (Drake, 2011). Thus, when the quality of interaction with faculty was found as a significant predictor of education majors' intention to return to the institution next year, the quality of interaction with academic advisors was no longer a significant predictor.

Research Question 2: Social Integration-Related Factors

The past literature generally agrees that students' likelihood of staying in school increases when they are more involved in collegiate activities and organizations (Miller, 2011; Robert & Styron, 2010; Tinto, 1993). Based on the theoretical frameworks constructed by Spady (1971) and Tinto (1993), students' persistence is primarily affected by whether they can integrate into

the institution's social system. The social integration-related factors investigated in this study include social involvement and the quality of interaction with faculty. In this study, students' social involvement refers to the amount of time education majors spend participating in co-curricular activities (see Appendix C, item 15b). The statistical results revealed that social involvement is not a statistically significant predictor of persistence in education majors. Meanwhile, the variable interaction with faculty is a statistically significant predictor of education majors' intention to return to the institution next year. Students who reported a high quality of interaction with faculty are more likely to return to the institution.

The finding is consistent with at least two studies. Barnett (2011) maintained that students' feeling of being heard and valued by faculty predicts a strong sense of academic integration among community college students and their intent to return to college. Lillis (2011) reported that the frequency of student and faculty interactions is significantly associated with students' choice to stay. However, it is worth pointing out that this study looks at the quality of the interaction with faculty, not the frequency. Thus, for Research Question 2, even though the results revealed that the additional variance added by social integration-related factors is statistically significant, not all social integration-related factors are statistically significant predictors of education majors' intention to return after accounting for the academic integration-related factors. Based on the finding, among all the social integration-related variables, only the variable of interaction with faculty made a statistically significant contribution to the model.

Research Question 3: Institutional Environment

The institutional environment encompasses factors including an institution's outwardly observable features and inward qualities, such as structures, size, distribution of expenditure, ingrained rules, culture, and environment (Calcagno et al., 2008). As reviewed in the literature,

there is a statistically significant association between institutional spending on student services and student dropout (Chen, 2012), the student retention rate is usually higher in more selective institutions (Schreiner, 2009), and the institutional expenditures on faculty professional development, course design, and instructional technology affect student retention rates (Marsh, 2014). In this study, the investigated aspects include the institutions' amount of emphasis on providing students with academic support, social support, learning services support, and other supports. Based on the statistical results, the conclusion for Research Question 3 is that the institutional environment is not a statistically significant predictor of education majors' intention to return after accounting for academic and social integration-related factors. The conclusion was made upon the notion that the additional variance added by the institutional environment is not statistically significant.

Research Question 4: Technology Usage

The study intended to determine whether technology usage can predict education majors' intention to return. It looked at technology's contribution to education major's improved understanding of the course and collaboration, the frequency of using technological devices like electronic textbooks, e-portfolios, collaborative software, multimedia software, and social networking. The study also looked at the frequency of using technology to communicate with other students, academic advisors, faculty, and other staff members. The results revealed that the additional variance explained by technology usage is not statistically significant.

In response to Research Question 4, the conclusion is that technology usage is not a statistically significant predictor of education majors' intention to return after accounting for academic integration-related factors, social integration-related factors, and institutional environment. The finding is not at all surprising. Technology's impact on students' persistence

varies by age. Available research suggests that adult learners' insufficient technological skills are associated with their dropout (Tyler-Smith, 2006). However, 89.6% of the participants in this study are 19 years old or younger, and those young students may have comparative sufficient technological skills.

Framework

Both Spady's (1971) sociological dropout model and Tinto's (1975) institutional departure model highlighted the close association between academic integration, social integration, and student persistence. In the study, Model 1 used academic integration-related factors to predict education majors' intention to return, and Model 2 considered social integration-related factors. The statistical results revealed that both Model 1 and Model 2 are good fits to predict education majors' intention to return. Thus, this alignment of study results and frameworks reconfirmed the effect social and academic integration have on education majors' retention. On the other hand, this study did not find academic grades significant predictors of education majors' intention to return. However, Spady's sociological dropout model pointed out that extrinsic rewards like grade performance can promote students' intrinsic development in academic integration and persistence.

Implications

First, the findings supported Tinto's (1975) institutional departure model. Building upon Spady's (1971) sociological dropout model, Tinto recognized the strong correlation between students' persistence and their degree of academic integration and social integration. In the study, the quality of academic advising was the significant predictor of education majors' intention to return within the realm of academic integration-related factors; as the quality of education majors' interaction with the academic advisor increases, their likelihood to return to the

institution next year increases. Furthermore, education majors' quality interaction with the faculty was a significant predictor of education majors' intention of return within the realm of social integration-related factors. The higher the quality of interaction with faculty, the more likely they will return to the institution next year.

Second, the study is meaningful as it attempted to build a holistic view toward the retention of education majors by using education majors' intention to return as a proxy to test the predictability of academic integration-related factors, social integration-related factors, institutional environment, and technology usage. As current teachers are leaving the profession at an alarming rate (Bryner, 2021) and the nationwide enrollment in teacher preparation programs has also witnessed a steep decline, there is an urgent need to prevent more education majors from dropping out of the programs. The models found to be significant to predict education majors' intention to return next year could potentially be used by teacher education programs in formulating effective student retention intervention plans.

Third, academic advisors help students set and reach tangible educational goals. The finding that quality interaction with an academic advisor is a significant predictor of an education major's intention to return reassures the critical role of academic advising. Thus, teacher preparation programs should have an excellent academic advising program and provide competent academic advisors to guide education majors through their academic journeys. Furthermore, considering that most study participants are first-year college students, teacher preparation programs should also consider providing education majors with quality academic advising early on. Having quality interaction with academic advisors from the early stage could increase education majors' likelihood to persist through the program.

Fourth, the tested models consistently concluded that the quality of interaction with faculty is a significant predictor of education majors' intention to return to the institution next year. Conversely, the lack of quality interaction with faculty may result in attrition. Thus, teacher preparation programs should prioritize improving the quality of interaction with faculty while implementing various student retention intervention models. There is also a need to reimagine the ways to foster student and faculty interaction. For instance, Smith et al. (2017) claimed that student and faculty interaction often occurs during office hours. However, students' perception toward office hours mismatches with its intended purpose. Thus, teacher preparation programs should reiterate the purpose of office hours and proactively promote consistent, productive, and purposeful interactions between students and faculty. Furthermore, as the number of students juggling work and study increases, faculty should consider increasing their approachability by offering flexible office hours in creative ways to accommodate students' needs (Romsa et al., 2017; Smith et al., 2017). For instance, faculty can consider offering in-person and virtual office hours in the evenings and even on weekends.

Limitations

The study has several limitations. First, the study used a secondary data set, which limited the choice of the research design and data analysis method. Furthermore, the NSSE survey was designed to investigate undergraduate education quality and student engagement. It might not contain the specific questions to gather the information that this study intends to obtain. Moreover, even though the data used in the study are nationally representative, given the purpose, the sample is limited to education majors only. Thus, the generalizability of the study's results is delimited to students of other majors. Lastly, even though the predictive models tested in the study found that quality of faculty interaction plays a major role in education students'

intention to remain in the major, comparative studies across other disciplines may reveal other factors to additionally explain some of the unaccounted variance in these students' intentions.

Recommendations

First, this study attempted to investigate eight factors associated with education majors' intention to return, including academic involvement, academic preparation, grades, academic advising, social involvement, interaction with faculty, institutional environment, and technology usage. Future studies could explore other factors that existing literature claims to be associated with student retention or persistence. Those factors include student socioeconomic backgrounds (Browman et al., 2017; Chen & John, 2011; Morales, 2014), student characteristics (Laskey & Hetzel, 2011; Raelin et al., 2014; Sawtelle et al., 2012), motivation (Rose, 2011; Slanger et al., 2015; Xiong et al., 2015), and the sense of belonging (Freeman et al., 2007; O'Keeffe, 2013; Strayhorn, 2012; Washor & Mojkowski, 2014).

Second, the study did not find technology usage a statistically significant predictor of education majors' retention; however, available research suggests that mature adult learners use fewer technologies and not as often as young learners (Staddon, 2020). Adult learners' insufficient technological skills are associated with their dropout (Tyler-Smith, 2006), and they need more technical training (Calvin & Freeburg, 2010). Thus, it would be interesting to further investigate the association between technology usage and education majors' intention to return among different age groups. Furthermore, students from disadvantaged socioeconomic backgrounds experience more hardships in obtaining and accessing technology (Gonzales et al., 2020). Future studies could also consider the effect of students' socioeconomic background. The results could provide us with a different perspective on the retention of older adult learners and socioeconomically disadvantaged students in the teacher preparation programs.

Third, the study found that student and faculty interaction quality was a statistically significant predictor of education majors' intention to return. Future studies could investigate more rigorously to find techniques to foster a positive student and faculty relationship and effective ways to engage education majors in quality interaction. Furthermore, the study's participants were education majors, and future studies can recruit faculty as participants and investigate faculty's perspectives on the impact of student and faculty interaction on student retention.

Lastly, this study used a quantitative method, and a future qualitative study could potentially provide a more detailed understanding of the significant variables associated with education majors' retention. A qualitative approach allowed researchers to collect and synthesize the information in a non-quantitative manner. Through reviewing and synthesizing, meaningful themes could be generated (Edmonds & Kennedy, 2016). By conducting group interviews, future qualitative studies can look into education majors' perceptions of factors that could construct quality interaction with faculty.

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Appendix A

NSSE Data Sharing Agreement

DocuSign Envelope ID: 763EE7EF-A113-4B2F-8618-8F55F8E84F26



Indiana University Data Sharing Agreement

This Indiana University Center for Postsecondary Research Data Sharing Agreement ("Agreement") defines the parameters for data sharing from the National Survey of Student Engagement ("NSSE") between the Research Institution(s) and its Authorized Researchers named below and the Trustees of Indiana University on behalf of the Indiana University Center for Postsecondary Research ("IUCPR"). The terms below are intended to reflect and comply with the existing agreements between NSSE and the institutions that participate in the survey program. Under these participation agreements NSSE may make de-identified data available to researchers.

RESEARCHERS

The following researchers ("Authorized Researchers") of Austin Peay State University ("Research Institution") may make use of NSSE data pursuant to the terms of this Agreement:

Hanrui He, Austin Peay State University, heh@apsu.edu

Dr. John McConnell, Chair of Educational Specialties, Austin Peay State University, mcconnellj@apsu.edu

FACULTY SPONSOR (Required for students)

Dr. John McConnell, Chair of Educational Specialties, Austin Peay State University, mcconnellj@apsu.edu

PROJECT TITLE or TOPIC ("Project")

The retention of education major students: Implications from NSSE

DATA DESCRIPTION

Under this Agreement, IUCPR will provide the researchers a data file delimited in the following ways ("NSSE Data File"):

Data Source(s):
NSSE 2019

Variables:
All core NSSE survey items and Engagement Indicators, institution-provided variables (sex, race/ethnicity, enrollment status, class level), and institution-level variables (collapsed Carnegie type, control, enrollment size in categories). All items from the Learning with Technology (TEC) Topical Module. All student identifiers will be removed. Institution identifiers will be replaced with unique non-identifiable codes. To avoid disclosure of student or institution identities, the data will not include open-text responses.

Cases:
The dataset will include a sample of all eligible (norms=1) first-year (IRclass=1) respondents from 21 U.S. institutions who completed the NSSE TEC Topical Module in 2019.



CENTER FOR POSTSECONDARY RESEARCH

INDIANA UNIVERSITY
School of Education
Bloomington

Indiana University Data Sharing Agreement

PARAMETERS FOR DATA SHARING:

1. IUCPR will provide a single copy of the NSSE Data File solely for non-commercial research by the Authorized Researchers.
2. The NSSE Data File will exclude the Unit ID code from Integrated Postsecondary Educational Data System (IPEDS), any other unique school or personal identifiers, and any variables that IUCPR determines reasonably may permit the identification of a participating institution or respondent.
3. The Authorized Researchers will not attempt, privately or publicly, to associate elements of the NSSE Data File with the individual institutions or individual respondents participating in the NSSE, nor will they share the data with anyone else who might do so.
4. In all publications or presentations of data obtained through this Agreement, the Authorized Researchers agree to include the following citation:

"NSSE data were used with permission from The Indiana University Center for Postsecondary Research."
5. The Authorized Researchers agree to provide to IUCPR a copy of all reports, presentations, analyses, or other materials in which the data given under this Agreement are presented, discussed, or analyzed.
6. **This Agreement is effective on the date of the last signature herein and expires on 12/31/2022.** The data should be encrypted when not in use by the above researcher and should be destroyed once the Project has been completed. If the researcher needs the data for any longer period than that which is necessary for completing the Project, the researcher is required to ask for an extension. Using the data for other purposes besides completing the Project must be approved by the Director of the Center for Postsecondary Research at Indiana University at Bloomington.
7. Other parameters: **None**
8. The IUCPR of Indiana University may, by written notification to the Authorized Researchers and the Research Institution(s), terminate this Agreement if it determines, in its sole discretion, that either the Authorized Researchers or the Research Institution(s) have breached the terms of this Agreement. In the event that this Agreement is terminated, the Authorized Researchers and Research Institution(s) shall return the originals and all copies of the NSSE Data File to the IUCPR, and securely destroy all NSSE Data File elements contained in any analyses or other materials created or maintained by Authorized Researchers, within ten (10) days of the receipt of the termination notice.
9. Each party shall be solely liable for payment of its portion of all claims, liability, costs, expenses, demands, settlements, or judgments resulting from negligence, actions or omissions of itself or those for whom it is legally responsible. Any and all monetary claims against the State of Tennessee, including APSU (Research Institution), its officers, agents, and employees in performing any responsibility specifically required under the terms of this Agreement shall be



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Bloomington

Indiana University Data Sharing Agreement

submitted to the Board of Claims or the Claims Commission of the State of Tennessee and shall be limited to those provided for in T.C.A. §9-8-307.

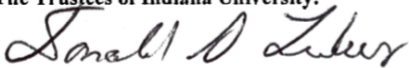
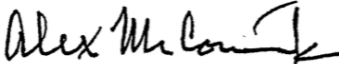
FEES

In exchange for access to and use of the NSSE Data File, **Hanrui He** of **Austin Peay State University** agrees to pay Indiana University the sum of **\$750** upon execution of this Agreement. IUCPR will send an invoice detailing payment instructions.

SIGNATURES

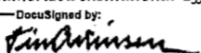
The undersigned hereby consent to the terms of this Agreement and confirm that they have all necessary authority to enter into this Agreement.

For The Trustees of Indiana University:

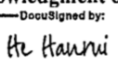
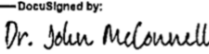
(BB)  10/21/2021
Mr. Donald Lukes, University Treasurer
Indiana University Office of the Treasurer
 Alexander C. McCormick
2021.10.08 15:44:53 -04'00'
Dr. Alexander C. McCormick, Director, National Survey of Student Engagement

For the Research Institution(s):

Authorized Institutional Official from Austin Peay State University

 10/8/2021 | 8:28 AM CDT
Name: _____
Title: _____

Acknowledgment of Authorized Researcher(s) (including Faculty Sponsor if applicable):

 10/5/2021 | 12:01 PM CDT
Hanrui He, Austin Peay State University, heh@apsu.edu
 10/5/2021 | 12:14 PM CDT
Dr. John McConnell, Chair of Educational Specialties, Austin Peay State University,
mcconnellj@apsu.edu, 931-221-7757

Appendix B

Learning with Technology Topical Module Survey

Question 1: During the current school year, how much has your use of technology contributed to the following:

- a) Your understanding of course materials and ideas

Very little Some Quite a bit Very much

- b) Demonstrating your understanding of course content

Very little Some Quite a bit Very much

- c) Learning, studying, or completing coursework on your own

Very little Some Quite a bit Very much

- d) 1d. Learning, studying, or completing coursework with other students

Very little Some Quite a bit Very much

- e) 1e. Distracting you from completing your coursework

Question 2: During the current school year, how much have your course improved your understanding and use of technology?

Very little Some Quite a bit Very much

Question 3. During the current school year, about how often have you used the following technologies in your courses?

- a) Electronic textbooks

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

- b) Online portfolios or e-portfolios

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

- c) Blogs

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

d) Collaborative editing software (Wikis, Google Docs, etc.)

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

e) Multimedia software (drawing, audio or video production, editing, etc.)

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

f) Social networking (Facebook, Twitter, etc.)

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

g) Mobile computing (handheld devices such as smartphones, tablets, etc.)

1 = Never 2 = Sometimes 3 = Often 4 = Very often 9 = I don't know what this is

Question 4. During the current school year, about how often have you used technology to communicate with the following people?

a) Students

1= Never 2= Sometimes 3= Often 4= Very often

b) Academic advisors

1= Never 2= Sometimes 3= Often 4= Very often

c) Faculty

1= Never 2= Sometimes 3= Often 4= Very often

d) Student services staff (career services, student activities, housing, etc.)

1= Never 2= Sometimes 3= Often 4= Very often

e) Other administrative staff and offices (registrar, financial aid, etc.)

Question 5. How much does your institution emphasize the following?

a) Teaching with new cutting-edge technologies

1= Very little 2= Some C= Quite a bit 4= Very much

b) Providing technology to help you learn, study, or complete coursework

1= Very little 2= Some C= Quite a bit 4= Very much

c) Teaching you how to use available technologies to learn, study, or complete coursework

1= Very little 2= Some C= Quite a bit 4= Very much

d) Providing support services to assist you with your use of technology

1= Very little 2= Some C= Quite a bit 4= Very much

Appendix C

Items Used from 2019 NSSE Core Survey

Item #	Variable name	Variable label	Values and labels
Question 1. During the current school year, about how often have you done the following?			
1a.	askquest	Asked questions or contributed to course discussions in other ways	1 = Never 2 = Sometimes
1b.	drafts	Prepared two or more drafts of a paper or assignment before turning it in	3 = Often 4 = Very often
1c.	unprepared	Come to class without completing readings or assignments	
1d.	attendart	Attended an art exhibit, play, or other arts performance (dance, music, etc.)	
1e.	CLaskhelp	Asked another student to help you understand course material	
1f.	Clexplain	Explained course material to one or more students	
1g.	CLstudy	Prepared for exams by discussing or working through course material with other students	
1h.	CLproject	Worked with other students on course projects or assignments	
Question 9. During the current school year, about how often have you done the following?			
9a.	LSreading	Identified key information from reading assignments	1 = Never 2 = Sometimes
9b.	LSnotes	Reviewed your notes after class	3 = Often
9c.	LSsummary	Summarized what you learned in class or from course materials	4 = Very often
Question 13. Indicate the quality of your interaction with the following people at your institution.			
13b.	QIadvisor	Academic advisors	1 = poor 2 = 2, 3 = 3,
13c.	QIfaculty	Faculty	4 = 4, 5 = 5, 6 = 6 7 = Excellent, 9 = NA
Question 14. How much does your institution emphasize the following?			
14a.	empstudy	Spending significant amounts of time studying and on academic work	1 = Very little 2 = Some
14b.	SEacademic	Providing support to help students succeed academically	3 = Quite a bit 4 = Very much
14c.	SElearnsup	Using learning support services (tutoring services, writing center, etc.)	
14d.	SEdiverse	Encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)	
14e.	SEsocial	Providing opportunities to be involved socially	
14f.	SEwellness	Providing support for your overall well-being (recreation, health care, counseling, etc.)	

Item #	Variable name	Variable label	Values and labels
14g.	SEnonacad	Helping you manage your non-academic responsibilities (work, family, etc.)	
14h.	SEactivities	Attending campus activities and events (performing arts, athletic events, etc.)	
14i.	SEevents	Attending events that address important social, economic, or political issues	
Question 15. About how many hours do you spend in a typical 7-day week doing the following?			
15a.	tmprep	Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)	1 = 0 Hours per week 2 = 1-5 3 = 6-10
15b.	tmcocurr	Participating in co-curricular activities (organizations, campus publications, student government, fraternity, sorority, intercollegiate or intramural sports, etc.)	4 = 11-15 5 = 16-20 6 = 21-25 7 = 26-30 8 = More than 30
Q20	Returnexp	Do you intend to return to this institution next year?	0 = No 1 = Yes 9 = Not sure
Q21b.	MAJfirst	Please enter your major or expected major:	Write in response
Q 22.	class	What is your class level?	1 = Freshman/first year 2 = Sophomore 3 = Junior 4 = Senior 5 = Unclassified
Data Provided by Your Institution			
–	IRsex19	Institution-reported: Sex	0 = Female 1 = Male 2 = Another 9 = Unknown
–	IRrace	Institution-reported: Race or ethnicity	1 = American Indian or Alaska Native 2 = Asian 3 = Black or African American 4 = Hispanic or Latino 5 = Native Hawaiian or Other Pacific Islander 6 = White 7 = Other 8 = Foreign or nonresident 9 = Two or more races/ethnicities 10 = Unknown

Item #	Variable name	Variable label	Values and labels
			1 = C- or lower 2 = C 3 = C+ 4 = B- 5 = B 6 = B+ 7 = A- 8 = A
Q 25.	grades	What have most of your grades been up to now at this institution?	
Q 31.	birthyear	Enter your year of birth (e.g., 1994):	Write-in response
—	agecat	Age category	1 = 19 or younger 2 = 20-23 3 = 24-29 4 = 30-39 5 = 40-55 6 = Over 55

Appendix D

Institutional Review Board (IRB) Approval



Date: 1/18/2022

Re 22-003: TITLE OF PROJECT: "The retention of education majors: implications from the national survey of student engagement"

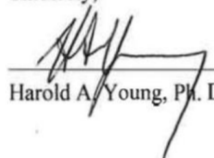
Dear Dr. McConnell and Mr. He,

We appreciate your cooperation with the human research review process. This letter is to inform you that study 22-003 the application has been reviewed on an expedited level. It is my pleasure to tell you that your application is approved.

This approval is subject to APSU Policies and Procedures governing human subject research. The IRB reserves the right to withdraw approval if unresolved issues are raised during the review period. Any changes or deviations from the approved protocol must be submitted in writing to the IRB for further review and approval before continuing.

This approval is for one calendar year and a closed study report or request for continuing review is required on or before the expiration date, 1/17/2023. If you have any questions or require further information, you can contact me by phone (931-221-7059) or email (youngh@apsu.edu).

Sincerely,



Harold A. Young, Ph. D. Chair, APIRB