INVESTIGATING NEW STUDENT AFFAIRS

PROFESSIONALS' PERCEIVED READINESS TO

UTILIZE DATA ANALYTICS

By

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Abstract: The shortage of qualified administrators who can utilize data analytics means that institutions are not able to harness data analytics to its fullest potential in order to remain competitive in a higher education market that continued to reward institutions that embrace entrepreneurship. Examining how new student affairs professionals in US higher education institutions acquire skills and knowledge needed in order to use and implement data analytics is imperative to sustain institutions' survivability. The purpose of this study is to examine the level of readiness those new student affairs professionals possess in regards to the usage and implementation of data analytics that take place at US higher education institutions. New student affairs professionals who are currently employed and associated with professional organizations were surveyed to measure their perceived readiness in working with data analytics. This study found that new student affairs professionals are not ready to utilize data analytics to its fullest potential. Additionally, there is no difference in the perceived readiness to utilize data analytics between participants who graduated from master's level student affairs preparation programs and other master's programs. This study also found that the participants perceived data analytics as an important tool and there is no difference in the perceived importance of data analytics among the participants who report to VP of student affairs, provost/academic affairs, and other leadership entities. Furthermore, participants who actively sought data analytics knowledge and skills from sources other than a master's level preparation program perceive data analytics as more important than those who did not actively seek out this knowledge and information.

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CHAPTER I

INTRODUCTION TO THE STUDY

"For every year we fail to use data effectively…we threaten the financial

sustainability of our institutions. The stakes are too high!" (AIR, EDUCAUSE, &

NACUBO, 2019). Data analytics is the process of processing data using advanced

analytics, collection of different tool types based on predictive analytics, data mining,

statistics, artificial intelligence, and natural language processing (Russom, 2011). Once

used primarily by corporations, these tools are now a necessity for a higher education

institution in order to be able to compete with other institutions and satisfy the

accountability imposed by federal and state government. The tools enable institutions to

make informed decisions in regards to the institution itself and students associated with

the institution. This in turn can also help institutions to justify the funding allocated to

them and satisfy the requirement for accountability in higher education pushed by policy

makers.

Higher education institutions have utilized different means, such as punch cards,

sequential magnetic tape files, and large mainframe computers, to store and preserve data

related to the students and institutions (Picciano, 2012). Although institutions did use and

analyze some of the massive amount of data collected, most data stored in the database

are left undisturbed (Daniel, 2015). By using data analytics, administrators in US higher

education institutions are able to utilize the historical data in day-to-day tasks and become an integral tool. Data analysis can support critical functions of higher education such as helping faculty members in tracking student progress, institutions with accountability pushed by stakeholders, and admission office to boost admissions (Bonderud, 2020; Inside Big Data, 2019; McGuire, 2019).

A joint statement by the Association for Institutional Research (AIR), EDUCAUSE, and the National Association of College and University Business Officers (NACUBO) (2019) highlighted the importance of data analytics to the sustainability and future of US higher education institutions and proposed six guiding principles that lay the groundwork for effective implementation and sustained use of data analytics. These six principles are committing to analytics, building a dream team, preparing the institution to take possible detours, investing all that institutions can afford to, avoiding pitfalls, and acting out as soon as possible (AIR, EDUCASE, & NACUBO, 2019). In one of the six guiding principles, building a dream team, there is a need for experts who will work across colleges, departments, and divisions in implementing and utilizing data that can help senior administrators lead institutions effectively and empower those on the front lines who are directly educating and supporting students (AIR, EDUCASE, & NACUBO, 2019).

Despite the known importance of data analytics and the need for qualified staff, institutions still have challenges in implementing and using data analytics. One system driven by data analytics is early-alert system, a system that helps institutions identify students who may need pro-active interventions. The aforementioned system can identify students who are struggling with their classes and pro-actively get the help they need in order to complete their coursework in a satisfactory manner. By using data analytics, this system can support faculty

and administrators who are involved in student affairs. In a survey conducted by the National Association of Student Personnel Administrators (NASPA), the Association for Institutional Research (AIR), and EDUCASE, 65% of institutions that do not use any form of early-alert systems reported that they lack the resources, such as financial, staff, software, and IT support, to implement such a system (Parnell et al., 2018). Indeed, experts and administrators in higher education recognized the lack of "data people" and became one of the reasons why AIR, EDUCASE, and NACUBO released the joint statement (Cubarrubia, 2019).

In addition to the lack of capable staff, institutions also have to address the lack of enthusiasm in financing data analytics projects. Even though around 60% of the surveyed CIOs and senior campus IT officials acknowledged data analytics as a "very important" tool, less than 22% evaluated their institution's IT investment in analytics as "very effective" (Green, 2020). This is surprising as data analytics can help and has helped institutions in variety of ways, as previously discussed. Boosting enrollment, increasing retention, graduating more low-income students, and helping institutions with accountability are just some examples of what data analytics can do for higher education institutions (McGuire, 2019; Schwatz, 2019). Despite the challenges, data analytics continued to be an important part of US higher education. The increasing usage of business tools and practices, such as data analytics, is a product of higher education becoming more entrepreneurial.

The ever-increasing emphasis on adopting business practices from the corporate world changed the structure of higher education institutions into a more corporate business setting that rely heavily on business tools, such as data analytics. Much like competition among entities in the business world, higher education institutions need to compete with each other in order to enroll the finite number of students and thereby balance their budget. This is

evident in the rise of for-profit higher education institutions in the last few decades that are enrolling more students than before. Once served a small chunk of postsecondary students, for-profit institutions now serve 13% of students, almost the same number as non-profit institutions (Kezar, 2013, p. 12). This competition to acquire students and resources was then magnified with the pressure from outside forces that imposed the idea of continuing growth at all cost, much like what people expect from publicly traded companies (Giroux, 2014, p. 58).

Free-market capitalism affects the missions of the higher education institution: teaching, research, and service, which inadvertently affect student affairs professionals who work in the aforementioned areas (Slaughter and Leslie, 1997). New student affairs professionals have resorted to measures used by their corporate counterparts in order to complete their day-to-day tasks and activities. Some of these measures are commodifying student development programs in order to bring more revenue, implementing reward or bonus system in order to increase productivity without increasing yearly wage, and hiring students as cheap labor in order to alleviate some of the burden of increasing pressure to accomplish unrealistic job expectations (Lee and Helm, 2013). The continuing effort to be more business-like in all aspects has pushed student affairs professionals to perform more than ever before and driven professionals out of the higher education field (Marshall et al., 2016). Burnout, job stress, long hours, and non-competitive salaries are some of the reasons that student affairs professionals decided to pursue other careers outside of higher education (Howard-Hamilton et al., 1998; Marshall et al., 2016; Mullen et al., 2018).

As higher education institutions are becoming more entrepreneurial, there is also a push for more accountability from the stakeholders in order to maximize the return on

investment. One stakeholder in particular is the state government (Carey, 2007; Kezar, 2013, p. 7-9; Kirwan, 2007). State policymakers prefer to quantify variables, such as average credits taught by each faculty member or the total number of degrees awarded by a university, in order to measure efficiency and performance (Carey, 2007, p. 27). Quantifying the data generated in the day-to-day operation of an institution, and presenting the data in a concise and coherent way is not an easy feat. The challenges are particularly true vis-à-vis those data related to elements of student academic performance. In order to satisfy the stakeholders, higher education institutions have to adopt tools from their business counterparts.

Indeed, US higher education institutions have adopted various business tools in order to remain competitive. Marketing, outsourcing, knowledge management systems, and enterprise resource planning software are just some that institutions have utilized as they become more business-like. One tool in particular that is the focus of this study is data analytics. As previously discussed, one manifestation of data analytics in students affairs is the early-alert system. Utilizing data sets that are not valuable in and of themselves, data analytics is able to transform these historical data, pertaining to student affairs in particular, and help institutions in making decisions such as budget allocations and interventions needed by students in order to remain competitive and help students in their studies. Investing in data analytics should also help student affairs professionals in performing their day-to-day tasks and alleviate their burden without resorting to exploitation of students and other disadvantaged groups.

Research Problem

The rise of data analytics in higher education is not proportional with the number of

student affairs professionals who can use and implement these tools. The shortage of

qualified administrators who can use and implement data analytics in higher education and

the absence of a focus on the usage and implementation of data analytics in preparing future

student affairs professionals is concerning (Dickerson et al., 2011; Ifenthaler, 2017). While

master's level preparation programs are in general doing a good job in preparing future

student affairs professionals, particularly in mastery of student affairs theory, cognitive or

problem solving, and intrapersonal skills (Ardoin et al., 2019; Herdlein, 2004; Waple, 2006),

technology is still taking a back seat to other emerging trends such as diversity and learning

outcomes. Furthermore, colleges and universities are adopting data analytics in order to

compete in the evolved higher education market and address accountability pushed by

stakeholders. The inability to utilize data analytics to its fullest potential means that

institutions cannot offer students the best tools and environment to support their learning.

This can in turn negatively affect student's learning process, which can then hinder their

progress.

Statement of Purpose and Research Questions

The shortage of qualified administrators who can use and implement data analytics

means that institutions are not able to harness and utilize data analytics to its fullest potential

in order to remain competitive. Examining how new student affairs professionals in US

higher education institutions acquire skills and knowledge needed in order to use and

implement data analytics is imperative to sustain institutions' survivability. Therefore, the

purpose of the quantitative study is to examine the level of readiness those new student

affairs professionals possess in regards to the usage and implementation of data analytics that take place at US higher education institutions. New student affairs professionals who graduated in the last five years and are members of National Association of Student Personnel Administrators (NASPA), American College Personnel Association (ACPA), or online student affairs professional groups were surveyed in order to find their level of readiness in regards to the usage and implementation of data analytics. This newfound knowledge could then add to the collective knowledge of master's level preparation program.

Two research questions guided the study:

1. Did the programs that new student affairs professionals graduated from prepare them to use data analytics and equip them with knowledge and skills in order to implement and work with data analytics?

2. How important is the knowledge and skills for data analytics at new student affairs professional workplace?

Further, descriptive statistics, t-test, and one-way analysis of variance were utilized to test the hypothesis: new student affairs professionals are not equipped with the necessary knowledge and skills on data analytics by the programs they graduated from even though new student affairs professionals acknowledge the importance of knowledge and skills in data analytics. Therefore, new student affairs professionals are not ready to use and implement data analytics in higher education settings.

Methodology Overview

The study reflected the post-positivist theoretical perspective in that the design was based on an assumption that reality can be observed and measured (Crotty, 1998). The researcher shares the value of objectivism in which there is one true meaningful reality,

which exists apart from any consciousness (Crotty, 1998, p. 8). An application developer with more than ten years' experience in designing, developing, and implementing software, the researcher's experience encouraged the desire to study readiness of new student affairs professional in using and implementing data analytics.

New student affairs professionals are individuals who support faculty members in providing a holistic student learning and development, in addition to fulfilling their departmental specific role (student housing, admissions office, orientation, etc), and graduated from a Master's program in the last five years. The participants were asked to self-identify whether or not they are new student affairs professionals and provide when they received their Master's degree, in addition to their current employment in the higher education field. Participants who did not meet the above-mentioned criteria were removed from the final analysis.

Quantitative research methods are appropriate for this study because they offer the most suitable method to measure the desired variable while minimizing individual subjectivity of the researcher and accommodate a larger sampling size (Creswell, 2014). The independent variable for this study is skills and knowledge acquired from a master's level preparation program, while the dependent variable is the participants' level of readiness in using and implementing data analytics. A t-test, along with descriptive statistics, was used to analyze the difference in readiness to use data analytics between the preparation group and non-preparation group, in addition to the education and social sciences group and business and science group. A one-way analysis of variance (ANOVA) test between the individuals who report to VP of student affairs, provost/academic affairs, and other leadership positions

was conducted to find whether there is a difference in perception on the importance of data analytics skills among the three previously mentioned groups.

The researcher adapted an existing instrument, the Ohio State Teacher Efficacy Scale (OSTES), developed by Tschannen-Moran and Hoy (2001), for use in this study. Based upon a previous scale developed by Bandura (1997). OSTES was developed as an instrument for use by educators to provide a consistent measure of teacher efficacy. Tschannen-Moran and Hoy (2001) tested and refined the instrument through three separate studies and resulted in an instrument that has 24 items for the long form and 12 items for the short form. The researcher acquired permission from the authors to modify OSTES, and use both the modified short- and long-form survey for data collection in the research.

Groves (1989) identified four different sources of error in sample surveys that researchers have to mitigate in order to ensure the integrity of the data collected from responders. These errors are coverage error, sampling error, measurement error, and nonresponse error. Dillman and Bowker's (2001) proposed 14 principles in conducting a web survey to mitigate the errors in sample surveys identified by Groves (1989). Some of the aforementioned principles are taking into consideration the overall design of a web survey, choosing colors that do not affect readability, and constructing the questionnaire so that they seamlessly scroll from one question to another (Dillman & Bowker, 2001, pp. 66-67). Qualtrics, web-based survey software, allowed the creation and the customization of the survey that is in line with Dillman and Bowker's (2001) 14 principles for conducting a web survey. By creating the survey in line with Dillman and Bowker's (2001) 14 principles, this design mitigated errors commonly associated with sample surveys as identified by Groves (1989). Use of Qualtrics technology also accommodated a variety of web browsers and

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devices used by participants as recommended by Couper et al. (2001), ensuring conformity of user interface across platforms and thereby consistency of data collected.

Significance of the Research

By conducting this research study, the researcher hoped to understand and add to the collective knowledge of the readiness of recently graduated student affairs professional for their new workplace. In particular, this study focused on their readiness to use and implement data analytics. This new understanding and addition to the body of knowledge could affect numerous facets of US higher education institutions.

First, it could help stakeholders with their roles in ensuring the institution's competitiveness. Professional organizations could be informed on the aspects of current student affairs professionals that they might miss when establishing standards for functional groups, the master's level preparation program in particular. Senior student affairs professionals could be informed in the hiring process and budget allocation for training new professionals. Student affairs professionals could be prepared for their first professional position after completing a master's level preparation program and help them secure the positions that they aspire to and manage their transition better.

Second, it could help institutions with continuing emphasis on accountability from state and federal government. With the continuing push to be business-like entities, higher education institutions are expected to be accountable for numerous different aspects. One such point is that the implementation of data analytics software will be more successful, therefore more accountable, if the workforce is equipped with the appropriate level of knowledge and skills. Further, it could protect the core business of higher education institutions and ensure better education of their students. Having access to information and

knowledge mined from available data that could help students be more successful will reflect positively on the students and institutions. Institutions could then justify the funding received from different stakeholders. Ultimately, having administrators and staff who are proficient in data analytics means having access to a critical business tool that the institution can use to generate reports pushed by state and federal governments.

Finally, data analytics could help US higher education institutions to retain their position as the leading authority in knowledge creation. The ability to take historical, current, and future projection data and transform them into useful information could certainly help institutions and scholars in creating and transferring knowledge.

Summary

Data analytics is an integral part of US higher education institutions and it is projected to be an even more important business tool in the future. The usage of business tools in US higher education has risen as institutions are becoming more business-like. Despite the known benefits of data analytics and the understanding by many institutions to implement and use data analytics, there is a concern that professionals in the field do not possess the expected knowledge and skills to fully utilize it. While most master's level preparation programs do a sufficient job in preparing future student affairs professionals for many aspects of their roles, there seems to be a lack of emphasis in conveying information regarding technology such as data analytics. In addition, past studies have looked into the overall view of new student affairs professionals' preparedness in technology rather than a specific set of knowledge, such as data analytics. The purpose of this study is to examine how prepared are new student affairs professionals on using and implementing data analytics.

The following chapters provide a detailed discussion of this research topic. Chapter two discusses the literature and research studies on higher education becoming more entrepreneurial, business tools, data analytics, and professional development. Chapter three provides a thorough discussion of the methodology, including research design, population and sample, hypothesis, survey instrument, and data collection procedures. The analysis of the data acquired by this study will be discussed in chapter four. The final chapter of this dissertation incorporates analysis of the findings as well as implications and recommendations for future research.

CHAPTER II

REVIEW OF THE LITERATURE

The rise of data analytics in higher education and the shortage of qualified administrators who can implement and use data analytics, in addition to lack of emphasis on competency in technology such as data analytics in preparing future student affairs professionals, is concerning. In order to understand the evolution of US higher education institutions into business-like entities and the need to have business tools such as data analytics systems in place to survive the competitive market of today's higher education, this literature review will explore different facets of US higher education. First, the debate whether higher education is a public or private good that coincides with the commercialization of US higher education will be discussed. Second, the discussion on the enterprising of US higher education institutions, along with associated changes in leadership and accountability, will be presented. Third, this literature review will discuss the adoption of business tools and practices by US higher education institutions, including data analysis. Discussion of data analytics in higher education, along with professional development will follow. Finally, this literature review will present the conclusion on all of the aforementioned sections.

The Purpose of Higher Education

Stakeholders in higher education have different views when it comes to the purpose of higher education. The discourse also exists amongst scholars and lecturers who are actively involved in the learning process. According to Keeling and Dungy (2004), the purpose of higher education is to produce well-rounded individuals who can contribute to both society and their professional fields by integrating academic learning and student development, including campus experience as a part of a comprehensive, holistic, and transformative learning. On the other hand, Musil and Hampshire (2012) suggest that higher education has a civic mission to educate and produce citizens who can serve the communities and preserve the idea of democracy. Since basic competencies of democracy cannot be learned only by studying books, civic learning needs to be expected in higher education rather than optional. Deviating from producing well-rounded citizens, Harvey (2000) addresses the issue of employability and proposes universities to empower learners by shifting traditional balance of power in learning from the education providers to the students. The common theme from the aforementioned studies is that higher education can affect both the individual and society where the individual belongs. The point here is as follows: the changes that institutions had to undergo and the perceived need for what some external and internal actors in the higher education sector deem a crucial aspect of business organizations, the use of business tools to enhance the performance of the business-like operations of colleges and universities is imperative.

Economists, policy scholars, legislators, government agencies, university presidents, key spokespeople for national higher education associations, policy analysts, and tenured faculty have been involved in the discussion regarding the aim of higher

education and higher education as a commodity (Pasque, 2010). Based on her review of 193 articles reflecting positions in the debate, Pasque (2010) offered a four-part typology, naming higher education as a public good, a private good, positioning public and private good functions as balanced, and framing public and private goods as interconnected and advocacy-oriented (Pasque, 2010, p. 13). Pasque's typology provides an organizational scheme for the following section discussing the debate about the purpose or primary function of higher education, along with the implications of either position for higher education institutions.

Higher Education as a Public Good

Renewed attention to the long-standing debate about the function or purpose of higher education re-emerged as colleges and universities in the US and abroad became more entrepreneurial. Proponents of higher education as a public good pointed out the importance of serving the community as a whole and not just in an economic sense, ensuring equal access for all aspiring students, and educating the students as individuals who will pursue the truth, lead their community, and be morally accountable (Giroux, 2014; Hall, 2009; Marginson, 2011). Supporters of higher education as a public good also argued that the mishandling of budget by state and federal governments, politicization of higher education, and greed are the reasons behind the push for commercializing higher education, rather than neoliberalism tenets such as self-interested individuals and free market economics (Giroux, 2014; Hall, 2009; Marginson, 2011).

Supported by university presidents and key spokespeople for national higher education associations, higher education is considered a public good because the goal of higher education is to educate students to participate in diverse society and contribute

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positively to the society (Pasque, 2010, p. 25). Scholars have used different perspectives

to argue for higher education as a public good, mainly from human rights and an

economic point of view. Privatizing higher education and relying on market forces to

solve all of the problems pertaining to higher education could limit access and quality of

education, and so it can potentially jeopardize existing human rights agreements, in that

everyone has the right to education according to Article 26 of The United Nations

Declaration on Human Rights (Assembly, 1948; Tilak, 2008). Hufner (2003) shared the

idea and cited the United Nations Declaration on Human Rights to argue that higher

education is a public good. Specifically, Article 26 states that higher education should be

available "on the basis of merit" (Assembly, 1948). The aforementioned language used in

the article, however, is open to different interpretations. Regardless of the interpretation,

social justice is at the heart of higher education as a public good according to scholars

because the public will reap the benefits and make for a more equitable society by

educating individuals to understand the multiple causes of educational inequities and

participate fully in a diversity democracy (Pasque, 2010).

Hufner (2003) also argued that higher education is a public good using the

common definition of a public good. This is in line with Stiglitz (1999), who argued that

knowledge is a public good using two properties of a public good. First, a public good is

a good that the public can consume without reducing the amount of goods that others are

able to consume (non-rival). Much like lighthouses, traffic light, and the judicial system,

an education can be consumed by the public without having to worry about supply

because there is an infinite amount of education. Second, it is very difficult or almost

impossible to exclude someone from enjoying the good (non-excludable). Much like

public roads and parks that are accessible even to non-taxpayers, it is very difficult to exclude one from accessing knowledge and education. In addition to the reasoning to argue that higher education is a public good, scholars also presented the danger of higher education becoming more entrepreneurial.

Higher Education as a Private Good

Supporters of higher education as a private good argued that knowledge is indeed a commodity as evidenced by a gap between supply and demand of goods, knowledge included, between countries and increasing demand for higher education that pushed for the need of private for-profit higher education institutions (Harvey, 2007; Slaughter & Rhoades, 2004; Tilak, 2008). In addition, studies have found that having a college degree can potentially increase one's wage and therefore support the argument that higher education is a private good that will benefit the student more than the larger community (Fortin, 2006; Grogger & Eide, 1995; Valletta, 2018). Individuals who often compete for or involved in the competition for limited resources, such as economists, policy scholars, legislators, government agencies, and leaders, support this idea of higher education as a private good (Pasque, 2010, p. 19).

Scholars have used economic reasons in order to understand the progression of higher education as a private good. Clark (2001) discussed that universities evolved because there is a growing imbalance between the demands from the public and universities ability to meet them. Rhoades and Slaughter (1997) and Slaughter and Leslie (2001) also recognized this gap between supply and demand, along with other neoliberal tendencies that universities have to take into consideration when crafting policies and measures. Meeting the increased demand for higher education, satisfying faculty

demands on equal share of profit from newly created knowledge, and recognizing the professionalism of individuals who work in higher education management took institutions to a place they have never been before. Rhoades and Slaughter (1997) viewed that a return to the old system is not possible and the stakeholders need to accept this new reality of higher education in the United States.

Institutions more commonly act in their own self-interest, much like individuals who aspire to attend these institutions. Federal and state funding going directly to the students furthers the idea that students, acting as customers who are shopping for the best product in the market, will choose the most appropriate institutions that can meet their demand for personal development (Pasque, 2010, p.21). While higher education market mimics that of a typical market, the unique dynamics of stakeholders in higher education market caused by different interests and ideals has created a distinct market altogether.

Higher Education as Both Public and Private Goods

Pasque (2010) offers two additional frames, public and private goods as balanced along with public and private goods as interconnected and advocacy-oriented, which blend the two differing views previously discussed. Public and private goods as balanced frame, typically supported by policy analysts and researchers at national higher education institutions, acknowledges that both the public and the private good benefits society and urges a model where higher education is both a public and private good (Pasque, 2010, p. 29). The study draws more heavily on the balanced frame, because literature reflecting the advocacy orientation seem to have had limited influence on the development of the initial competency model for the student affairs profession.

Both previously discussed frames offer more fluidity in analyzing higher education as a commodity. Some of the authors discussed, for example, can easily be classified into one of the two additional frames. Giroux's (2014) assertion that the source of regression in higher education is people with neoliberal economic view is in line with public and private goods as interconnected and advocacy frame. Slaughter and Rhoades' (2004) call to increase access to higher education and prepare citizens to engage in democracy, capitalizing the demand for higher education in order to fund the suggested goals, fit the characteristics of public and private goods as interconnected and advocacy frame and can fit the authors into that frame.

This section discussed how higher education is viewed as a good and there are two opposing views on the type of commodity higher education should fall into, public and private good. The proponents of higher education as a public good argue that human rights and economic related reasons are just some of the reasons higher education should be accessible and affordable to general population. Supporters of higher education as a private good push the fact that students reap the most benefit from a higher education degree and the existence of a gap between supply and demand for education as primary reasons higher education should be a private good. In the face of continuing argument from both sides, higher education institutions are commercializing their assets in order to balance their budget. Offering STEM majors because they can attract more students and increase revenue from tuition is one example of such commercialization. The discussion on how US higher education institutions are becoming more entrepreneurial and how this has affected accountability and leadership in higher education institutions is next.

Once only accessible to the elites, a higher education degree is now attainable by millions of Americans. Colleges and universities adapted to the new realities, the perceived connection between higher education, employability, and individual empowerment, and tailored the learning process in order to meet the expectations of the students who believe that a higher education degree can open the doors to many employment possibilities, in particular regarding their socioeconomic status (Harvey, 2000). The understanding that millions of Americans need a higher education degree in order to contribute further to the economy prompted federal and state government to fund higher education. This understanding and investment, however, did not last as federal and state government started to cut appropriations for higher education to balance their budget and expect students to fund their education themselves.

Federal and state funding continues to decline while public officials and other stakeholders push for greater accountability from higher education institutions for the public funds they do receive (Dill, 1999; Tuchman, 2009). In most instances, the funding that is available to institutions is tied to institutional outcomes set by policy makers such as retentions and graduation rates, faculty productivity, and job placements, and, critics and pundits warn, unfairly benefits high-resource institutions (Hagood, 2019). With the loss of two significant sources of funding and an uneven playing field, institutions have had to find new sources of funding and – in response – have commercialized parts of their institutions.

Indeed, commercializing parts of their institutions is a logical solution in replacing lost funding, as there is no guarantee that federal and state government will restore appropriations that have been cut. The cuts themselves can be caused by external

factors that higher education cannot control. All states, except for Alaska and North Dakota, are spending less per student than they did before the economic recession of 2008 that was caused by the collapse of the housing market (Mitchell et al., 2015; Oliff, et al., 2013). The slow economic recovery due to high unemployment and still-depressed housing value makes it difficult for states to restore funding to the pre-recession era. The recent pandemic caused by a new novel virus, COVID-19, has also contributed to the budget cuts for higher education. The budget cuts were so severe that some higher education institutions have to layoff full-time faculty and furlough non-faculty staff members as cutting programs and auxiliary spending was not enough to balance the budget (Hubler, 2020; Whitford, 2020). If the trend persists, higher education will experience the effects of the budget cuts years down the line and will not be able to restore the budget to pre-pandemic era levels.

Advocacy-Oriented Blending of Public and Private Goods

A view of public and private goods as an interconnected and advocacy-oriented frame, typically supported by tenured faculty from the social sciences, acknowledges the interconnectedness of the public and private good perspectives (Pasque, 2010, p 33). Scholars writing in this vein focus more on the need to blend the two perspectives in order to ensure continuity of service and maintain comparative advantage against other countries. In addition, supporters speak with a voice of advocacy, believing that colleges and universities leaders need to initiate change to address educational inequity across race, gender, and class within and outside of higher education.

Looking to the scholarship related to student affairs professional practice, Pope et al.'s (2019) updated discussion of multicultural competencies most closely reflects the

fourth category in Pasque's typology. According to Pope et al. (2019), multicultural competence is "the awareness, knowledge, and skills needed to work with others who are culturally different from one's self" (p. 37). Multicultural competence is a part of Pope et al.'s (2019) revised dynamic model of student affairs competence that includes: theory and translation; administration and leadership; helping, supporting, and advising; assessment, evaluation, and research; ethics, law, and policy; teaching and training; technology; and multicultural competence, social justice, and inclusion (p. 33). The understanding of multicultural competencies evolved from social justice and the idea of transforming college campuses, systemic and systematic changes, into campuses that are inclusive, equitable, and just.

There are several domains in multicultural competencies that student affairs professionals need to know and apply in their day-to-day activities. These domains are multicultural awareness, multicultural knowledge, multicultural skills, and multicultural action (Pope et al., 2019, p. 39). Multicultural awareness is the values, attitudes, dispositions, and assumptions shaped by our own culture, upbringing, family and friends that can influence our identity, worldview, and how we interact and relate to others (Pope et al., 2019, p. 40). Multicultural knowledge involves knowledge of important cultural constructs, information needed to create welcoming, affirming, and transformed campus environments, knowledge of culturally inclusive programs, practices and services, and information about various cultural groups along with effective and respectful interaction with people from a wide range of cultures and backgrounds (Pope et al., 2019, p. 41). Multicultural skills are behaviors that allow us to apply appropriately multicultural and social justice awareness and knowledge in our daily interactions and interventions (Pope

et al., 2019, p. 43). Multicultural action is about putting the awareness, knowledge, and skills that student affairs professionals possess into work in concrete, active, direct, and immediate ways (Pope et al., 2019, p. 44).

Pope et al.'s (2019) multicultural competence is necessary in advocacy-oriented blending of private and public good in higher education. The goal of multicultural competence, to create more welcoming, affirming, inclusive, just, and equitable campuses for all students, agrees with Pasque's (2010) assertion that justice and equity across race, gender, nationality, and class is the hallmark of the interconnected and advocacy frame. This culture of inclusiveness will in turn produce well-rounded citizens who can contribute to a diverse democracy and address social problems and issues, in addition to sustainable knowledge creation that contribute to the economics of higher education.

The intersection of higher education, funding, social justice, and goals of higher education is critical to the continuity of service and competitiveness of higher education institutions. When one or more of the components evolve, institutions have to adapt to the new reality or lose their advantages. As presented in this section, the nature of funding and understanding of education as a good has evolved. While the core purposes of higher education are still intact, literature suggests that higher education institutions have evolved into business-like entities.

Enterprising Higher Education

Federal and state funding continues to decline while public officials and other stakeholders push for greater accountability from higher education institutions for the public funds they receive (Jackson & Saenz, 2021; Mitchell et al., 2019; Umbricht, et al.,

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2017; Zumeta, 2018). In most instances, the funding that is available to institutions is tied to institutional outcomes set by policy makers such as retentions and graduation rates, faculty productivity, and job placements, and, critics and pundits warn, unfairly benefits high-resource institutions (Hagood, 2019). With the significant reduction of funding, from both the federal and state government, and an uneven playing field, institutions have had to find new sources of funding and – in response – have commercialized parts of their institutions.

The rise of government policies favoring free-market capitalism, put into place by legislators who lean toward higher education as a private good (Pasque, 2010), paved the way for policies and laws that further commercialized higher education (Harvey, 2007; Olssen & Peters, 2005). Self-interested individuals, commitment to laissez-faire, or free market, economics, and policies favoring free trade, in both state and federal government, define this new idea of liberalism, known also as pro-market liberalism. Critics refer to these policies under the heading of "neoliberalism" (Giroux, 2014; Olssen & Peters, 2005). Cutting funding for higher education, deregulating businesses closely tied to higher education such as student loan lenders, and creating a market for knowledge that enables private entities to tap into higher education resources are just some examples of policies that lawmakers have put in place and thereby support free-market capitalism in higher education (Olssen & Peters, 2005; Slaughter & Rhoades, 2004). These changes resulted in more entrepreneurial higher education institutions whose administrators are willing to adopt business practices in order to survive in the new competitive market.

Prior to this idea of self-sustaining institutions, both the federal and state governments significantly supported higher education in the US. This support from

federal and state governments to help higher education goals, such as producing citizens

that can positively affect society, can be categorized as the support for higher education

as a public good according to Pasque's (2010) typology. The US state legislatures and

federal government helped shape US higher education through policies and laws, such as

Morrill Acts of 1862 and 1890, which established and funded land-grant universities. One

policy that changed the higher education landscape enormously is the Servicemen's

Readjustment Act of 1944, known as G.I. Bill, which made it possible for average

Americans to attend college and universities because of funding made available by the

federal government (Cohen & Kisker, 2010, p. 195; Stanley, 2003). States appropriation,

in the form of grants and loans, went up from $150 million in 1940 to $12.2 billion in

1975 and federal appropriation went up from less than $40 million in 1940 to $5.5 billion

in 1975, with contributions changed from support for research and facilities to aid for

students (Cohen & Kisker, 2010, p. 267).

The aforementioned trend of increasing appropriations to higher education,

however, ended during President Ronald Reagan's administration. Within his first year in

office, Reagan employed block grant mechanisms in order to provide more state

autonomy in exchange for less federal financial assistance to the states in order to fund

state education programs (Verstegen, 1990). Furthermore, Reagan fashioned a federalism

swap that provided the states assistance with less regulation and more accountability in

exchange for the federal government to assume costs for Medicaid (Verstegen, 1990). By

the end of the Reagan administration in 1988, federal appropriations for higher education

had risen only 7.3% compared to the $14.7 billion appropriation in 1980, adjusted for

inflation (Verstegen, 1990, p. 368). The annual cut to higher education budget,

continually reducing construction funds for state campuses, and insistence on moving away from federal grants to student loans were backed by the members of the U.S. congress (Verstegen, 1990; Clabaugh, 2004). They in turn passed resolutions that changed how higher education institutions fund themselves. With federal funding for education reduced from 12% to 6% of the overall federal budget, institutions then had to rely more on state appropriations and other sources of funding.

Tandberg (2010) analyzed 19 years of economic and demographic data from 50 states to find the relationship between state supports for higher education, political influences, and state-level interest groups. The findings show that higher education involvement in the state political and budgetary process may be beneficial to offset the negative impacts that other interest groups have on state appropriations for higher education. The effort to understand relationships between variables related to higher education funding has also been done in a different manner. In their effort to find the relationship between variables such as state aid appropriations, state appropriations for public colleges and universities, and tuition levels for public higher education, Hossler (1997) analyzed economic and demographic data from states and interviewed policymakers. The study findings suggest that the relationship between the aforementioned variables is weak and most states are not enacting legislations that coordinate public tuition and state aid policies.

In their exploration of economic data, Hossler (1997), and later Tandberg (2010) noted a trend: state appropriation for higher education began to decline starting fiscal year 1978-1979; dramatic decline of state appropriations started around 1988, and carried over into 1990s, worsened by the increasing state budget shortfall that forced states to

reduce funding to many other programs. State appropriations for higher education have been in a declining trend in the last four decades due to politics/political interest groups significantly affected decisions about how to balance state budgets in the face of declining tax revenue and court-mandated increases to K-12 education in some states (Klein, 2015; Tandberg, 2010). Political decisions and public support for decreasing funding to higher education further supported framing higher education as private good, conveying benefits primarily to the degree-earner (Giroux, 2014; Marginson, 2011; Pasque, 2010). The continuing reduction of higher education funding is also in line with the assessment that colleges and universities are raising tuition to offset the decreased state funding (Klein, 2015; Zemsky at al., 2005).

Policy makers continuing support of free-market capitalism is reflected in policies and laws produced at both the federal and the state levels. In addition, supporters of higher education as a private good argue that the changes in economy and society that demanded new approaches for providing higher education to the people. These individuals continue the scrutiny on higher education appropriations and urge the institutions to pay for their own expenses. Rhoades and Slaughter (1997), in their discussion on the concept of academic capitalism, describe a new reality in higher education where institutions have become more business-like compared to the previous iterations and would continue to operate according to corporate values more than the public good. Considering the aforementioned fact, institutions have to be ready for the new push for accountability and a new type of leadership resulting from the new push for accountability.

Accountability and Changes in Leadership

In addition to having appropriations to higher education reduced, higher education institutions have to experience new pressure to justify funding received from federal and state governments (Hagood, 2019; Mitchell et al., 2019; Umbricht, et al., 2017). The push by stakeholders to be more bureaucratic in approaching accountability, tying appropriations with performance, was accepted by higher education institutions and resulted in an accountability culture within these institutions (Burke, 2005, p. 216-219). Retention and student progression are some institutional student outcomes set by policy makers in order to assess a higher education institution performance (Hagood, 2019).

The aforementioned push for a more bureaucratic approach in accountability by stakeholders resulted in the rise of audit culture. Tuchman (2009) proposes that faculty senates and academic departments losing control of key university functions to staff offices means that administrators have a more prominent influence over matters, such as curriculum and promotions, and can implement quantifiable measures to evaluate performance that is in line with the expectations from the federal and state governments. The rise of audit culture then changed the way institutions assess student, faculty, and research performance in order to justify appropriations by federal and state governments for hiring new faculty members and purchasing new software (Baert & Shipman, 2005; Craig et al., 2014; Dill, 1999; Parker, 2013). Mimicking the business sector practice of justifying investment, in technology for example, by assessing labor and administrative productivity (Rai et al., 1997), institutional outcomes set by policy makers used to assess institutional performance is another step taken by higher education in becoming more

business-like (Rhoades & Slaughter, 1997). This push for more accountability then gave way to the next evolution in US higher education institutions, change in leadership.

As higher education institutions are becoming more business-like, the type of leadership in these institutions is also changing. Since the mid-1960s, governance of an institution of higher education required joint effort among the governing board, the president, and the faculty (AAUP, 1966). This idea of shared governance separated higher education institutions from any other institution and made both leadership and group dynamics complex. Burns (1978) suggested that executive leaders in a bureaucratic organization, such as business entities where decisions mainly come from the top, have to juggle different facets of transactional leadership and always bear in mind the cost involved in the exercise of effective leadership (p. 374). In a sense, the finite resources forced the leaders to think about the bottom line. Indeed, capitalism made its way to US higher education and influenced the type of leadership expected by the stakeholders (Slaughter & Rhoades, 2004; Tuchman, 2009).

Scholars and higher education journalists identified a number of trends threatening share governance: shifting faculty demographics from primarily tenure-track to contingent or part-time appointments (Jacoby, 2006; Kezar & Sam, 2010; Schuster & Finkelman, 2006), decreasing state appropriations for higher education (Mitchell et al., 2019; Oliff, et al., 2013), changing demographics of college students (Anderson, 2003; Keller, 2001), increasing competition in the higher education marketplace (Hanna, 1998; Goldman, et al., 2004; Zemsky, et al., 2005), and growing pressure for accountability (Alexander, 2000; Burke, 2005; Tuchman, 2009). Birnbaum (1988) recognized the pattern and suggested a new approach to university governance, the cybernetic model,

which he argued could handle challenges posed by business practices in higher education institutions without abandoning the principles of shared governance. AGB leadership eventually responded to these trends by advocating for a rethinking of institutional governance (AGB, 2010); specifically, the association pushed for more direct decision-making processes, such as those common in the business sector. Not everyone agreed with the leadership changes that shifted more power to the administration. Faculty on individual campuses, professional organizations such as AAUP, and scholars criticized the trend toward the "corporatization of higher education" (Slaughter & Rhoads, 2004; Washburn, 2003), for its departure from the traditional shared governance model (AGB, 2011). In the same spirit as Birnbaum's earlier work, Kezar (2013) proposed a multi-aspect change framework maximizing the impact of grassroots change agents to initiate changes from all parts of the organization.

An array of forces, including government policies, pressure from stakeholders, and the updated understanding of the economy have helped shape US higher education over the last four decades. The latter has undeniably influenced the shift within US HEI toward more business-like practices. Becoming more business-like means that the type of leadership will also have to change, along with the way institutions handle resources. The push to become more entrepreneurial, new reality of competing for limited resources, and increasing pressure on accountability have created a complex affair of today's higher education. Institutions have to turn to tools and practices that business entities are using in order to survive this new reality.

Adoption of Business Tools and Practices in Higher Education

The previous section discussed the shift toward entrepreneurial behavior within US higher education institutions. As they become more entrepreneurial, college and university leaders have had to adopt tools typically associated with the business sector in order to adapt to new challenges and innovations. Computers, presentation software, and email are some examples of business tools that higher education institutions have adopted in the past (Association of South East Asian Nation, 2012; Butler & Sellbom, 2002). In addition to the aforementioned business tools, higher education institutions have also adopted different business practices such as marketing, outsourcing, knowledge management systems, enterprise resource planning software, and more relevant to the focus of the study, data analytics.

Marketing

The development of services and the promotional activities, known in the business world as marketing, has been present in the US higher education for a considerable amount of time (Litten, 1980). Marketing itself has existed since the 10th century and has since progressed into its own field of study (Hollander et al. 2005; Shaw & Jones, 2005). In its evolution, marketing managed to be adopted into different fields, including higher education. Research in the usage of marketing in higher education increased in the 1970s as the idea of education as a commodity began to take shape (Blackburn, 1979; Fram, 1973; Goldgehn, 1982), and institutions turned to the business world in order to find solutions for their problems, mainly to attract resources and students.

Marketing in higher education evolves as the nature and the problems that institutions face also evolve. While Goldgehn's (1989) found that target marketing and marketing segmentation were the norm for HEI marketing effort, Newman (2002) findings suggest that advertising, marketing planning, marketing research, and marketing audits replaced the aforementioned marketing effort as the standard for HEI. The rise of social media, a new category of online interactive application based on user-generated contents, has also influenced the development of marketing in higher education as institutions are racing to use this new platform to spread their messages and attract new resources and students (Clark et al. 2017; Constantinides & Zinck Stagno, 2011). While marketing is essential in order to advertise products and services, for most organizations it is not a core business area. HEI has utilized outsourcing, a business practice involving the offloading of non-core business areas in order to focus on core competencies, to maximize resources and offer quality education and research.

Outsourcing

Outsourcing is the purchase of a good or service that was previously provided internally in order to emphasize the company's core competencies, which allows managers to leverage their firm's skills and resources for increased competitiveness (Lacity & Hirschheim, 1993; Quinn & Hilmer, 1994). Developing few well-selected core competencies, focusing investment and management attention on them, and strategically outsourcing many other activities that are not crucial are outsourcing strategies that companies choose to follow in order to succeed and not incur penalty for improper use of outsourcing (Bettis et al. 1992; Quinn & Hilmer, 1994).

Outsourcing is not something new in higher education, and it is currently ubiquitous in many campuses, as outside vendors have taken over many services in the 90s when enrollments were down and cost-cutting measures were taken, including food service, bookstore, endowment funds, legal service, and housekeeping/janitorial (Phipps & Merisotis, 2005; Wood, 2000). Outsourcing is also prevalent in college athletics, as athletic departments prefer to outsource their marketing campaigns to third-party advertising companies so that they can focus on their core competencies (Burden & Li, 2003; Lee & Walsh, 2011). Higher education institutions also have to take precaution when outsourcing services, especially those that are tied closely to core competencies such as classroom instruction, because of the sensitive nature of the topic that can damage the institution from forces inside and outside of the institution (Allen et al. 2002; Bartem & Manning, 2001; Schibik & Harrington, 2004).

Knowledge Management Systems

The knowledge management system (KMS) is a class of information systems applied to managing organizational knowledge by creating, storing/retrieving, transferring, and applying the knowledge that (Alavi & Leidner, 2001; Codd, 1989). KMS, enabled by relational database that came into prominence in the 1980s, can process tacit knowledge, knowledge learned from actions and experience, and explicit knowledge, generalized knowledge in the institution learned through any learning method. While KMS was initially used by business entities for many different objectives, such as capturing lesson learned, leveraging knowledge of entire firm, improving sales, and reducing cost, the rise of knowledge economy in higher education sector in the 1980s

makes KMS a perfect fit for higher education institutions (Davenport et al. 1998; Earl, 2001; Powell & Snellman, 2004).

In addition to managing the knowledge produced by the institution, KMS evolved and can also contribute to the curriculum development process, student and alumni services, administrative services, strategic planning, and knowledge transfer among human assets that can increase the competitiveness of the institution in competing for limited resources (Brewer & Brewer, 2010; Kidwell et al. 2000). KMS was designed to store and propagate knowledge pertaining jobs within the institution. It was not designed to store, process, and transfer critical data, related to institution's core business activities, among entities in an institution. This need for a centralized system to handle large amounts of data paved the way to a system known now as enterprise resource planning software.

Enterprise Resource Planning

The Gartner Group coined the term enterprise resource planning (ERP) in the early 1990s to describe enterprise systems which integrate business processes including manufacturing, distribution, accounting, financial, human resource management, and project management. ERP system then added more modules, such as advanced planning and scheduling, customer relationship manager, and supply chain management, to satisfy the demand from businesses that are continuing to digitize their business processes, which then created the extended ERP (Rashid et al. 2002).

As an important part of modern organizations since the 1990's, ERP systems are designed to provide organizations with seamless integration of processes across the functional areas that will in turn help to achieve operating efficiency (Davenport, 1998;

Law & Ngai, 2007; Mabert et al. 2003). Despite the benefits of using such a system, implementing an ERP software can be a challenging, time consuming, and expensive project for any organization (Akkermans & Van Helden, 2002; Davenport, 1998).

Between 1950s and 1980s, US higher education institutions utilized custom software from a few niche vendors to manage their organization and enable them to pay bills, schedule classes, administer financial aid, and pay employees (Kvavik et al., 2002). The shift from flat file database to relational database in the 1980s enabled software developers to expand the abilities of integration software and enticed US higher education institutions to replace the legacy custom software that are not supported anymore with new ERP systems (Alavi & Leidner, 2001; Codd, 1989; Kvavik et al., 2002). These new ERP systems enable institutions to better integrate departments, create reports, and help ensure institutions to meet regulations and accountability. This adoption by the higher education institutions created a unique solution of ERP solution, influenced by the old custom software. The new model offers new ERP functionalities to suit higher education needs. Some of the modules unique to higher education are student, course, and financial aid (Pollock & Cornford, 2004).

As argued in the previous section, more entrepreneurial higher education institutions are willing to adopt business practices in order to survive in the new competitive market. Indeed, adopting business tools and practices is not new for US higher education. Marketing, outsourcing, KMS, and Enterprise Resource Planning software are some business practices that have made their way into US-based higher education institutions. Enterprise resource planning software is especially crucial in competing with other institutions and producing reports required for accountability. As

asserted before, ERP was designed to store, process, and transfer data among entities within the institution. This system enabled institutions to store an enormous amount of data, even data that were collected before the implementation of an ERP system. This data is then mined, dissected, and transformed into knowledge that can be used to make decisions by a process called data analytics.

Data Analysis and Data Analytics

Data analysis is the process of collecting and processing extracted data and converting them into a form pertinent for a presentation to the user, which in turn can help make decisions more scientific and help businesses operate more effectively (Baars & Kemper, 2008; Xia & Gong, 2014). Data analysis itself is not something new in the scholarly and business world. In 1962, Tukey (1962) highlighted the importance of data analysis in the future and laid the foundation for analyzing complex data, even before the creation and wide adoption of personal computer and statistics software. By converting data, raw facts or characteristics of an event or object, to a useful information, institutions can then accumulate knowledge to be used by individuals inside and outside of the institution (Baltzan & Phillips, 2015). Knowledge itself includes "skills, experience, and expertise, coupled with information and intelligence, that creates a person's intellectual resources" (Baltzan & Phillips, 2015, p. 11).

Processing data and presenting the new acquired knowledge in a manner that is easy to grasp by individuals in an institution, often in a visually appealing format, are what data analysis can offer to institutions. The nature of the knowledge is one that is related to the past or present time. The logical progression of data analysis is then to produce knowledge related to the future that institutions could use to predict future events

and objects. This need for knowledge that can help make executive decisions regarding future events and objects then created a subset of data analysis, data analytics.

Data analytics involves processing data using advanced analytics, collection of different tool types based on predictive analytics, data mining, statistics, artificial intelligence, and natural language processing (Russom, 2011). There is an argument to be made that data analytics that exist today is an evolution of decision support system from the 1970's and business intelligence (BI) from the 1990's (Watson, 2014). Indeed, when we look at the definition of BI, applications, technologies, and processes for gathering, storing, accessing, and analyzing data to help business users make better decisions, data analytics is a close resemblance of BI. However, due to the wide usage of data analytics outside of business, this paper will use Russom's (2011) definition that encompasses different fields. Despite the inconsistencies with the history, Russom (2011) and Watson (2014) are at the opinion that large data sets are needed to better predict the future. Because data analytics require vast amounts of data in order to make accurate prediction of the future, the usage of data analytics in conjunction with an enormous amount of data is often referred to as big data analytics.

Big Data Analytics

Big data analytics can be defined as operating descriptive and/or statistical descriptive analysis techniques on big data sets, typically terabytes or petabytes of data accumulated over several years (Russom, 2011). Big data sets and data analytics teamed up to create one of the most important trends in business intelligence (BI) today. Undoubtedly, the vast potential of big data enticed other sectors and picked up the trend to transform data accumulated over the years into knowledge that can help them better

predict the future. In addition to business uses, big data analytics can also help countries with development, infrastructure, generic services, and regulations (Hilbert, 2013).

Indeed, big data analytics is crucial for business entities as uncovering knowledge that can potentially predict future trends and profits will help them to keep up with the competitions. There is a good amount of literature on the usage of big data analytics in the business sector, documenting the usefulness of these tools in business settings to increase productivity and profit. Kumar et al. (2018) used big data analytics to replace condition monitoring in optimizing maintenance schedule of machines used in manufacturing plant and improve the prediction accuracy to quantify the remaining life prediction uncertainty. Chen et al. (2015) found that organizational-level big data analytics has significant impacts on two types of supply chain value creation: asset productivity and business growth. Furthermore, technological factors (expected benefits and technological compatibility) have direct influence on big data analytics usage, while both organizational and environmental factors have indirect influence on big data analytics usage. In addition to the two previously mentioned business sector examples, big data analytics is also used to predict the stock market (Attigeri et al., 2015), optimize and monitor transportation of goods, improve chances of finding oil (Watson, 2014), and help market products to the right demographic (Mohamed & Al-Jaroodi, 2014).

Outside of the business world, efforts have been made to use big data analytics in order to predict numerous different things. Strohbach et al. (2015) proposed a framework using data collected by devices connected to the internet and big data analytics in order to predict electricity usage and automobile traffic. Alexander and Wang (2017) found that big data analytics is suitable to be used in healthcare, especially in the effort to predict

heart attack and tailoring medical treatment to the individual. In addition to the two previous examples, big data analytics has also been used to support tourism by predicting when and where tourists will travel to (Fuchs et al. 2014), help farmers by predicting weather and crops to plant (Kamilaris et al. 2017), and support police and emergency response team with crowd control by monitoring car traffic and people's movement throughout the city during a big event (Mohamed & Al-Jaroodi, 2014).

Once considered an essential tool only in the for-profit or corporate environment, big data analytics is now used globally by business and non-business entities alike. Big data analytics can be used to transform data that are considered useless into knowledge that can help institutions with many different facets, their core business product or service in particular. In addition to the examples presented in the previous paragraphs, big data analytics have also found its way to the context of the study: US higher education.

Data Analytics in Higher Education

Similar to other sectors, big data analytics helps US higher education in many different ways. The use of different data analytics techniques can be viewed as a potential groundwork for a systemic change and have a significant positive impact if it is seen and served as an instrument that can help higher education institutions seek out solutions for their most specific issues (Van Barneveld et al., 2012). Van Barneveld et al. (2012) and Daniel (2015) identified academic analytics and learning analytics as two specific areas where data mining is in use within HIED settings.

Academic Analytics. Academic analytics (AA) is the institutional level data analytics which goal to provide higher education with the data necessary to support operational and financial decision making (Van Barneveld et al., 2012). By definition,

AA is closely related to BI from the business world. AA mines, processes, and transforms available data in order to create new knowledge that in turn can help administration makes decision regarding issues related to business side of a higher education institution, such as budget plan, recruitment, retention, and human resources.

The usage of technology to aid recruitment, enrollment, and course management is not something new to higher education as institutions such as Stanford Universities and University of Pennsylvania used Hollerith (punched) cards, sequential magnetic tape files, and large mainframe computers to collect and store data (Picciano, 2012). While technology was used to just passively capture data and manipulate them for internal usage, big data analytics enable institutions to use those data and transform them into knowledge that they can actively use in activities such as recruiting students. Big data analytics makes it possible for institutions to focus recruitment effort on students who have high probability of attending their institutions based on variables such as SAT score, location, date completed the college entrance exam, cost, and availability of student loan (Goff & Shaffer, 2014). Despite the present usage of AA by US higher education institutions, literature in academic analytics, however, is sparse. Most researchers focus their effort on the next facet of big data analytics in higher education, learning analytics.

Learning Analytics. Learning analytics (LA) is the departmental/learner level data analytics which goal to help target instructional, curricular, and support resources to support the achievement of specific learning goals (Van Barneveld et al., 2012). Using student data, faculty members and data analytics practitioners can help students to learn and perform better in class by identifying potential issues. One way LA can help is by

nudging students when issues are detected, similar to a *fitbit* smartwatch that reminds users to walk every 30 to 60 minutes.

Learning analytics have several different strands, including descriptive analytics, diagnostic analytics, predictive analytics, and prescriptive analytics (Boyer & Bonnin, 2016; Cooper, 2012; Daniel, 2015). Descriptive analytics looks at historical data on students, teaching, research, policies, and other administrative processes in order to show what events happened in the past. Descriptive analytics can be used to identify patterns from samples that will then lead to report on current trends on student enrollment and graduation rates (Daniel, 2015). Diagnostic analytics examines data or content in order to explain why certain events happened. An example of diagnostic analytics is to see whether specific actions, such as extending opening hours of libraries and developing blended learning, can affect student progress (Boyer & Bonnin, 2016).

Predictive analytics aims to estimate the likelihood of an event occurring in the future by looking into trends and identifying associations on related issues. Predictive analytics can help look for students who are exhibiting behaviors that might result in dropping out of a course and help them before the point of no return (Daniel, 2015). Prescriptive analytics helps institutions make informed decisions and recommendations based on models that were constructed by analyzing past data. An example of prescriptive analytics is to suggest teacher to include a certain activity because it might help students in learning a topic (Boyer & Bonnin, 2016).

Learning analytics has evolved beyond business applications and made its way to higher education. Even though some terms were in fact carried over to higher education, there are terms that are unique to the education domain. Descriptive, diagnostic,

predictive, and prescriptive analytics may be foreign for administrators and lecturers. Terms such as early warning system and student engagement analytics are more mainstream in their usage and application in higher education.

Numerous higher education institutions in the United States have implemented and used learning analytics. Grade performance system adopted by the Northern Arizona University and course signals system utilized by Purdue University are just some examples of learning analytics that existed in the US higher education (Picciano, 2012). Colleges and universities around the United States have adopted an early warning system (EWS), a mechanism for identifying students most likely to fail academically or experiencing other issues in the college environment by analyzing student data gathered from systems such as a Learning Management Systems (LMS) and institutional survey system (Akcapınar et al., 2019; Beck & Davidson, 2001; Krumm et al., 2014). Academic advisors, administrators, and faculty members can use EWS to make just-in-time decisions (Aguilar et al. 2014), such as sending reminders and additional tutoring, in order to stop the issues that can hinder the students from escalating or prevent the issues to even take root.

Student engagement analytics reflect data from LMS in order to find the instructor's role in student engagement and how students are engaged with the instructor and each other, particularly in online courses (Chen et al., 2018; Ma et al., 2015; Strang, 2017). While it is mainly used on predominantly online LMS, student engagement analytics can also be utilized in a traditional classroom. Bidwell and Fuchs (2011) study utilized observation by experts and face tracking software that extracts eye movement of students in a classroom in order to help teachers identify student behaviors and

behavioral trends that may not be caught during classroom activities. Aslan et al. (2019) used multi-modal approach in their study to observe how students are engaged by monitoring their facial landmarks, in addition to their performance on an educational platform, and found that the technology assistance was able to significantly impact teachers' classroom practices and student engagement. The aforementioned studies show that student engagement analytics is appropriate for traditional classrooms and it can provide the instructor with both real-time and delayed support.

Compared to academic analytics, learning analytics have been studied more heavily by researchers. Selecting and analyzing literature from the year 2000 through 2017, Aldowah et al. (2019) found that the majority of researchers focused on computer-supported predictive analysis (CSPA), which consists of learning material evaluation and students' learning evaluation or assessment. Following CSPA, researchers focused on computer-supported learning analytics (CSLA), which consist of collaborative learning, social network analysis, and self-learning behavior or self-assessment. Indeed, the topic of learning analytics will continue to grow as better computing power and storage gets more accessible. Data analytics of these sorts, however, is not without its shortcomings.

Challenges of Using Big Data Analytics in Higher Education. Despite the advantages that big data analytics can bring to higher education, there are challenges in implementing and using big data analytics. Some potential challenges are getting users to accept big data analytics, cost related to purchasing and implementing a system, and systems that are not interoperable, so aggregating administrative data with classroom and online data can be challenging (Daniel, 2015; Daniel & Butson, 2013).

Ifenthaler (2017) surveyed 153 professionals in educational technology to understand the current capabilities of learning analytics, various data sources for a valid learning analytics, and the significance of insights from learning analytics from a summative, real time, and predictive perspective. Although the aforementioned study found students, facilitators, and learning designers would derive many benefits from learning analytics, US higher education institutions were lacking staff available for learning analytics projects. Specialized staff members with a strong background in learning and teaching as well as data science are in short supply, with only 25% of the institutions included in the study employing learning analytics specialists. US higher education has a real problem at hand because the shortage of qualified staff members will contribute to the lack of learning analytics system available to administrators and teachers, which can affect student's progress and institution's ability to be accountable (Ifenthaler, 2017). Fortunately, US higher education institutions are equipped to remedy the lack of qualified staff members who are proficient in learning analytics. Including data analytics in a Master in Higher Education program can potentially help future student affairs professionals in their responsibilities, both in administrative and teaching responsibilities, by equipping them with the necessary skills and knowledge to implement and utilize data analytics.

Professional Development and Educational Technology in Higher Education

Researchers have studied professionalism and the ever-evolving nature of it as the nature of occupations, which professionalism is closely tied to, are continuing to evolve (Evetts, 2013). The effort to define professionalism is tied to the effort in defining the work that professionalism is tied to. According to Freidson (1999), professional work is

"specialized work that cannot be performed mechanically because the contingencies of its tasks vary so greatly from one another that the worker must exercise considerable discretion to adapt his knowledge and skill to each circumstance in order to work successfully" (p. 119). As previously discussed, professionalism is tied closely to work and the definition might be different amongst professions. Evans (2002) reviewed literature regarding professionalism in education and defined professionalism as "an ideologically-, attitudinally-, intellectually- and epistemologically-based stance on the part of an individual, in relation to the practice of the profession to which s/he belongs, and which influences her/his professional practice" (pp. 6-7). It can be inferred from the aforementioned definition that professionals generally refer to individuals who have learned a profession, such as a teacher or researcher, and practice that profession according to the standard practice, adapting one's knowledge and skill to each circumstance in order to work successfully.

A departure from the aforementioned scholars in regards to the definition and nature of professionalism, Sullivan (2005) was at the opinion that professionalism is hard to define and can only be used as a loosely defined term. Sullivan (2005) approached professionalism from the social and civic history of professionalism, trying to make sense how modern professionalism in the United States was established, criticized, and reinvented. While it is hard to narrow down, professionals can be viewed as "historically emergent social groups who share common educational experiences and a resultant outlook on themselves and the rest of the world (Sullivan, 2005, p. 54). Professionals also share common traits such as clear standards, official licensing, professional education, formalized expertise, and jurisdiction over formalized public activity (Sullivan, 2005, pp.

36, 37). Universities became the focal point in preparing professionals as the availability of professors with critical thinking, existence of experts in different fields, and opportunity for aspiring professionals to practice entice aspiring professionals to attend these higher education institutions. These universities and professional institutions then form partnership to tackle the problems and possibilities of the society by shaping professional disciplines (Sullivan, 2005, p. 255).

Common themes existed among the definitions of professionalism offered by Freidson (1999), Evans (2002), and Sullivan (2005). All three held that professionals need to learn from the experts, both theory and practice, on how to perform the work as expected by the customer and society. Second, professionals need to have the ability to adapt to situations using their critical thinking. Finally, standard of practice that is shared amongst professionals. The extension of the last theme is an institution that license and preside over the work of these professionals. These themes exist in different professions, including student affairs.

Carpenter and Stimpson (2007) discuss in details regarding student affairs practitioners as professionals in the effort to synthesize recent thinking and writing around professionalism in student affairs and find that student affairs practitioners do qualify as professionals. Much like any other professionals, student affairs practitioners experience challenges in their professional field. These challenges are the ability to articulate theoretical and research-based reasons for their goals and actions, expectations to take account of peer review, pressure to collaborate and consult with other practitioners, and standardization so that student affairs practitioners can be held to the same standard across institutions. The aforementioned challenges, however, are

reasonable in the pursuit of competency amongst the professionals, tomorrow as well as today (Mott, 2000). Competency, viewed from a governing body, is only one side of the complex nature of professionalism. The professionals themselves engage in professional development activities in order to become a better version of themselves that can in turn affect others. One example, the vast majority of teachers believe that by becoming a better teacher means enhancing student learning outcomes (Guskey, 2002). In order for these professionals to acquire the knowledge and skills, professional development needs to be utilized.

Professional development can be defined in many different ways because there are numerous professions with their own idiosyncrasies. Certainly, different authors have tried to narrow down the definitions of professional development. For example, Winston and Creamer (1998) defined professional development as just events beyond daily work duties in order to increase staff effectiveness. Another example, Dirkx et al. (2004) were of the opinion that activities focused on new practices, techniques, and knowledge were important to mastery of skills and competencies. For the purpose of this study, professional development is defined as activities, that individuals partake in during their tenure in a particular profession or before going into a particular profession, that is designed to improve professional competence, practice, or knowledge with clear goals or standards unique to a profession, such as improvement of student learning for a teacher (Carpenter & Stimpson, 2007; Guskey, 2002; Mott, 2000).

Professional Competencies in Student Affairs

Professional development aims to improve professional competence, practice, or knowledge, in line with goals and standards set for a profession. Activities relating to

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professional development can be taken before going into a profession or during a tenure in a particular profession. This section will first discuss professional standards in student affairs developed by several different professional organizations. Then, a discussion on the standards and expectations in the usage and implementation of technology in student affairs will be discussed. The discussion on self-assessment and individual excellence in student affairs will follow after the technology standard. Next, the discussion on how knowledge is transferred and skills sought by higher education institutions will be presented. Finally, a discussion on previous studies related to new professionals and workplace readiness, focusing on methods used.

Stakeholders, such as peers, government agencies, and professional organizations, can certainly influence goals and standards in regards to their field. There are currently three professional organizations that continuously update goals and standards for professionals in student affairs. These organizations are College Student Educators International (ACPA), Student Affairs Administrators in Higher Education (NASPA), and The Council for the Advancement of Standards in Higher Education (CAS). ACPA and NASPA collaborated in 2009 to establish a common set of professional competency areas for student affairs educators (ACPA & NASPA, 2015). CAS, along with ACPA and NASPA, then proposed a document in 2010 and later adopted the competency document setting standards of knowledge and skills required for student affairs professionals. The document was then analyzed and updated in 2015 and 2019 by CAS.

The CAS (2019) competencies document presented student affairs professionals with core competencies or general standards and competencies related to each of the 46 recognized functional areas. CAS defines a functional area as a "distinct grouping of

activities, programs, and services within higher education that can be differentiated from other groups (e.g., departments) by its focus, mission, purpose, policies, practices, budget, body of literature, and professional interests and backgrounds of its practitioners" (CAS, 2019, p. 11). Programs and services are used in CAS standards to explain how a functional area is structured and what it does; thereby streamlining discussions regarding the development and refinement of programs and services offered by institutions (CAS, 2019).

Some of these functional areas include academic advising programs, career services, dining services programs, financial aid programs, international student programs and services, undergraduate admissions programs and services, and women's and gender programs and services. In addition to the individual functional areas, CAS also provides standards for Master's level preparation programs. The standard for the previously mentioned functional areas is unique as the standard is intended to guide the faculty responsible for the academic preparation of emerging higher education administrators, rather than administrators.

In general, CAS standards fulfill a three-fold purpose of fostering and enhancing student learning and development, recognizing and promoting essential standards of practice and assessment for related programmatic and student outcomes, and providing a foundation related to the development, guidance, assessment, and improvement for programs and services (CAS, 2015, p. 59). The standards and guidelines are broken further into different parts: mission, program; organization and leadership; human resources; ethics; law, policy, and governance; diversity, equity, and access; internal and external relations; financial resources; technology; facilities and management; and

assessment. Technology, an integral component in delivering programs and services to students, is a significant part of the overall standards that CAS created to further promote excellence in student affairs. CAS standards for the usage and management of technology, along with how the standards have changed in response to technological evolution, will be discussed next.

CAS and Technology in Student Affairs

The CAS general standards related to technology call for the inclusion of technology in programs and services under recognized functional areas in order to support the achievement of an institution's mission and goals (CAS, 2019). Technology and its use must also comply with policies and procedures set by the institutions and other relevant codes and laws. CAS require programs and services to use technologies to "provide updated information regarding mission, location, staffing, programs, services, and official contacts to students and other constituents in accessible formats; provide an avenue for students and other constituents to communicate sensitive information in a secure format; and enhance the delivery of programs and services for all students" (CAS, 2015).

In general, CAS breaks down technology standards into four categories: system management, user management, compliance and information security, and communication (CAS, 2019). CAS calls several considerations when using technologies, such as performing backup on a regular basis, following institutional policies, implementing a replacement plan, and incorporating accessibility. When providing student access to technology, programs and services must define clear and easy to understand policies on the use of technology, provide information regarding support

services for those needing assistance in accessing or using technology, provide instruction or training regarding the proper usage of technologies, and inform students of implications of inappropriate use of technologies. New in their 2019 publication of standards for higher education professionals, CAS included the importance of website and social media platforms in order to meet constituent's needs. In addition, there is also an emphasis on exploring different means of communication other than phone, text, and web chat. The security aspect of communication is also emphasized in order for users have the ability to communicate sensitive information in a secure format.

CAS includes technology in the professional standards for numerous functional areas such as financial aid, student leadership, and multicultural student services. However, preparation programs for student affairs professional do not have technology standards in the last three edition of CAS professional standards in higher education (CAS, 2012, 2015, 2019). The exclusion of technology in order to address the emerging and continuing trends is a curious case and one that future researchers can investigate. Despite the exclusion of technology and any recent trending application, CAS did revise standards for programs that prepare student affairs professionals, particularly in the master's level, as CAS observed emerging trends in higher education that graduate programs in the field need to be aware of and address. Some of the emerging trends that CAS observed were increased diversity among students, increased emphasis on accountability, and changing demographics of college students (CAS, 2019).

Not present in the original core competencies introduced by Pope and Reynolds (1997), technology was added into the updated core competencies (Pope et al., 2019), mirroring the addition of technology into the 2015 CAS professional competency areas.

The inclusion of technology is important as student affairs professionals use technology in their daily tasks for both administrative/resource management functions and the student development/learning functions (Pope et al., 2019, p. 239).

The technology and tools introduced to higher education may not be originally designed to solve issues such as incorporating multiculturalism in student affairs. However, it is the responsibility of student affairs professionals to look into the possibility of using such technology and tools, in addition to discovering potential biases. An example of a technology that promotes multicultural competence is Georgia State University's usage of AI to predict students who will commit but not enroll in any classes, typically first generation college students and minority students, and help them by answering questions regarding financial aid, housing deadlines, and course registration (Pope et al., 2019).

The critical nature of technology in multicultural competence prompted Pope et al. (2019) to call for multicultural actions in technology. These actions are acknowledging the intersection of technology and multicultural competency, preparing the next generation of practitioners to use technology in a way that is multiculturally sensitive, challenging decision-makers on campus to investigate the purchase and use of technological tools and applications, and challenging student affairs professionals on how to use technology to address social justice issues on campus (pp. 261-262). In addition to the aforementioned actions, Pope et al. (2019) also suggested that practitioners and researchers should rigorously research and study the power of technology with respect to social justice goals.

Most recent discussions about technology in the peer-reviewed literature are focused on students and student affairs professionals' use of social media (Eaton et al., 2021; Gebre & Taylor, 2020; Mathewson, 2019). While Gebre and Taylor (2020) and Mathewson (2019) look into how social media, particularly Facebook, can affect student mental health and involvement in the learning process, Mathewson (2019) focuses on understanding how student affairs professionals use Facebook groups. One scholarly work that deviated from the norm is Jaekel's (2020) study on using e-portfolios, used for both formative and summative assessments in graduate student affairs preparation programs through collected artifacts. The recent trend previously discussed, however, is lagging behind the general education research effort in technology. While social media was expected to be prominent in 2016-2017 academic year (Johnson et al., 2016), artificial intelligence and analytics technologies were the topics pursued by researchers in 2019-2020 academic year (Alexander et al., 2019; Brown et al., 2020). Zawacki-Richter et al. (2019) analysis of 2656 scholarly works, published between 2007 and 2018, further explained the lack of studies in artificial intelligence and analytics coming in from higher education as the findings suggested that most studies in artificial intelligence and analytics originated from computer science and other science majors.

Rokkum and Junco (2016) also highlighted the importance of knowledge and skills in technology, social media in particular, in preparing future student affairs professionals. This knowledge and skills in social media can then be used in conjunction with other technology such as geolocation, tracing user location through data, to measure different aspects of student learning such as student involvement on campus (Rokkum & Junco, 2016). Contrary to Rokkum and Junco (2016) discussion that is more focused on

social media, Pope et al (2019) presented a more broad discussion on knowledge and skills in technology for student affairs professionals. Implicit bias in digital technology, artificial intelligence, predictive analysis, digital activism, and tools available to help student affairs professionals in both administrative and student development are just some issues that Pope et al. (2019) discussed in an effort to better prepare current and future practitioners.

The CAS standards cover many functional areas, including student affairs professional preparation program. There are many elements to consider in bringing functional areas up to CAS standard. Even when a functional area is already up to CAS standards, institutions will need to invest resources in the future in order to continue to be compliant to CAS standard. Higher education and society in general will continue to evolve and CAS will update the standards to keep up with changes in technology and cover emerging trends to better prepare future student affairs professionals. In order to help institutions check for compliance and standardize a functional area, CAS suggests a self-assessment test.

Self-assessment and Individual Excellence

The CAS self-assessment process is a robust procedure that includes several steps. These steps are to "plan the self-study process; assemble and educate the self-assessment team; identify, collect, and review evidence; conduct and interpret ratings using evaluative evidence; develop an action plan; prepare a report; and close the loop" (Council for the Advancement of Standards in Higher Education, 2019). Guided by a self-assessment package that can be purchased through CAS, programs and services can

evaluate their own practices and generate reports needed to close the gap between what they currently have and CAS standards.

The standards that CAS promotes do not just stop at a program or service level. Programs and services comprise of individuals from different functional areas who have their own personal and professional principles. CAS standards also apply to individuals within these programs and services. In order to move the student affairs profession and other professionals within the higher education context to more concrete, concise, and agreed upon characteristics, CAS furnishes a document outlining individual competencies in several broad areas (CAS, 2006). Characteristics are grouped into general knowledge and skills, interactive competencies, and self-mastery. Some characteristics under general knowledge and skills include "understands and supports the broad responsibility of the institution for enhancing the collegiate experience for all students", "possesses appropriate knowledge of relevant theories, literature, and philosophies on which to base informed professional practice", "manages and influences campus environments that promote student success", "engages disparate audiences effectively", "works collaboratively", "uses technology effectively for educational and institutional purposes", and "models effective leadership" (CAS, 2006, p. 2).

Some characteristics under interactive competencies include the knowledge of the developmental effect of college on students, ability to interact effectively with a diverse range of students, effective supervision of others, ability to contribute effectively in partnerships and team efforts, and active contribution and support activities that promote campus community. Examples of the characteristics under self-mastery include committing excellence in all work, striving to maintain personal wellness, staying

professionally current by reading literature and attending conferences, maintaining work-life balance, and abiding to laws and institutional policies and promoting change to policies when current policies are not aligned with personal and professional principles.

Knowledge Transfer and Skills Sought

The previously discussed standards proposed by CAS, both for programs or services and individuals, are a great building block to provide further legitimacy to student affairs professionals as standardization can hold student affairs practitioners to the same standards across institutions (Carpenter & Stimpson, 2007). There is a lack of focus on the attainment of proposed skills and alignment of the skills needed by institutions today despite the clearly defined standards and self-assessment. While CAS states that their members have taken leadership position with different conferences, workshops, and instructional activities, there is no mention of preferred venues of knowledge attainment of proposed skills (CAS, 2015).

Graduate programs in higher education and student affairs are still the primary source of professional development for new student affairs professionals, followed by mentorship (Gayles & Kelly, 2007; Herdlein et al., 2013; Roberts, 2007). Consequently, students who completed their study at graduate programs that aligned with CAS standards did attain a broad set of competency-related learning outcomes at a higher level than students who completed their study at non-compliant programs (Young & Janosik, 2007). Professional associations, conferences, and mentorship are the primary sources for mid-managers, while senior administrators opt to utilize professional journals and books as they have less time to attend conferences and obligation to mentor others (Roberts, 2007).

Studies exploring learning outcomes and methods related to professional development and preparation programs are the most current works on these topics and have been used by other recent studies. Young and Janosik (2007) surveyed new student affairs professionals who graduated in the previous two years in order to find the difference in learning outcomes between CAS compliant and non-CAS compliant graduate preparation programs. Cooper et al. (2016) expanded on what Young and Janosik (2007) found and addressed the perceived skill deficiencies in student affairs graduate preparation programs by reviewing available literature. Finney and Horst (2019) effort to map professional standards for outcomes assessment was also built upon Young and Janosik (2007) findings. Young and Janosik (2007) study that utilized a survey to answer the research question is still discussed by newer studies in the ongoing effort to generate and add to the collective knowledge.

Based on the literature, graduate programs seem to be where student affairs professionals acquire the bulk of their skills and knowledge. While professionals in mid-level management positions can attend conferences and potentially acquire new skills, Bredeson and Scribner's (2000) findings on the ineffectiveness of conferences in transferring knowledge among educators raise a question whether student affairs professionals suffer from the same reality. In addition to conferences, practitioners can also acquire knowledge by reading journals. Managers, researchers, and practitioners in the U.S. tourism and hospitality industries who participated in Frechtling's (2004) study indicated that even though reading journals and books can indeed contribute to knowledge transfer, the amount of knowledge transferred and retained according to the respondents' individual measurement, however, varied.

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CAS standards also give insufficient attention to whether or not the skills are aligned with higher education institutions' specific needs. This results in a mismatch between what competencies that faculty and senior student affairs officers (SSAOs) are focused on with competencies necessary for effective practice in the field. While graduate programs that followed CAS standards produced individuals with higher competency in those particular areas, there is a concern whether the competencies they acquired are what institutions are looking for (Young & Janosik, 2007).

Dickerson et al. (2011) surveyed members of Student Affairs Administrators in Higher Education (NASPA) to compare and contrast graduate preparation faculty and senior student affairs officer expectations on competencies that new professionals should possess before going into their new positions. The aforementioned study found that there is a gap between competencies suggested by professional organizations (CAS, ACPA, and NASPA) and adopted by faculty, with what professionals in the field think the list of competencies should be. For example, SSAOs rated new professionals higher in their ability to interpret research while faculty rated them higher for knowledge of group dynamics and organizational structures, skill in advising, and willingness to collaborate (Dickerson et al., 2011). In addition, there is also different perception between faculty and SSAO on where the greatest gap currently exists.

Faculty who responded to Dickerson et al.'s (2011) survey were of the opinion that new professionals' knowledge of diversity-related issues and their commitment to social justice is not up to the standards where they supposed to be. SSAO on the other hand were of the opinion that new professionals' are lacking the ability to use current and future trends data as well as their ability to apply theory in practice. The deficiencies

found by Dickerson et al. are in line with Cuyjet et al.'s (2009) findings after surveying new student affairs professionals and their supervisors. The agreement between surveyed respondents is that new student affairs professionals are lacking in the knowledge and skills in finance, institutional politics, and supervision. In addition to the aforementioned discrepancies between the standards that guided faculty and competencies sought after in the field, there are additional studies that show how students in the student affairs preparation programs may not be learning what they will actually need to know to be successful on the job.

Young and Dean's (2015) findings concur with Dickerson et al. (2011), in that knowledge and skills related to conducting or interpreting research, engaging students, and managing organizations are amongst the top knowledge and skills acquired after attending a Master's level preparation program according to student affairs professionals who graduated within three to five years of the study. The study also shows that the knowledge of new technologies was amongst the lowest of knowledge and skills attained, in line with Dickerson et al. 's finding that new professionals' are lacking the ability to use current and future trends data, which are most likely associated with data analytics software and services.

Herdlein et al. (2013) took another route in their effort to find knowledge and skills sought after in student affairs professionals by reviewing available literature on student affair competencies in order to expand the understanding brought up by Lovell and Kosten (2000). The meta-analysis conducted by Herdlein et al. (2013) on 22 articles from 1996 to 2012 showed that multicultural/diversity, student development, research/assessment, legal issues, budget and finance, and ethics are the top six categories

that are particularly relevant for graduate preparation curricula and professional development according to different demographic such as managers, faculty, and senior student affairs officers.

On this point, Herdlein et al. (2013) depart from previous research. Lovell and Kosten's (2000), for example, conducted a meta-analysis reviewing 23 studies published from 1967 to 1997 in their effort to find skills, knowledge, and personal traits necessary to be a successful student affairs administrator. Their study found that graduate students, new professionals, middle managers, and senior student affairs officers responded with student development, unit responsibility, academic background, organizational development, federal policies, and student needs as the top skills, knowledge, and traits necessary to be a successful student affairs administrator. Herdlein et al. (2013) found multicultural/diversity as the most important knowledge and repositioned student development to be the second most important knowledge. Research and assessment moved into the third most important and in line with SSAOs observation (Dickerson et al., 2011) who are at the opinion that knowledge and skill related to conducting or interpreting research are important to be effective in the field. Furthermore, the absence of technology-related competency in the top six might contribute to the lack of ability to use current and future trends data that SSAO also observed among new student affairs professionals.

There is evidence, however, that faculty members involved in graduate level preparation program in student affairs are addressing the deficit in knowledge and skills related to technology. Findings from Ardoin et al.'s (2019) study that interviewed 19 SSAOs to get their perspectives on professional preparation programs concur with

findings from Dickerson et al. (2011) and Cuyjet et al. (2009), new student affairs professionals lack the knowledge and skills in budgeting and finance, navigation of institutional contexts and politics, and supervision. In addition to the deficiencies, Ardoin et al. (2019) also found that SSAOs noticed an improvement in preparing new student affairs professionals to work with assessment and technology. The improvement in knowledge and skills for both assessment and technology is welcomed as assessment, related closely to technology in deployment and analysis, continued to be an important part of student affairs. Assessment can be used for internal purposes, improvement of programs and services, and external purposes, report generation for accountability (Gansemer-Topf & Kennedy-Phillips, 2016). While there is a correlation between conducting a research and an assessment, assessment is unique because it is not generalizable and is only conducted within a specific context for a specific purpose. Schuh and Gansemer-Topf (2010) argued that the general proficiency in conducting and interpreting research possessed by student affairs professionals, confirmed by Dickerson et al. (2011) findings, does not translate to the proficiency in conducting assessment and help the need for sustainable assessment. Sustainable assessment is paramount not just to improve existing programs and services, but also to satisfy the pressure from legislators for more accountability – particularly for public funds received as discussed by Dill (1999) and Tuchman (2009).

Student affairs professional duties have expanded, true also for other professionals in higher education. In data analytics context, student affairs professionals are responsible to develop and conduct interventions and to manage early-alert system (Parnell et al., 2018). Indeed, there is a need for a new breed of student affairs

professionals who are well versed in both student affairs and data analytics. Parnell et al (2018) surveyed institutional researchers, information technology professionals, and student affairs professionals to find whether they have enough personnel to conduct student success studies and found that only one-third of institutions have sufficient staffing.

The discussion on the available literature shows that there is a discrepancy between competencies and skills pushed by professional organizations and adopted by faculty, with what is needed to be able to perform in the field according to student affairs professionals who are currently serving or has served in the student affairs field in the past. While senior student affairs professionals are looking for knowledge and skills needed in the field now, professional organizations and faculty members seem to be focusing on issues they deem to be relevant, shown by how the list of knowledge and skills has evolved. For example, faculty's concern on diversity-related issues in 2011 (Dickerson et al., 2011) became the most important knowledge in 2013. The lack in the ability to use current and future trends data raised by SSAO during the same time 2011 (Dickerson et al., 2011), on the other hand, did not make it to the top of the list of competencies.

Even though there is evidence that new student affairs professionals are getting better in utilizing assessment and technology, the small sample size of the study and lack of focus in technology cannot help researchers in making a definite assertion regarding the current state of new student affairs readiness in using technology, data analytics in particular. The discussion in the gap between knowledge and skills acquired in master's level preparation programs and expected by institutions has been brought to the latest

scholarly works available to the researcher. This study understands and acknowledges the historicity of the aforementioned assertion. However, if the assertion holds true, this discrepancy still exists today.

Exploring Professional Readiness among New Student Affairs Professionals

Extant scholarship documents a discrepancy between the standard published by CAS, which guided faculty in constructing Master's level preparation program for future student affairs professionals, with competencies needed to be able to work effectively in the field. This contrariety can indeed affect the performance of future student affairs professionals, as they may not receive the necessary skills and knowledge, defined by faculty and senior student affairs officers, related to student affairs. In addition, while there are other professional development avenues that aspiring and experienced student affairs professionals can pursue, emerging student affairs professionals attained skills and knowledge mostly from graduate preparation programs. Graduate preparation programs are especially important for new professionals, as what emerging SAPs learn in graduate school will make up the bulk of the skills and knowledge that they can use to adapt to their current and future roles in the field, at least in the early years of their career. In order to find whether preparation programs are effective, researchers have studied recent graduates and students in their last year of higher education and student affairs (HESA) program to find whether they are ready for their new workplace.

Published scholarship appearing over the last 15 years reflects the perceptions of recent graduates regarding topics including readiness to work with international students (Shelton & Yao, 2019), effectiveness of curricula (Cuyjet et al., 2009), competencies necessary for entry-level student affairs work (Waple, 2006), and experiences of new

professionals in student affairs (Renn & Hodges, 2007). Researchers have utilized different methods in their studies to explore the aforementioned focuses. Shelton and Yao (2019) interviewed new professionals, who graduated within three years from their HESA program, to discover whether they were adequately prepared and ready to work with international students. The authors' findings indicated that the new student affairs professionals perceived themselves as having low levels of readiness to work with international students, due to the limited exposure to relevant topics in their graduate preparation program.

Although CAS standards and ACPA/NASPA competencies did indeed touch upon understanding international perspectives as an important aspect in both professional standards and competency, Shelton and Yao noted that these documents did not provide adequate direction on how to develop these skills and hoped the findings can help professional organizations in updating the standards and competencies in the future. Targeting similar demographic, Cuyjet et al. (2009) surveyed 325 recent graduates, with 139 usable responses, in order to explore the perceptions of new student affairs professionals and their supervisors regarding application of competencies learned in preparation programs and found that recent graduates somewhat agreed they had received a high level of training in relevant competencies.

Waple (2006) also surveyed graduates earning a master's degree in college student personnel within the past five years and found that new professionals were not properly ready for their work in the field because of the lack of supervision of staff, strategic planning, budget and fiscal management, and use of microcomputers that are used on the job at a high degree. A phenomenological study that utilized interviews by

Taylor and Killacky (2010) explored leadership readiness perspectives of 10 participants from a higher education doctoral program and found that they considered themselves ready to lead. Five themes that emerged from the aforementioned study are communication, collaboration, leadership, relationships, and support. The aforementioned themes suggest that the participants are confident in leading their peers and value collaboration through clear and concise communication without sacrificing personal and professional ethics. Renn and Hodges (2007) interviewed individuals who graduated from their program in 2005 in order to answer the question: "How do master's level, full-time student affairs professionals experience their first year on the job?" and found that in general, recent graduates went through three phases: pre-employment, transition, and settling. In addition, recent graduates learned that they should try to find balance and be proactive to enhance their experience as new professionals. Finding balance means to spend time with family, friends, and off-campus community, while being proactive means to actively seek involvement at work and take personal responsibilities in bridging personal and professional gaps.

One common trend in the research reviewed above is the focus on newly graduated professionals. This demographic was targeted by the researchers to be in agreement with past studies and get respondents with information that has not been affected by the passage of time. The second common trend is the discordance between knowledge and skills that the students received in master's level programs and their perception of competence in doing their tasks. Attending a program that follows the standards established by professional organizations does not always translate to perceived readiness to work in the field, such as student affairs.

When researching student or professional readiness on technology, utilizing a survey or questionnaire seems to be the preferred means. Summak et al. (2010) surveyed teachers from 11 different primary schools in Turkey on their readiness to use technology in the classroom and found that the majority of the teachers do not have the skills necessary. Caison et al. (2008) surveyed nursing and medical students at Memorial University of Newfoundland regarding technology readiness in operating medical devices and found that the students were lacking the technological knowledge. In concluding their findings, Caison et al. (2008) urged health care professional schools to implement curricular changes in order to support those who need help the most, such as rural students, women, and those entering school at a non-traditional age. Lai (2008) researched the state of technology readiness of professional accounting students by surveying students who registered for the Malaysian Institute of Certified Public Accountants' advanced stage examination and found that the professional account students were neither highly techno-ready nor highly techno-resistant towards new technologies. Finally, Petko et al. (2018) studied the connection between the school readiness and teacher readiness for educational technology integration by surveying teachers from 145 primary schools and found that educational technology integration is dependent on individual teachers' readiness, which is in turn influenced by school readiness.

Student affairs professionals utilize the CAS standards, covering core competencies for each of the 46 recognized functional areas, to serve, assess, and improve programs and services offered by higher education institutions. CAS standards fulfill a three-fold purpose to foster and enhance student learning and development,

recognize and promote essential standards of practice and assessment, and provide a foundation related to all aspects of programs and services. In regards to technology, CAS incorporates technology in standards for functional areas and requires programs and services to use technologies in order to provide the most up-to-date information on the institution, departments, programs, and services, in addition to ensuring secure communication and enhancing the delivery of programs and services for all students. Despite the inclusion of technology in other functional areas, preparation programs for student affairs professional functional areas do not have technology standards in the last three editions of CAS professional standards in higher education.

Student affairs professional preparation programs in the US incorporate and abide by the CAS professional standards for student affairs. Available literature suggests that graduate preparation programs are where student affairs professionals acquire the bulk of their skills and knowledge. In addition, available literature also suggests that there is a discourse between the competencies suggested by faculty and senior student affairs officers with competencies necessary for effective practice in the field. If the aforementioned fact persists, there is a disconnect between the knowledge and skills acquired by newly graduated student affairs professionals and the needed proficiency in technology, data analytics in particular, by the senior student affairs professionals and institutions.

Criticisms of the Competency Model

As previously discussed, institutions and professional organizations in different fields have adopted the competency model to help prepare professionals perform the required tasks. Despite the upside and wide adoption, it is not without its criticisms. As

one of the earliest critics of competency and performance-based models in education, Broudy (1972) was at the opinion that basing education or training on a list of separated tasks would give learners fragmented knowledge without a sure way to bring them into a whole.

After analyzing a competence-based model in graduate medical training, Talbot (2004) also found that competency is only one side of the equation and that understanding the knowledge as a whole is important in performing the assigned tasks and seeing the broader picture. Jordan and Powell (1995), along with Von Treuer and Reynolds (2017), questioned the initial process of determining the competencies, as this can have a negative impact on the learning process afterward. Indeed, they argued that extra efforts are needed in capturing and documenting the competencies that can reflect the intricate nuances of different professions, such as psychology and special needs education, that will allows learners to understand the overarching principles that drive these competencies within professional practice as discussed by Talbot (2004).

Summary

The evolution of US higher education institutions into business-like entities changed different aspects of higher education institutions such as their view on knowledge, type of leadership, and accountability to whom and for what. These changes also forced institutions to adopt business tools in order to compete with other universities. Data analytics have helped institutions compete with their competitors by helping solve general academic issues and learning, or even classroom-related issues. Furthermore, data analytics will help institutions in satisfying changes in accountability pushed by different stakeholders such as federal government, state government, and parents.

Despite its upside, there is a lack of staff and faculty members who can implement and use data analytics. While current student affairs professionals can attend workshops and conferences as part of their professional development to acquire new skills and knowledge, this literature review has shown that student affairs professionals attain the bulk of skills and knowledge from graduate level preparation programs. The absence of technology in CAS standards for Master's level preparation programs is concerning as faculty use the aforementioned standards in building their curricula. If there is an indication that programs in higher education are not preparing their students for the work after they graduate, it is logical for them to assess their programs and update the curricula. Results from this study can certainly paint a better picture on whether the graduate programs are preparing the students to implement and use data analytics and CAS standards and competencies should be updated to reflect skills and knowledge that student affairs professional need to perform in the field. Equipping them with the necessary skills is imperative not just for the future students who are going into the workforce, but also for US higher education to remain competitive and survive in this rapidly changing higher education landscape.

CHAPTER III

METHODOLOGY

US higher education market has shifted into a unique market that take advantage of free market efficiency while keeping the benefits of public administration and financing (Hufner, 2003; Taylor et al., 2013). Institutions need to compete and justify the state funding appropriations within what is more often framed as a higher education market, in the sense that institutions compete for students who commonly understand themselves as consumers (Guilbault, 2018). In response to the shift in higher education market, institutions adopted business tools such as data analytics system in order to remain competitive. This in turn increased data analytics usage and paved the way for data analytics to be an integral part of US higher education. Despite the increase of usage, there is a concern regarding the shortage of qualified administrators who can implement and make use of the information generated by data analytics tools (Ifenthaler, 2017).

The purpose of this study is to investigate recent HESA graduates' readiness in using data analytics to help with daily tasks and implementing new data analytics systems. This chapter will discuss the research methodology selected to find whether the current and recently graduated students are ready to use and implement data analytics. The population and sample, the instrument, the procedures for data collection, and data analysis methods will be discussed in detail in this chapter.

Research Design

This quantitative survey research study aims to investigate the readiness of new student affairs professionals to use and implement data analytics in their work in the field. Responses from recently graduated student affairs professionals who are currently employed, associated with professional organizations, American College Personnel Association (ACPA) and National Association of Student Personnel Administrators (NASPA), and active online, Facebook groups and Twitter, were gathered through an online survey. Analysis of the responses followed upon the end of the data collection period.

Theoretical Perspective

This study follows the post-positivist theoretical perspective, as it is quantitative in nature. A derivative of the positivist approach, post-positivism surfaced when Werner Heisenberg theorized that it is impossible to determine both the position and momentum of a subatomic particle, and that the particle is altered in the very act of being observed, and Neils Bohr argued that classical concepts like position and momentum are incompatible with particles (Crotty, 1998, p. 29). The idea that researcher and researched objects are independent did not hold true and post-positivism expanded the epistemology. Post-positivism states that the researcher's background, knowledge, and values can influence what is observed.

This research study is conducted by an application developer with more than ten years of experience in designing, developing, and implementing software. The acquired experiences cover both standalone and web-accessible applications. The researcher has also been involved in implementing and creating jobs related to data analytics for higher

education institutions. This experience as a practitioner in the field encouraged the desire to study readiness of new student affairs professionals in using and implementing data analytics. As an objectivist, the researcher shares the value of objectivism in which there is one true meaningful reality, and it exists apart from any consciousness (Crotty, 1998, p. 8). The alignment of both the researcher's worldview and epistemology of the method, in addition to the experiences in the field, will surely enrich the inquiry process and add to the integrity and rigor of the research study.

Research Approach

This quantitative research study utilized a survey to collect the appropriate data. A survey design "provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population" (Creswell, 2014, p. 155). The versatile nature of survey research made it possible to uncover knowledge that exists amongst individuals. Survey methodology has been used effectively to extract the information related to readiness of early career student affairs professionals in their new workplace in particular. For example, Young and Dean (2015) utilized results from a survey conducted on alumni who had graduated within the previous three to five years in order to find competencies and knowledge they attained from programs that used standards recommended by the Council for the Advancement of Standards in Higher Education (CAS) in their development. Cuyjet et al. (2009) surveyed 325 recent graduates in order to get the perceptions of new student affairs professionals and their supervisors on application of competencies learned in preparation programs.

Survey-based research studies are very common in higher education today because of the relative ease and low cost of implementing surveys (Stage & Manning,

2015, p. 156). The use of survey research does, however, draw criticism. The increasing popularity of surveys has created a "survey fatigue" on the part of many potential respondents, which in turn has suppressed response rates, and resulted in the questionable quality of data in some studies (Stage & Manning, 2015, p. 156). While a survey is relatively easy to conduct and typically inexpensive to implement, there are challenges to consider when utilizing a web survey, such as survey fatigue. Nevertheless, when done correctly, web survey can be a powerful tool in conducting research in a higher education context.

Research Questions

The research questions that guided this study on the readiness of recent graduates of Master's-level higher education and student affairs preparation programs to use data analytics were:

1. Did the programs that new student affairs professionals graduated from prepare them to use data analytics and equip them with knowledge and skills in order to implement and work with data analytics?

2. How important is the knowledge and skills for data analytics at new student affairs professionals' workplace?

Hypothesis

As higher education institutions evolved and became more business-like, the use of business tools such as data analytics became more prominent. Helping undergraduate admission offices to focus on recruitment efforts and predicting which students might drop a course are just some of many important things that data analytics can do for higher education institutions (Daniel, 2015; Goff & Shaffer, 2014). Despite the rise in usage of

data analytics, experts have for at least a decade expressed concerns about the shortage of administrators qualified to use and implement data analytics in higher education, as well as a lack of efforts to include technology in preparing future student affairs professionals (Dickerson et al., 2011; Ifenthaler, 2017). In addition, CAS, an authority in student affairs professional standards, has not included technology in each of the last three editions of its standards for master's level preparation programs (CAS, 2012; CAS, 2015; CAS, 2019). This study is expected to find that even though new student affairs professionals acknowledge the importance of knowledge and skills in data analytics, they were not equipped with the necessary knowledge and skills on data analytics by the programs they graduated from and therefore are not ready to use data analytics to help with daily tasks and implement new data analytics systems in higher education settings.

Population and Sample

The population is new student affairs professionals employed by higher education institutions in the United States of America. For the purpose of this study, a student affairs professional is defined as an individual who understands the historical role of student services and possesses the required skills and knowledge to support faculty members in providing a holistic student learning and development, in addition to fulfilling their functional area-specific role (student housing, admissions office, orientation, etc) that ensures the continuity and quality of programs and services for the students according to the standards set by professional associations such as CAS (CAS, 2019; Hevel, 2016; Schuh et al., 2016). This study used several different means in inviting participants to take part in the study.

First, the researcher reached out to individuals who are members of student affairs professional organizations, National Association of Student Personnel Administrators (NASPA) and American College Personnel Association (ACPA), and were available through the organizations' listserv. Only members who had self-identified as new student affairs professionals received the invitation to participate in the study. ACPA distributed the invitation on behalf of the researcher while the researcher himself distributed the invitation to NASPA members in accordance with NASPA's policy that the organization would only provide the name and contact of its members and not distribute the invitation on behalf of the researcher. Second, this study tapped into three different student affairs Facebook groups, student affairs professionals group, future student affairs grad students group, and millennials in student affairs and higher education group, and asked the members to participate in the study, while also encouraged the members to share the invitation with individuals who might be eligible for the study. Lastly, this study reached out to new student affairs professionals through Twitter by posting an invitation tweet with a link to the questionnaire. Hashtags and mentions, such as #SAPros, #StudentAffairs, @ACPA, and @NASPAtweets, were included in the invitation tweet in order to reach new student affairs professionals who were active on Twitter and followed professional organizations such as NASPA and ACPA.

This study used a combination of convenience and snowball sampling by sending the survey to all new student affairs professionals who are involved in NASPA, ACPA, Facebook, and Twitter, and encouraged recipients to share the survey to individuals who might be relevant to the study. Guided by previous studies, only new student affairs professional who graduated in the last five years were selected for this study (Shelton &

Yao, 2019; Tull, 2006; Waple, 2006). Participants were asked to self-identify and only valid responses, completed responses by participants who are currently employed by a higher education institution, with appropriate answers to the questions asked, were used for the final analysis.

Instrument

To test the hypothesis articulated above, data regarding new student affairs professional perceived readiness to utilized data analytics were collected, using a modified version of the Ohio State Teacher Efficacy Scale (OSTES; Tschannen-Moran & Hoy, 2001) originally developed to achieve a consistent measure of self-efficacy as self-reported by K-12 teachers. The researcher acquired a written approval from one of the original author to modify and use the modified OSTES for this study.

Ohio State Teacher Efficacy Scale

Previous efforts to measure teacher efficacy resulted in many different tools, none of which could measure teacher efficacy in a satisfactory and consistent manner. In their study, Tschannen-Moran and Hoy (2001) reviewed major measures available at the time and found that they were riddled with persistent measurement problems. Using Bandura's (1997) self-efficacy scale as the base for the new instrument, the researchers developed and tested the new instrument by conducting three different studies, reviewing and refining the instrument after each one. The final version of the instrument has 24 items for the long form and 12 items for the short form covering three factors: efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement. While OSTES was created to assess overall teacher efficacy, the instrument itself is versatile and has been used to assess specific perceived efficacy.

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Modifications to OSTES for the Present Study

Other researchers, beginning with Moore-Hayes (2011), and followed by Kent

and Giles (2017), have modified the original OSTES instrument to facilitate the

collection of data related to integrating technology into the K-12 curriculum. Table 1

presents a side-by-side comparison of the two modified instruments.

Table 1

Comparison of modified OSTES survey

Moore-Hayes (2011)	Kent and Giles (2017)
How competent do you perceive yourself to select and use various media to support teaching and learning?	How competent do you perceive yourself to select and use various media to support teaching and learning?
How well prepared are you to evaluate software to support teaching and learning?	How well prepared are you to evaluate software to support teaching and learning?
To what extent can you integrate technology across the curriculum?	How capable are you of determining why, when, and how to use technology in education?
How capable are you of learning why, when, and how to use technology in education?	To what extent do you feel prepared to select and utilize assistive technologies?
To what extent do you feel prepared to select and utilize assistive technologies?	To what extent did you incorporate technology to enhance teaching and learning in the lessons you taught in your field of experience this semester?

Moore-Hayes (2011) reduced the number of items from eight to five, keeping

only items relevant to the efficacy of technology-mediated instructional strategies factor.

The updated instrument used a six-point Likert scale to measure teachers' perceived

efficacy in using and integrating technology into their teaching. In addition, Moore-

Hayes (2011) added an open-ended item to identify specific examples that the teachers

felt affected their perceptions of preparedness to integrate technology into their teaching.

Kent and Giles (2017) also modified the original OSTES instrument, focusing on the

efficacy for instructional strategies factor of the survey consisting of five items and used a six-point Likert scale to measure preservice teachers' perceived efficacy in using technology.

Both Moore-Hayes (2011) and Kent and Giles (2017) have shown that modified OSTES survey is a suitable measure of perceived efficacy in using technology, such as data analytics. Moore-Hayes (2011) found no statistically significant difference between preservice and in-service teachers' self-efficacy beliefs regarding their preparedness to integrate technology into their teaching. Kent and Giles (2017) found that 90% of the participants felt they could integrate technology across the curriculum.

Instrument Design

A modified OSTES survey was also used for this study (see Appendix A). There are four parts to the instrument used for this study, including the modified OSTES survey consisting of five items using a Likert scale. The first part of the survey is the consent form, including information regarding the purpose of the study. The second part is comprised of series of demographic questions designed to gather the characteristics of the participants. These include information regarding the institution and department where they worked and received their education. The third part is a brief introduction to data analytics and its current usage in US higher education. The modified OSTES survey constituted the final part of the revised instrument. The Likert scale consists of 1 = very inadequately, 2 = inadequately, 3 = somewhat inadequately, 4 = somewhat adequately, 5 = adequately, and 6 = very adequately, to generate new student affairs professionals' responses to their perception of readiness to use and implement data analytics. The average time to finish the survey is approximately 6 minutes.

Data Collection

Data collection proceeded following the protocol approved by the Oklahoma State

University Institutional Review Board (IRB). Data were collected through an online

survey tool. The researcher chose Qualtrics as the tool to design and administer the

survey. The ability to send an anonymous link, password protect the survey, and enable

anonymous responses are features that Qualtrics offers that are required by IRB standards

and could help mitigate errors associated with web questionnaire identified by Dillman

and Bowker (2001) (SAP SE., n.d.). In addition, Qualtrics was also accessible and

optimized for both desktop/laptop and mobile device web browsers. Considering that

more people use web browser on mobile devices than desktop/laptop, choosing a web

survey that is optimized for mobile device users is necessary (Broadband Search, n.d.).

The researcher started the data collection process by sending out requests to participate in

the study through email utilizing NASPA and ACPA listserv, an email list management

software that is commonly used by institutions, or an internal distribution list, Facebook

groups, and Twitter. Recipients were asked to encourage other colleagues to participate in

the survey and advertise the incentive. The email body consisted of an invitation letter

and link to the website where the survey was hosted. The email invitation letter,

Facebook group invitation, and twitter invitation are available in appendix B. The landing

page for the survey consisted of a description of the study and consent form. Following

IRB standards, the questionnaire was only accessible after the participants gave their

consent by selecting the "I Agree" radio button and then clicking the next button.

Because IRB required complete anonymity, the survey did not ask about any personal

information, nor recorded any internet protocol (IP) address, nor enabled the "save &
continue" feature enabled.

The inquiry process itself was divided into four parts. First, information regarding
the purpose of the study, definition of key terms, inclusion criteria, procedure, and the
potential harm it may pose. Respondents indicated their informed consent to participate
before they could proceed. Second, general demographic questions were presented. This
section covered a variety of items associated with the respondents' workplace, education,
and professional organization affiliations. Regarding the current workplace, the
participants were asked about the name of the institution, department/functional area
where they worked, and location in the university or student affairs organizational chart..
On the topic of education, the participants were asked to name of the institution and
department from which they received their master's and bachelor's degrees, and specify
whether the master's program is a student affairs professional preparation program. The
participants were also asked about their professional organization affiliations and were
requested to enter manually organizations that they were affiliated with but not present on
the provided list of professional organizations. Next, a brief introduction to data analytics
and its current usage in US higher education was introduced to the respondents. Finally,
questions regarding data analytics were presented to the respondents. One open-ended
question asked participants to identify any sources of skills/knowledge for data analytics
that may not have been included in the survey.

By the end of the online data collection period, a total of 223 responses had been
submitted by the participants. Of those submissions, 184 responses were fully completed.
Then, after a round of data cleaning, only 177 out of 184 responses were used for the

study. Out of seven responses that were excluded, four were excluded because the respondents received their master's degree more than five years before the survey was conducted and three were excluded because of an incorrect response to one or more demographic questions. ACPA and NASPA members make up the 94% of the participant group, submitting 167 of the 177 responses included in the final dataset. Facebook group users contributed 10 responses, while Twitter users did not contribute any responses.

Incentive

The increasing popularity of surveys has led to "survey fatigue" that in turn has resulted in an increase of non-response (Manning, 2015, p. 156). Some researchers have adopted an incentive approach to counter the negative effects caused by "survey fatigue." The usage of incentives is common with studies that employ a survey. Its effectiveness, however, is still debatable. While Porter and Whitcomb (2003) found that there is no significant difference in response rate between incentivized and non-incentivized groups, Gajic et al. (2012) found that the incentivized group did showed a higher rate of response for a web-based survey. Nonetheless, the 2.3% difference between incentivized and non-incentivized groups in Gajic et al.'s (2012) research is still a net positive difference. Therefore, this study utilized a high lottery and several small incentives as guided by Gajic et al. (2012). One $100 gift card and ten $10 gift cards, in the form of Amazon gift cards, were available for eligible participants who completed the survey, for the grand total of $200. After the data collection period concluded, the researcher randomly picked the winners and sent the gift cards through email.

Errors and Mitigations

In addition to survey fatigue, there are also challenges associated with using web-based technology. Similar to other types of survey, web-based surveys are also subject to sample survey errors. Groves (1989) identified four different sources of error in sample surveys: coverage error, sampling error, measurement error, and nonresponse error. First, coverage error is due to all units in a defined population not having a known nonzero probability of being included in the sample drawn to represent the population. Second, sampling error is the result of surveying a sample of the population rather than the whole population. Third, measurement error is caused by inaccurate responses because of poor question wording, poor interviewing, survey mode effects, and respondents' behavior. Finally, nonresponse error is the result of nonresponse from people in the sample that can provide different answers to the survey than those who did respond.

Recognizing the errors identified by Groves (1989), Dillman and Bowker (2001) proposed 14 principles in conducting a web survey to mitigate such errors. Regarding the design of a web survey, choosing colors for the font and background that do not affect readability, avoiding differences in the visual appearance of questions, and constructing the questionnaire so they scroll from question to question seamlessly are some of the important principles (Dillman & Bowker, 2001, pp. 66-67). Instructions are also an important part in the principles as providing specific instructions on how to respond to the questionnaire and/or skip the questions appropriately (Dillman & Bowker, 2001, pp. 66-67). Item selection and presentation are also crucial. Choosing an interesting first question can grab the respondents' attention while presenting each question in a conventional format similar to paper self-administered questionnaires can help

respondents to be comfortable with the web survey (Dillman & Bowker, 2001, pp. 66-67). Finally, providing a PIN number to limit access only to people in the sample is paramount to keeping the security and integrity of the web survey (Dillman & Bowker, 2001, pp. 66-67).

Web surveys offer more design choices compared to traditional paper-based surveys, as devices used to access web survey can display and play multimedia such as interactive forms and video files. Couper et al. (2001) conducted three experiments regarding web survey design choice and found that progress indicator, a graphical or text based indicator that informs respondents of their progress in completing the survey, did not increase percentage of completed survey. Furthermore, items separated across several screens are less correlated than items appearing together on a screen, and radio buttons yield more consistent results despite taking longer to complete when compared to blank text box. In addition to design consideration when developing a web survey, Couper et al. also highlighted the importance of having a consistent design across different equipment when accessing the survey. Choosing a server to host a web survey will need to consider that more people are browsing the internet using mobile devices today than ever before and the usage of said mobile device is varied among age groups (Fazal-e-Amin, 2015; Broadband Search, n.d.).

Reliability and Validity

An instrument demonstrates reliability when repeated usage of a given instrument yields consistent results (Creswell, 2014). This study utilized Cronbach's alpha, a single-administration test score reliability expressed as a number between 0 and 1, to test for the

reliability of the instrument (Cronbach, 1951). This test analyzed Cronbach's alpha on the responses after the end of the data collection process.

Cronbach and Meehl (1955) identified three types of validation: criterion-oriented, content, and construct validity. The first is predictive or concurrent validity, lumped together as criterion-oriented validation procedures, which focuses on the criteria that the researcher wishes to predict. Content validity is concerned with whether the test items are a sample of a universe where the researcher is interested in studying. Evaluation of construct validity reflects how well the test items measure hypothetical constructs or concepts (Cronbach & Meehl, 1955, p. 282). Construct validity has become the focal point in more recent studies as the idea of using the three above-mentioned aspects of validity is replaced with an integrated idea of validity, in that whether the scores served a useful purpose and had positive consequences in practice (Hubley & Zumbo, 1996, p. 210).

Tschannen-Moran and Hoy (2001) ensured reliability and validity throughout the development of their original OSTES survey. The final principal-axis factor analysis specifying one factor resulted in loadings ranging from 0.49 to 0.76 for the long scale and from 0.49 to 0.75 for the short form. The final test for reliability yielded 0.94 for the 24-item scale and 0.90 for the 12-item scale. OSTES was also compared to two other instruments to test for validity. Tschannen-Moran and Hoy (2001) found that the OSTES long form was positively related to Gibson and Dembo's teacher efficacy scale and Rand Corporation teacher efficacy questionnaire. As previously discussed, OSTES had also been adapted by both Moore-Hayes (2011) and Kent and Giles (2017) in their studies to measure the perceived efficacy in using technology. The previously discussed results

demonstrate that the modification and adaptation of the instrument did not negatively impact the significance of the findings. In other words, OSTES is reasonably valid and reliable. In order to test the instrument further for reliability, this study used Cronbach's alpha test after data collection ended. Guilford's (Price, 2016) formula, applying the square root of the reliability, was used to further test the instrument for validity after the completion of data collection.

Summary

A modified instrument was administered to new student affairs professional who graduated in the last five years from a master's level preparation program. The researcher used ACPA and NASPA listserv, Facebook groups, and Twitter to distribute the questionnaire and encourage recipients to propagate the questionnaire to individuals who fit the criteria. This study used descriptive statistics, t-test, one-way ANOVA, and Cronbach alpha to analyze the responses and test the reliability and validity of the instrument.

CHAPTER IV

RESULTS

The purpose of this study was to find the readiness level of new student affairs

professionals in working with data analytics, day-to-day usage and new system

implementation, and the importance of knowledge and skills in data analytics in the field.

First, participants took the online survey pertaining to their readiness in using and

implementing data analytics. Then, several statistical analyses were conducted to address

the two research questions that guided this study. The data and data analysis process,

along with the findings from the OSTES survey, will be presented in this chapter. The

results are organized here by the specific research question to which they relate.

Research Questions 1:

Did the programs that new student affairs professionals graduated from prepare

them to use data analytics and equip them with knowledge and skills in order to

implement and work with data analytics?

This question was analyzed using descriptive statistics and independent t-tests.

Participants responded to five questions pertaining to their readiness to utilize data

analytics in daily tasks and implement data analytics system in higher education setting,

particularly in student affairs. Each question used a 6-point Likert-type scale to capture

the participants' readiness level in working with data analytics. The 177 participants were

divided into two groups, graduated from a master's level higher education student affairs professional preparation program and graduated from other master's level program. Descriptive statistics was used to find the overall mean response for questions one through five. In addition to the overall mean response, descriptive statistics was also used to find the mean response for participants who graduated from a master's level higher education student affairs professional preparation program ($n=141$) and participants who graduated from other master's level programs ($n=36$), shown on table 2.

Table 2

Mean Response for Preparation Program and Non-preparation Program

Question	Overall	Preparation Program	Non-Preparation Program
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	3.94	3.91	4.03
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	3.94	3.94	3.92
To what extent can you integrate data analytics across the department?	3.64	3.67	3.53
How capable are you of determining why, when, and how to use data analytics in student affairs?	4.04	4.02	4.11
To what extent do you feel prepared to select and utilize data analytics technologies?	3.40	3.41	3.36
Total	**3.79**	**3.79**	**3.79**

The combined means of 3.79 for participants who graduated from preparation program and 3.79 for participants who graduated from non-student affairs preparation

programs put the overall perceived readiness below the somewhat adequately level. The means between the two groups are indeed close, with the group who graduated from a professional preparation program having a higher mean in evaluating data analytics tools, integrating data analytics across the department, and selecting and utilizing data analytics technologies. The non-preparation program group, on the other hand, has the higher mean in selecting and using data analytics tools to support tasks related to student affairs and selecting and utilizing data analytics technologies. Although the statistical significance was not determined, the findings from the descriptive statistics show that master's level student affairs preparation programs are on par with other programs in preparing students to work with data analytics. Furthermore, new student affairs professionals are likely not equipped with the necessary knowledge and skills in data analytics by graduate programs given that the participants reported their overall perceived readiness to be between the "somewhat adequate" and "somewhat inadequate" levels. The perceptions reported by participants in this study may explain the shortage of qualified professionals who can use and implement data analytics in higher education settings reported by Ifenthaler (2017). Further testing was then done in order to find whether the differences in the means are statistically different.

Five independent t-tests with a Bonferroni adjusted alpha level of .01 per test (.05/5) were conducted on the two groups in order to find whether the means are statistically significantly different. Comparing the means of the five questions for participants who graduated from a master's level higher preparation program and graduated from other master's level program, the independent t-tests show that there is no statistically significant difference between the two groups for all of the five questions, as

shown in table 3. The results of the t-test further drive the fact that master's level student affairs preparation programs were on par with master's programs in other academic fields in providing students with information regarding data analytics. While the low perceived readiness is a cause for concern, the fact that student affairs preparation programs are not lagging behind other programs is something that institutions and professional programs can build upon.

Table 3

T-test Results for Participants who Graduated from Preparation and Non-Preparation Program

Question	df	t stat	p (2-tail)
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	175	-.560	.576
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	175	.126	.900
To what extent can you integrate data analytics across the department?	175	.670	.503
How capable are you of determining why, when, and how to use data analytics in student affairs?	175	-.439	.661
To what extent do you feel prepared to select and utilize data analytics technologies?	175	.211	.833

This study also looked at the possibility that undergraduate program can affect a participant's perceived readiness in utilizing data analytics. Participants were asked to list their undergraduate degree program, in addition to their master's degree program. The participants were then divided into two groups based on their undergraduate degree

programs, education and social sciences (*n*=122), and business and science (*n*=55). The means for the business and science group are higher across the board when compared to the education and social sciences group, as shown in table 4. The differences, however, are not as significant when examined closely.

Table 4

Mean Response for Education and Social Sciences, and Business and Science

Question	Overall	Education and Social Sciences	Business and Science
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	3.94	3.84	4.15
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	3.94	3.83	4.18
To what extent can you integrate data analytics across the department?	3.64	3.56	3.84
How capable are you of determining why, when, and how to use data analytics in student affairs?	4.04	3.96	4.22
To what extent do you feel prepared to select and utilize data analytics technologies?	3.40	3.29	3.65
Total	**3.79**	**3.69**	**4.00**

Similar to the previous groups, five independent t-tests with a Bonferroni adjusted alpha level of .01 per test (.05/5) were conducted to find whether undergraduate academic background affected perceived readiness in using and implementing data analytics in higher education. Table 5 shows that the difference between the means for question one through five are not statistically significant among participants who have undergraduate

degrees in education and social sciences when compared to participants who have

undergraduate degrees in business and science.

Table 5

T-test Results for Participants with Education and Social Sciences, and with Business

and Science Undergraduate Degree

Question	df	t stat	p (2-tail)
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	175	-1.731	.085
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	175	-1.946	.053
To what extent can you integrate data analytics across the department?	175	-1.480	.141
How capable are you of determining why, when, and how to use data analytics in student affairs?	175	-1.463	.145
To what extent do you feel prepared to select and utilize data analytics technologies?	175	-1.792	.075

Participants in the study also indicated whether they learned about data analytics

outside of the master's level student affairs preparation program. If so, we asked the

participants to specify the source of that information. As shown in Figure 1, current

employment is the number one source outside the master's program, followed by

undergraduate courses, and previous employment. Those who acquired skills and

knowledge of data analytics through their current employment ($n=19$) listed mandatory

training ($n=15$) and supervisors or other colleagues ($n=4$) as the source.

Figure 1

How Participants Learned about Data Analytics from Sources Other than Master's

Program
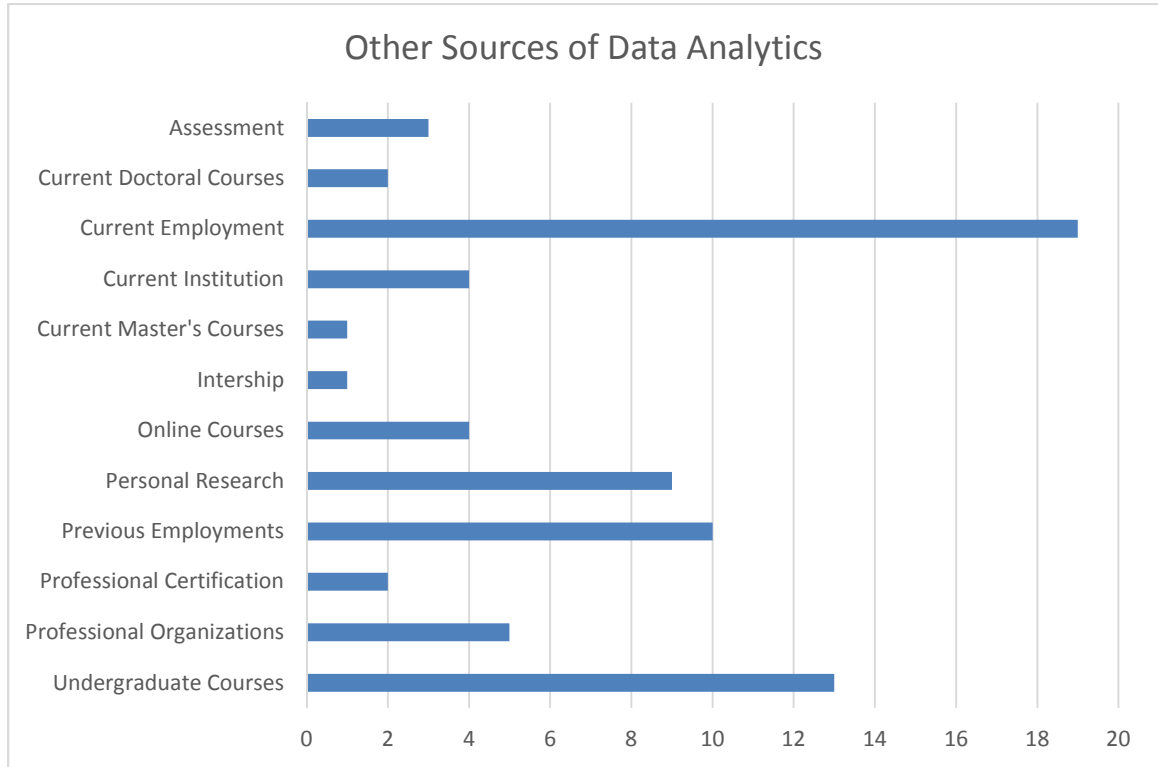
This study also used descriptive statistics in order to find whether there is a difference in the means of the five questions between those who learned about data analytics from sources outside of master's programs (N = 74) and did not learn from sources outside of master's programs (N = 103). Participants who learned data analytics from sources other than a master's program had higher means for all of the five questions than those who did not learn data analytics elsewhere, shown in table 6. Indeed, having learned data analytics from other sources makes the participants more comfortable in working with data analytics.

Table 6

Mean Response for Learned Elsewhere, and Did Not Learn Data Analytics Elsewhere

group

Question	Overall	Learned Elsewhere	Did Not Learn Data Analytics Elsewhere
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	3.94	4.04	3.86
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	3.94	4.04	3.86
To what extent can you integrate data analytics across the department?	3.64	3.81	3.52
How capable are you of determining why, when, and how to use data analytics in student affairs?	4.04	4.20	3.92
To what extent do you feel prepared to select and utilize data analytics technologies?	3.40	3.55	3.29
Total	**3.79**	**3.93**	**3.69**

Five independent t-tests with a Bonferroni adjusted alpha level of .01 per test

(.05/5) were also used to find whether the difference in means between the two groups for

all five questions is statistically significant. Shown in table 7, while participants who

learned data analytics from sources other than their master's program had higher means

than those who did not learn from other sources, the differences were not statistically

significant. While not statistically significant, participants who acquired data analytics

knowledge and skills outside of master's level preparation programs had higher overall

combined means, meaning that they are more prepared to utilize data analytics than participants who did not acquire data analytics knowledge and skills from other sources. This fact is encouraging as new professionals are getting the knowledge and skills that they need to perform their assigned tasks from other sources.

Table 7

T-test Results for Participants Who Learned Elsewhere, and Did Not Learn Data

Analytics Elsewhere

Question	df	t stat	p (2-tail)
How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?	175	1.075	.284
How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?	175	1.026	.306
To what extent can you integrate data analytics across the department?	175	1.622	.107
How capable are you of determining why, when, and how to use data analytics in students affairs?	175	1.690	.093
To what extent do you feel prepared to select and utilize data analytics technologies?	175	1.360	.176

Research Questions 2:

How important is the knowledge and skills for data analytics at new student affairs

professional workplace?

This question was analyzed using Cronbach's alpha, descriptive statistics, t-test, and analysis of variance (ANOVA). Participants were asked to respond to a question pertaining to the importance of data analytics in their workplace. The question used a 6-

point Likert-type scale to capture the participants' perception on the importance of data analytics at new student affairs professional workplace. Before data analysis was done on this particular question, a reliability test was used to find whether the question was reliable as the question was an additional item that did not exist in the original survey. The data analytics questionnaire, consisting of six questions, was found to have relatively high internal consistency (α = .874). Descriptive statistics was then used to find the overall mean response for question number six; how important is the knowledge and skills for data analytics at new student affairs professional workplace? Along with the overall mean response, for the first analysis, descriptive statistics was also used to find the mean response for participants who report to the vice president (VP) of student affairs, provost/academic affairs, and others, shown on table 8. Some functional groups or departments represented by the "Other" category included alumni associations, career advancement, diversity and inclusion, graduate admission, and success coaching.

The means for the three aforementioned groups, 4.91 for VP student affairs, 5.02 for provost/academic affairs, and 4.87 for other, are similar to each other - with VP student affairs and provost/academic affair groups higher than the overall mean of 4.9. A one-way ANOVA test was conducted to compare the means for the question regarding the importance of knowledge and skills for data analytics at new student affairs professional workplace between the VP of student affairs (n=99), provost/academic affairs (n=47), and other group (n=31). Results from one-way ANOVA indicated that the means of the three conditions were equal because the p-value is greater than .05, $F(2,174)$ = .301, p = .740, with the full results shown in Table 9.

Table 8

Descriptive Statistics Result for Student Affairs, Provost/Academic Affairs, and Other

Question	Overall	VP Student Affairs	Provost / Academic Affairs	Other
How important is the knowledge and skills for data analytics at new student affairs professional workplace?	4.9	4.91	5.02	4.87

Table 9

ANOVA Result for VP of Student Affairs, Provost/Academic Affair, and Other

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.542	2	.271	.301	.740
Within Groups	156.644	174	.900		
Total	157.186	176			

The second analysis involves the differences in means between the groups mentioned in the previous section, preparation program with non-preparation program groups, education and social sciences with business and science groups, and learned data analytics from other sources with did not learn data analytics from outer sources groups. Descriptive statistics was used to find the mean of each group. The preparation program group (N = 141) mean of 4.91 is lower than the non-preparation program group (N = 36) mean of 5.03. The education and social sciences group (N = 122) mean of 4.87 is lower than the business and science group (N = 55) mean of 5.07. Finally, the learned elsewhere

group (N = 74) mean of 5.11 is higher than the no learning data analytics group (N = 103) mean of 4.81.

T-test was also used to find whether the differences in means between the groups are statistically significant. The findings show that the difference in means between the preparation program group and non-preparation program group is not statistically significant, $p = .498$. The difference in means between the education and social sciences group and business and science group is also not statistically significant, $p = .185$. The difference in means between the learned elsewhere group and did not learn data analytics elsewhere, however, is statistically significant, $p = .035$. The full report of the findings is shown in table 10.

Table 10

Means and T-test Results for Different Groups on the Importance of Knowledge and Skills for Data Analytics at New Student Affairs Professional Workplace

Groups	Means	df	t stat	p (2-tail)
Preparation Program and Non-preparation Program	4.91 : 5.03	175	.679	.498
Education and Social Sciences, and Business and Science	4.87 : 5.07	175	-1.331	.185
Learned Elsewhere, and Did Not Learn Data Analytics Elsewhere	5.11 : 4.81	175	2.120	.035

Summary of Findings

The findings show that there is no difference in the perceived readiness to use and implement data analytics between new student affairs professionals who graduated from master's level student affairs preparation programs and other master's programs. While the difference is not significant, the descriptive statistics show that new student affairs professionals who earned their master's degree from a student affairs preparation program reported that they were more confident in evaluating data analytics tools and reports to support tasks related to student affairs, integrating data analytics across the department, and selecting and utilizing data analytics technologies. The new professionals in the non-preparation groups, on the other hand, are more confident compared to new professionals in the preparation groups in selecting and using data analytics tools to support tasks related to student affairs, and determining why, when, and how to use data analytics in student affairs.

The results from data analysis also show that participants who have an undergraduate degree in a business or science field perceived themselves more prepared in working with data analytics when compared to those who have an undergraduate degree in education or social sciences. While the overall means of the five questions for the business and science group are higher than the education and social sciences group, the difference, however, was not statistically significant. The findings also show the same trend when participants who learned data analytics from sources other than the master's program were compared to those who did not learn data analytics from other sources. While participants who learned data analytics from other sources have higher means for

all of the five questions, the differences of the means compared to those who abstained from learning from other sources are not statistically significant.

Finally, the findings indicate that the office of the provost/academic affairs deem data analytics more important when compared to the office of vice president for student affairs and other functional areas using descriptive statistics. The differences of means among the three groups, however, are not statistically significant when compared using a one-way ANOVA. The findings also show that participants who did not attend student affairs preparation program, have business or science undergraduate degrees, and learned data analytics from other sources than master's programs perceive data analytics more important in their current workplace. However, only the difference in means between those who learned data analytics from other sources than master's programs group and did not learn data analytics from other sources group is statistically significant.

CHAPTER V

CONCLUSIONS

This study aimed to examine the level of readiness that new student affairs professionals report in regards to the usage and implementation of data analytics that take place at US higher education institutions. New student affairs professionals were surveyed to measure their perceived readiness in working with data analytics. Additionally, these new professionals were also asked about the importance of data analytics in their current workplace. Several significant findings emerged from this study, including the fact that there is no difference in the perceived readiness to utilize data analytics between participants who graduated from master's level student affairs preparation programs and other master's programs. Furthermore, while participants who report to VP of student affairs, provost/academic affairs, and other leadership entities responded that knowledge and skills for data analytics are important at new student affairs professional workplaces, the means between the groups are not statistically different. This study also found that participants who actively sought data analytics knowledge and skills from sources other than a master's level preparation program perceive knowledge and skills for data analytics as more important at new student affairs professional workplaces than those who did not actively seek out this knowledge and information.

Participants who took part in this study were very diverse, representing 112 unique higher education institutions, both public and private non-profit. In addition, the participants represent 138 distinct departments. Some examples of departments represented by the 138 distinct departments are residential life, academic advising, career center, alumni association, disability office, graduate admission, diversity and inclusion, office of the dean, and financial aid and scholarship. The different venues used for recruiting participants (e.g., ACPA, NASPA, Facebook, and Twitter), added to the diversity of the participants. The survey methodology, along with descriptive statistics, t-test, and one-way ANOVA, were used in this study to capture the participants' responses and help answer the two research questions that guided this study.

Importance of Data Analytics

The findings show that data analytics is equally important for professionals in student affairs, academic affairs, and other departments in higher education institutions. The findings of this study on the importance of data analytics concur with Green's (2020) findings, in which 60% of the surveyed CIOs and senior campus IT officials deemed data analytics as a "very important" tool. While participants who report to VP of student affairs, provost/academic affairs, and other leadership entities responded that knowledge and skills for data analytics are important at new student affairs professional workplace, the means between the groups are not statistically different. There is also no difference in the new student affairs professionals' perceived importance of data analytics knowledge and skills in the workplace for these groups: graduated from master's level student affairs preparation programs and other master's programs; have undergraduate degree in education and social sciences or have undergraduate degree in business and science.

Participants who actively sought data analytics knowledge and skills from sources other than master's level preparation programs, however, perceived knowledge and skills for data analytics to be more important at new student affairs professional workplace than those who did not actively seek out this knowledge and information pertaining to data analytics. The said finding is interesting as those who actively sought data analytics knowledge and skills from sources did not perceive themselves better prepared when compared to those who did not seek out data analytics knowledge and skills elsewhere after graduating from a master's level preparation program. From the findings, it can be inferred that further professional development that the participants took did help in understanding the importance of data analytics, but not in developing knowledge and skills related to data analytics.

The findings suggest that data analytics is a business tool that is crucial to the student affairs field. Similar to the previously discussed business tools, such as marketing, knowledge management system, and enterprise resource planning that have affected the higher education field, data analytics has also influenced the student affairs field. Indeed, the skills and knowledge required by student affairs professionals have changed as higher education evolved. Lovell and Kosten's (2000) findings on the importance of student development as the top skills and knowledge that student affairs professionals should possess do not agree with Herdlein et al.'s (2013) findings that multicultural/diversity are the most important skills and knowledge needed to succeed in the field of student affairs. While student affairs may have been traditionally associated with student development, today's student affairs field has evolved and professionals in the field have to juggle several different roles. Having that knowledge of data analytics,

however, could arguably help student affairs professionals with student development. For example, predictive analytics could help look for students who are in danger of dropping out of a course, and student affairs professionals could intervene and help the students with their issues or struggles before they drop the course completely (Daniel, 2015).

New Student Affairs Professionals and Data Analytics

The findings confirm the hypothesis that new student affairs professionals are not ready to use and implement data analytics in higher education settings. This study found that even though new student affairs professionals acknowledged the importance of data analytics, they were not equipped with the necessary knowledge and skills on data analytics, even if they earned their degree from a master's level student affairs preparation program. Indeed, the participants rated data analytics as very close to the important level on a Likert scale of "very insignificant" to "very important", while their perceived readiness hovered between somewhat inadequate and somewhat adequate. Curiously, the difference in readiness between those who attended master's level student affairs level preparation program and other programs is not significant. This suggests that master's programs that specialized in higher education student affairs are not that far off in terms of preparing the students to use data analytics relative to the experience offered by master's programs in business, health, arts, and social sciences.

This study also looks at factors that may contribute to participants' preparedness in using and implementing data analytics, factors that occur before they went into and after they completed a master's level preparation program. While participants who received their undergraduate degree in business and science perceived themselves more prepared than those who received their undergraduate degree in education and social

sciences, the difference between the two groups is not significant. The same is true between participants who pursued data analytics knowledge and skills after they have received their master's degree and those who did not. While participants who pursued data analytics knowledge and skills after they have received their master's degree responded higher mean in their perceived readiness in working with data analytics, the difference between the aforementioned group and those who did not pursue data analytics after a master's degree is not significant.

The lack of new professionals with adequate knowledge and skills in data analytics supports Parnell et al.'s (2018) findings that 65% of institutions that do not use any form of early-alert systems, an example of a data analytics system, lack the resources to implement such a system, including qualified staff. As higher education institutions are becoming more business-like and depending more on business tools to complete their day-to-day tasks and activities, data analytics tools and experts who can fully utilize data analytics have not caught up to other business tools that have been discussed in this study such as marketing, outsourcing, knowledge management system, and enterprise resource planning. Indeed, this phenomenon is concerning as it could threaten the financial sustainability of higher education institutions by depriving them of the ability to compete for finite resources in a very competitive higher education market (AIR, EDUCAUSE, & NACUBO, 2019). In addition, lacking the ability to quantify the data generated in the day-to-day operation of an institution and present the data in a concise and coherent manner means not being able to satisfy accountability pushed by the stakeholders, such as the state government, to justify the investment into higher education institutions (Carey, 2007; Kezar, 2013). The findings show that student affairs professionals who did not

receive adequate training in data analytics from master's level preparation program had to close the gap by acquiring information from other sources.

Other Sources of Information

Participants reported current employment as the number one source for data analytics information outside of their master's programs, followed by undergraduate courses, and previous employment. Current employment consists of components such as mandatory training, supervisors, and colleagues. This finding is in line with Roberts (2007), in that new student affairs professionals get most of their knowledge and skills from master's level preparation program, followed by mentorship in their new workplace. Nineteen respondents learned data analytics from their current workplace. Thirteen respondents reported learning about data analytics from undergraduate courses and ten respondents stated that they learned data analytics-related knowledge from their previous workplace.

There were more respondents (n=103) who did not receive information regarding data analytics, than those (n=60) who had some kind of professional development after completing a master's program. The low number of respondents who did not get data analytics knowledge and skills outside is expected. The underutilization of professional organizations in learning about data analytics, while staggering, is not unexpected as it is in line with Roberts' (2007) findings that mid-managers utilize professional associations more than senior administrators and new professionals. Looking at the numbers, 175 of the participants are associated with one or more student affairs professional organization and only four participants learned data analytics from professional organizations; it begs

the question whether professional organizations missed the opportunity in propagating the knowledge to early career professionals.

Implications and Recommendations

New student affairs professionals are not getting the appropriate level of preparation regarding data analytics and therefore are not ready to use and implement data analytics in their daily tasks, even though data analytics has been established as an important part of the current higher education institutions. The gap between the perceived readiness to use and implement data analytics and the perceived importance of data analytics in higher education institutions calls for an immediate action. Implications for practice and research revolve around exacerbating the lack of preparation by master's level preparation programs and the lack of qualified professionals who can use data analytics in higher education to its fullest potential. Recommendations for practice and research centers on the changes to student affairs preparation programs, professional development options after completing a master's program, and revisions to new workplace orientation to better help prepare new student affairs professionals in working with data analytics.

Practice

The low level of perceived readiness, 3.79 or below the somewhat adequately level, and the high level of perceived importance, 4.9 or below the important level, shows that there is a gap between what institutions need and what the professionals can supply in terms of the ability to use and implement data analytics systems. Ifenthaler (2017) documented a shortage of administrators qualified to use these systems. Furthermore, there is a lack of focus on the usage and implementation of data analytics in master's

level preparation programs (Dickerson et al., 2011). The exclusion of technology

standards in the last three editions of the CAS professional standards for preparing higher

education and student affairs professionals (CAS, 2012, 2015, 2019) does not help the

previously discussed issue and may further exacerbate the lack of professionals who can

work with data analytics.

The findings in the present study, however, suggest that master's level student

affairs preparation programs are not that different from other master's program in

preparing their students to work with data analytics. The fact that master's level student

affairs preparation programs are at the same level of other programs is not a cause for

rejoicing. This is, nonetheless, a very good opportunity for institutions, programs, and

professional organizations to improve the way they prepare future student affairs

professionals, especially in technology and data analytics. One recommendation that this

study makes is to add technology, particularly data analytics, into the CAS professional

standard (2019) for the master's level preparation program competencies. Having data

analytics in the master's level preparation program competencies should prompt

institutions and programs to update their curriculum to include data analytics, for both

using it in their daily tasks and implementing new data analytics system. Another

recommendation that this study proposes is for faculty members to add technology,

particularly data analytics, into the curriculum in their academic programs. While it is

wise to conform to standards set by professional organizations such as CAS professional

standards (2019), scholars who are responsible in preparing new student affairs

professionals should immediately address the current gap between the importance and

demand of expertise in data analytics in US higher education and the knowledge and skills possessed by new professionals.

Participants who learned data analytics from sources other than a master's level preparation program perceived data analytics to be more important, despite not showing higher level of perceived readiness. The top three sources of data analytics according to the participants are current workplace, undergraduate courses, and previous workplace. This finding was expected as Roberts (2007) and Herdlein et al. (2013) show that new student affairs professionals get most of their knowledge and skills from master's level preparation programs, followed by mentorship in their new workplace.

The low number of professionals who developed data analytics knowledge and skills after they finished their master's program, however, is concerning. Excluding participants who learned data analytics prior to attending master's programs, there are only 60 new professionals who learned data analytics post master's program, while 103 new professionals did not. The new workplace is an important venue for new student affairs professionals to obtain knowledge and skills post master's level preparation programs. The fact that most new professionals who were surveyed did not receive any kind of training or mentorship regarding data analytics means that there is a good opportunity for institutions to remedy this shortcoming. This study recommends institutions update their new professional orientation process by including the subject of data analytics in the mentorship effort.

Professional organizations are not doing a sufficient job in propagating data analytics skills and knowledge. Only 5 of 177 participants reported that professional organizations helped them in learning about data analytics. This finding was expected

given Roberts' (2007) findings suggesting that professional associations are the primary source of information for mid-managers, but this is not so for new student affairs professionals, who go most of their knowledge from graduate programs and mentorship, and senior administrators, who utilize professional journals and books. This norm, however, should not continue, as the role of student affairs professional organizations, such as CAS, is to "promote the use of its professional standards for the development, assessment, and improvement of quality student learning, programs, and services" (CAS, 2019). The final recommendation is for professional organizations to offer professional development in data analytics, and actively encourage early career members to participate in this training.

Research

Previous studies in student affairs have not examined technology competency by itself, treating it instead as a part of overall competencies required for student affairs professionals (Cuyjet et al., 2009; Dickerson et al., 2011; Young & Dean, 2015). This study placed data analytics, a technology, in the forefront, thereby setting the research apart from previous scholarship. The findings from this study, low levels of perceived readiness in working with data analytics, concur with Dickerson et al. (2011) and Young and Dean (2015), in that technology competency is amongst the lowest of knowledge and skills attained from Master's level preparation programs. The above-discussed connection can hopefully help stakeholders in student affairs preparation programs, such as faculty members and professional organizations, better understand the overall competencies needed to succeed as a new student affairs professional.

The previous section highlighted the similarity between master's level student affairs preparation programs and master's programs in other fields in terms of preparing their graduates to incorporate data analytics in their professional practice. Indeed, the findings are mixed and show that participants who graduated from student affairs preparation programs have higher mean for questions on evaluating data analytics tools and reports to support tasks related to student affairs, integrating data analytics across the department, and selecting and utilizing data analytics technologies, compared to those who graduated from other master's programs. Future researchers can pursue explore possible explanations for no significant differences between the two groups as that question was beyond the scope of this study. This study also discussed the means through which student affairs professionals received information on data analytics after they graduated from a master's program. The different venues reported by participants can be pursued by future researchers to discover further information on the selection process and effectiveness of the different options in imparting information on data analytics. Finally, the exclusion of technology in CAS professional standards for student affairs preparation programs, along with the low number of new professionals who went to professional organizations to get information on data analytics, begs the question whether professional organizations are aware that they may have missed the opportunity to prepare qualified professionals who can utilize data analytics to the fullest. Future studies might examine the impact of the decisions made by professional organizations regarding technology, particularly data analytics, on the number of professionals who are qualified and can serve the student affairs field.

Limitations

Several limitations exist within this study. First, it is unlikely that the findings can be generalized to the entire population due to the relatively small sample size. Although the study was able to get participants from 112 unique higher education institutions and 138 distinct departments from across the United States, the total number of responses is still relatively small. Consequently, future studies should capture the perceptions of more participants in order to increase the sample size and increase the generalizability of the findings.

Second, due to the anonymous nature of the study, the researcher is not able to contact participants to clarify responses, ask additional questions, and urge them to finish the questionnaire. A total of 39 responses were excluded from data analysis because they were either incomplete or had incorrect responses. Having access to the participants can help clarify the findings and increase the number of responses, which in turn can help with the generalizability of the study.

Finally, this study recorded the participants' perceived readiness to use and implement data analytics, which may or may not be an actual reflection of their actual knowledge and skills in working with data analytics. Indeed, this is not just the limitation of the instrument used by this study, but any study that relies on self-reporting. Having a complete picture of the participants' level of readiness, by surveying their supervisor and observing their day-to-day tasks for example, would be an interesting direction for future studies.

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APPENDICES

Appendix A

How competent do you perceive yourself to select and use data analytics tools to support tasks related to student affairs?

	Very Inadequately	Inadequately	Somewhat Inadequately	Somewhat Adequately	Adequately	Very Adequately
Please select one	○	○	○	○	○	○

How well prepared are you to evaluate data analytics tools and reports to support tasks related to student affairs?

	Very Inadequately	Inadequately	Somewhat Inadequately	Somewhat Adequately	Adequately	Very Adequately
Please select one	○	○	○	○	○	○

To what extent can you integrate data analytics across the department?

	Very Inadequately	Inadequately	Somewhat Inadequately	Somewhat Adequately	Adequately	Very Adequately
Please select one	○	○	○	○	○	○

How capable are you of determining why, when, and how to use data analytics in students affairs?

	Very Inadequately	Inadequately	Somewhat Inadequately	Somewhat Adequately	Adequately	Very Adequately
Please select one	○	○	○	○	○	○

To what extent do you feel prepared to select and utilize data analytics technologies?

	Very Inadequately	Inadequately	Somewhat Inadequately	Somewhat Adequately	Adequately	Very Adequately
Please select one	○	○	○	○	○	○

How important is the knowledge and skills for data analytics at new student affairs professional workplace?

	Very Insignificant	Insignificant	Somewhat Insignificant	Somewhat Important	Important	Very Important
Please select one	○	○	○	○	○	○

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Appendix B

Email Letter of Invitation to Participate in Research

Dear participant,

We invite you to participate in a research study conducted by Jonathan Marpaung, a doctoral candidate in the Oklahoma State University Higher Education Leadership and Policy studies program. The faculty advisor for this study is Dr. Tami Moore, associate professor in Higher Education Leadership and Policies program at Oklahoma State University.

The purpose of this study is to examine new student affairs professional perceived readiness in using and implementing data analytics. You are eligible to participate in this study if you are a new student affairs professional who graduated in the last five years from a Master's level preparation program. The survey should take approximately 10 minutes and can be taken anytime between 06/14/2021 and 07/12/2021.

Participation is voluntary and you may withdraw from the study at any time. The study is completely anonymous. Eligible participants have the option to be included in the drawing to win one $100 gift card and ten $10 Amazon gift cards by providing an email address at the end of the survey. If you know anyone else who would be interested in this study, feel free to extend this invitation. The researcher can be contacted at jonathan.marpaung@okstate.edu or 405-762-0862. Please open the following link to access the survey:

https://okstateches.az1.qualtrics.com/jfe/form/SV_29bc0FBj2LiPlJj

Sincerely,

Jonathan Marpaung

Invitation to Participate in Research for Facebook Groups

Hello Everyone,

My name is Jonathan Marpaung and I am inviting you to participate in my dissertation study: Investigating New Student Affairs Professionals' Perceived Readiness to Utilize Data Analytics.

The purpose of this study is to examine new student affairs professional perceived readiness in using and implementing data analytics. You are eligible to participate in this study if you are a new student affairs professional who graduated in the last five years from a Master's level preparation program. The survey should take approximately 10 minutes and can be taken anytime between 05/20/2021 and 06/30/2021.

Participation is voluntary and you may withdraw from the study at any time. The study is completely anonymous. It does not require you to provide your name or any other identifying information. Your completion of the survey and submitting it to the researcher indicates your consent to participate in this study. Eligible participants have the option to be included in the drawing to win one $100 gift card and ten $10 Amazon gift cards by providing an email address at the end of the survey.

The researcher can be contacted at jonathan.marpaung@okstate.edu. Please open the following link to access the survey:

https://okstateches.az1.qualtrics.com/jfe/form/SV_29bc0FBj2LiPlJj

Sincerely,

Jonathan Marpaung

Higher Education Leadership and Policy Studies Doctoral Candidate

Invitation to Participate in Research for Twitter

Are you a new student affairs professional? I'm inviting you to participate in my dissertation study on data analytics in higher ed! Chance to win one $100 or ten $10 Amazon gift cards! #SAPros #SAPro #StudentAffairs #highereducation @ACPA @NASPAtweets

https://okstateches.az1.qualtrics.com/jfe/form/SV_29bc0FBj2LiPlJj

Appendix C

IRB Approval Letter

Oklahoma State University Institutional Review Board

Date:	05/11/2021
Application Number:	IRB-21-231
Proposal Title:	An Investigation into New Student Affairs Professionals' Perceived Readiness to Utilize Data Analytics
Principal Investigator:	Jonathan Marpaung
Co-Investigator(s):	
Faculty Adviser:	Tami Moore
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which <u>continuing review is not required.</u> As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

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Appendix D

Permission to Adapt OSTES Instrument

Marpaung, Jonathan

From:	Anita Woolfolk Hoy <anitahoy@me.com>
Sent:	Tuesday, September 01, 2020 2:36 PM
To:	Marpaung, Jonathan
Subject:	Re: Permission to use and adapt survey instrument

> **CAUTION:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe

You are welcome to use the TSES in your research as you describe below. This website might be helpful to you:

http://u.osu.edu/hoy.17/research/instruments/

Best wishes in your work.

Anita

Anita Woolfolk Hoy, PhD
Professor Emerita
The Ohio State University
7655 Pebble Creek Circle, Unit 301
Naples, FL 34108
anitahoy@mac.com
415-640-2017

Ohio State Website: http://u.osu.edu/hoy.17/

Personal Website
https://anitawoolfolkhoy.com

On Sep 1, 2020, at 3:30 PM, Marpaung, Jonathan <jonathan.marpaung@okstate.edu> wrote:

Dr. Hoy,

My name is Jonathan Marpaung and I'm currently a Doctoral candidate at Oklahoma State University college of education.
For my dissertation, I'm trying to find the data analytics readiness level of new student affairs professional.
I found your study on teacher efficacy when I was working on my literature review and thought that the survey is a great match for what I'm trying to achieve.

I would like to ask your permission to use and adapt the survey from the following study:

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. Teaching and teacher education, 17(7), 783-805.

VITA

Jonathan Nahum Marpaung

Candidate for the Degree of

Doctor of Philosophy

Dissertation: INVESTIGATING NEW STUDENT AFFAIRS PROFESSIONALS'
PERCEIVED READINESS TO UTILIZE DATA ANALYTICS

Major Field: Higher Education Leadership and Policy Studies

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in your major at
Oklahoma State University, Stillwater, Oklahoma in December, 2021.

Completed the requirements for the Master of Science in your major at
Oklahoma State University, Stillwater, Oklahoma in 2007.

Completed the requirements for the Bachelor of Science in your major at
Oklahoma State University, Stillwater, Oklahoma in 2005.

Experience:

Educational Technology Coordinator - English Language Institute, Oklahoma
State University, Stillwater, Ok, Feb 2019 – Aug 2020

Application Developer - IT Software Services, Oklahoma State University,
Stillwater, Ok, Dec 2007 – Aug 2018

Professional Memberships:
- NAFSA
- ACPA
- AECT