

Degree Attainment in Online Learning Programs: A Study Using National Longitudinal Data

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ABSTRACT

The purpose of this study is to compare degree attainment rates in online and not wholly online degree programs, using longitudinal data from a national sample. Longitudinal data, collected from the National Center for Education Statistics via Beginning Postsecondary cohort 12/14, were analyzed to determine if relationships between degree attainment, course type, and degree program existed. The largest sample size available for analyzing any combination of relationships was 6,770 students. Chi-square and log-linear analyses indicated a significant interaction between course type, degree program, and degree attainment at $p < .005$. In terms of degree attainment, results indicated that online learning lends to similar student success, to learning that does not take place in a fully online environment. Additionally, in an analysis of specific program outcomes, students taking online psychology programs were more likely to finish the degree program than students not taking all online courses, $p < .000$.

KEYWORDS

Degree Attainment, Online Degree Programs, Online Learning, Student Success

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INTRODUCTION

In the last decade, postsecondary education has changed considerably. Fluctuating enrollment, driven by changes in availability and qualification requirements of federal aid (Hopkins, 2012), as well as a mindset focused on degree attainment (ACoSFA, 2012), has forced higher education institutions to develop initiatives focused on student retention and completion rates. Such initiatives have included: limiting the number of hours for the attainment of a bachelor's degree (Texas Higher Education Coordinating Board, 2014), creation of early college high school programs (Zinth, 2015; Cowan & Goldhaber, 2014), and offering online degree programs to meet students' varying needs (Stoessel, Ihme, Barbarino, Fisseler, & Sturmer, 2015). However, online courses have proved to be one of the most viable solutions for long term financial solvency (Allen & Seaman, 2014; Twigg, 2003), as well as an opportunity to maintain, or even increase, student enrollment (Allen & Seaman, 2016). Enrollment in online learning has steadily increased since 2003, with more than one-third of students enrolled in at least one online course as of 2017 (Allen & Seaman, 2017).

This demand for online learning has caused a shift in how institutions are thinking about course design, pedagogy, and practice (Salmon, 2011, 2014). Pedagogy and accountability have become more inclusive of online learning, but translating instruction delivered in a face-to-face format into an online format does not always convert accordingly (Gillett-Swan, 2017). Thus, a debate as to whether online learning is comparable to that of traditional formats has led to deeply rooted, and divided opinions between administrators and faculty (Allen & Seaman, 2014; Lederman & McKenzie, 2017). Specifically, faculty members still doubt whether online learning can match traditional courses by rigorously engaging students in content (Lederman & McKenzie, 2017). The rationale is partly supported by the notion that administrators and vendors exaggerate potential financial benefits and stress difficulty in acquiring, and coordinating, the necessary resources to implement a quality online learning program (Lederman & McKenzie, 2017). However, when pedagogic practices specific to online learning are implemented in online courses, studies have found student course completion rates (Muljana & Luo, 2019), student motivation, end-of-course grades, student engagement, and satisfaction are positively affected (Gregory & Lampley, 2016; Soffer & Nachmias, 2018).

Pedagogic effectiveness refers to a student-centric approach where teaching and learning are influenced by an educator's reflection on theory, practice, and policy implementation, resulting in positive impacts on the learners (Keengwe, Mbae & Onchwari, (2016). By studying specific pedagogic practices, research reaffirms what may be considered best practices, or practices that are considered most effective (Sener, 2015). The concern, then, is how these best practices have been naturally adopted within the educational system, including transcending geographical distance between learners and instructors. Highly varied data currently exists to affirm how online degree attainment compares to degree attainment for students in face-to-face and blended learning environments (Ice, Díaz, Swan, Burgess, Sharkey, Sherrill,

Huston, & Okimoto, 2012; Garrett, 2018). The purpose of this study was to compare degree attainment rates, as a measure of student success, in online and blended (due to the nature of the data, blended has been defined as courses that were taken face-to-face or in a combination of face-to-face and online courses) degree programs, using longitudinal data from a national sample. Such information can lead to a more holistic perspective of the overall comparison of online and face-to-face/blended learning.

The research questions included:

1. Does an association exist between degree attainment of students who took only online courses versus those who took courses in a blended learning environment?
2. Does a relationship exist between most frequently enrolled instructional programs, course type (taken completely online versus not wholly online), and degree status?

THEORETICAL FRAMEWORK

Online courses and programs of study are often used interchangeably with distance education, but the term distance education is not just limited to online learning. The definition of distance education encompasses learning between a student and teacher who do not formally meet in a classroom, but rather use technological means to implement pedagogy (Sumner, 2000). Online learning is a type of distance learning, where the primary delivery mechanism is the internet. In the last decade, online student enrollment has surged from 1.6 million to more than 6 million (Allen & Seaman, 2003; Allen & Seaman, 2017). However, the definition of online learning, in terms of instructional delivery mode, time, and flexibility have also experienced dissent among organizations (Sener, 2015). The Online Learning Consortium (OLC) has defined online courses, or programs, as having at least 80 percent of the content delivered online, and blended classroom or blended online as being a hybrid of both online and face-to-face where a significant portion is executed out of either the classroom (blended classroom) or online (blended online). Additionally, online courses can meet synchronously or asynchronously. Blackboard (2020a) defines synchronous learning as having “real-time” interaction, whereas asynchronous interactions extended over time. However, the OLC cautions students that this guideline is not consistently followed at every institution (Sener, 2015).

Inconsistencies in defining online, blended/hybrid, web-enhanced may lead to difficulty in comparing the body of literature as related to understanding factors related to student retention, progression, and degree attainment. Particularly, it remains critical that comparing online learning, face-to-face, and blended ensures the differences between modalities are acknowledged and overcome via recommended best practices in terms of institutional support, program difficulty, sense of belonging, facilitation of learning, course design, student characteristics, and certain demographic, as well as personal, variables (Muljana & Luo, 2019).

In contrast, studies have presented starkly different interpretations of how online learning compares to face-to-face learning in terms of retention and degree attainment.

For example, Ice et. al (2012) noted that retention in online courses and programs range anywhere from 5% to 87% below retention rates in face-to-face courses and programs. Additionally, Garrett (2018) compared state data regarding online enrollment and degree attainment, noting that there are significant inequalities between states- 11 of 20 states with the highest in-state online student enrollment were among the lowest in comparing Bachelor's degree attainment while the other nine were among the highest. Whereas, case studies at individual institutions have reported higher retention rates for students in exclusively online or blended courses and students who took between 40% and 60% of their courses online finished degrees earlier than students who took no online courses (Carter, 2018).

The demand to continually offer more courses, as well as degree programs, online, has become a critical strategy in higher education administrators' long-term plans (Allen & Seaman, 2016), by widening access to non-local students (Garrett, 2018) and students with varying needs (Stoessel et. al, 2015). This demand has also prompted differing attitudes toward online learning, particularly in comparison to more traditional learning environments by the faculty who are having to execute such plans (Lederman & McKenzie, 2017). The literature has shown mixed results when comparing student success with instruction delivered in online environments. Some studies have found mixed and/or negative results (Kirtman, 2009; Brown & Liedholm, 2002; Xu & Jagers, 2013). The largest contextual study indicating mixed or negative results was conducted by Xu and Jagers (2013). The study (Xu & Jagers, 2013) utilized a larger sample population, which drew data from the state level of all students enrolled in online courses taken at institutions in the state of Washington. The authors found that all students had lower persistence and earned lower marks in online courses as compared to courses taken face-to-face, but, in particular, males, younger students, African-Americans, students with lower grade point averages struggled to adapt more than others participating in the study.

However, other studies have noted significant differences in favor of online learning with regards to learning outcomes (Navarro & Shoemaker, 1999), student satisfaction, engagement (Soffer & Nachmias, 2018), and student end-of-course grades (Gregory & Lampley, 2016). Several meta-analyses comparing face-to-face instruction with online learning found no significant differences (Russell, 1999; Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, & Huang, 2004; Zhao, Lei, Yan, Lai, & Tan, 2005). Interestingly, Zhao et. al (2005) even noted that studies published after 1998 found significant differences in favor of online learning. One explanation may be "Because academic rigor pertains to the conditions that surround learning, the teachers' responsibility for planning learning experiences and supporting students as they pursue them is critical" (Schwegler, 2019). Therefore, when learning is structured to utilize best practices, instructors may transcend the type of learning environment by gauging the efficacy of techniques employed within the course.

In addition to rigor, Muljana & Luo (2019) identified that when online learning is considered an open system, by which all the systems within the learning context exert a relationship between attributes (such as the technology, professional support,

administrative policies, learner characteristics, etc.) student retention and success is positively affected. Therefore, learning should be considered the product of a quality environment and the interactions within that environment (Muljana & Luo, 2019; Roblyer, 2016).

Transactional Distance Theory

Transactional distance theory was first introduced, by Michael Moore in 1993, out of research regarding basic insights to learning autonomy and independent learning. Moore (1997) argued that transactional distance is a continuous variable due to dynamic psychological and communication behaviors between the student and instruction. (Moore, 1997) proposed three tenets- structure, dialogue, and learner autonomy- that were interrelated constructs. However, pedagogy was the most impactful on distance education, not the physical distance itself. Relationships among these variables may be briefly summarized as the quality of teaching and interactions among students, how a course is structured, and consideration of student characteristics rather than the geographical separation that may exist (Moore, 1993). Therefore, it may be argued that some transactional distance exists in any learning environment, including face-to-face, but recognizable patterns contribute to the identification of teaching-learning strategies and techniques that might be best suited to overcome separation.

Construct validity regarding the relationships between structure, dialogue, and learner autonomy has been difficult to prove, as operational definitions have continually evolved due to expanding modalities for providing distance education (Garrison, 2000; Dron 2005; Gorsky & Caspi, 2005). Gorsky and Caspi (2005) argued that the propositions of transactional distance theory have neither been supported nor validated by empirical research for two reasons. First, Moore (1993) did not define the constructs operationally, but researchers attempted to use operational definitions within the methods of the study (Gorsky & Caspi, 2005). Second, even when operational definitions were equivalent to Moore's (1993) formal definitions, various dialogue types led to different kinds of transactional distances (Gorsky & Caspi, 2005). Rather, Gorsky and Caspi (2005) deduced Moore's theory of transactional distance may be better referred to as a tautology.

Since the publication of Gorsky and Caspi's (2005) study, researchers have acknowledged the authors' critiques and have validated the theory with higher levels of construct validity using more modern definitions, specifically in regards to the instructional media used in the online environment (Huang, Chandra, DePaolo, & Simmons, 2016; Huang, Chandra, DePaolo, Cribbs, & Simmons, 2015). Huang et al (2015) agreed with Gorsky and Caspi (2005) that there is still a need for clear definitions, particularly as technology evolves, but the constructs could be operationally studied via a 7-point Likert scale derived from Moore's (1993) version of the theory. Huang et al (2015) found an inverse relationship existed between high dialogue, high structure, and high learner autonomy and lower transactional distance. Consequently, while Gorsky and Caspi's (2005) critique presents an opportunity for reconsidering

transactional distance as a theory, more current research has disproved the several key points of the argument.

Course Design

The first tenant of transactional distance theory focused on structure, defined as the objectives, strategies, and evaluation methods of an educational program and the extent to which each may accommodate, or be responsive, to a learner's individual needs (Moore, 1993). Thus, structure, or course design, is reliant on best practices for a given context of learning. Best practices may be defined as research-based benchmarks that focus on engaged and intentional design which serve learners through quality experiences within the limitations of a particular environment (Sener, 2015). Best practices for online course design can be broken into two larger constructs: the course design itself and how the instructor effectively uses the design to engage learners at a distance. For course design, overviews, introductions, objectives, assessments, materials, activities, etc., as well as learner support, the level of integrated interaction and collaboration, and assessment methods should all be accounted for (Blackboard, 2020; Quality Matters, 2018). However, QM (2018) further elaborated by including the accessibility and usability of a course, as well as how technology is integrated within the course. In online learning environments, instructors need to be more intuitive to students' needs and address those with quality course design (Rottman & Rabidoux, 2017). This intuition considers the unique barriers online students face as compared to students enrolled in face-to-face and hybrid courses. Due to the types of technologies often integrated within a course, students tend to have difficulty adapting to online learning methods (Gillett-Swan, 2017; Orlando & Attard, 2016). Specifically, online students are prone to lacking a true understanding of the online learning environment and often misperceived personal technological expertise concerning the technology necessary for the course prompting lower retention rates (Muilenberg & Berge, 2005).

Quality course design can overcome, or at least minimize these barriers. Regarding the learning environment, building a clear, consistent structure is imperative to usability, findability, student motivation, and overall student success (Rottman & Rabidoux, 2017; Simunich, Robins, & Kelly, 2015). For example, requiring students to complete a course orientation has demonstrated strong associations with course retention and future registration for subsequent courses with a program of study (Kai, Andres, Paquette, Baker, Molnar, Watkins, & Moore, 2017).

Interaction and Communication

Moore (1993) also emphasized dialogue, or communication, and the interaction of students and teachers within the learning environment. Retention and academic achievement studies on the faculty-staff communication and rapport have found that persistence and success were derivative of rewarding academic and social interactions on both a formal and informal level (Tinto, 1993; Bean, 1990). In face-to-face classes, instructors have the option to arrive early and stay after class to facilitate conversations and assist students, offering feedback and suggestions for improvement (Center for

Teaching Excellence, 2018). In online learning environments, Schutt, Allen, and Laumakis (2009) found that when instructors utilize audio, visual, and text materials, high levels of instructor immediacy may still be perceived by students.

When faculty are present in an online learning environment, accessibility, involvement, professionalism, and trustworthiness are communicated to the student and improves the instructor-student rapport (Trepal, Habersroh, Duffey, & Evans, 2007). Communication methods such as “conferencing, television broadcasting, online learning management systems, and mobile applications” (Heng, et.al, 2014, p. 2) are tools that can provide faculty with the means to ensure positive teacher-student rapport in online learning. Interestingly, students’ communication preferences lend to electronic tools, such as email and social media, over face-to-face interaction (Guo, Shen, & Li, 2018).

Regardless of the context, faculty have a responsibility to be available and responsive to students, as student satisfaction, motivation (Los, 2016; Belaja, Sai, & Lin, 2012), and academic achievement (Eccless & Wigfield, 2002; Los, 2016) have also been found to directly relate to the rapport between an instructor and student. A strong correlation exists between instructor-student interactions and engagement in a course (Dixson, 2012), leading to the prediction of whether a student will achieve academic success in completing coursework (Soffer & Cohen, 2018). “Factors impacting online social context and online communication and interactivity are: effective dialogue; well-structured interactions; ease of media tool use, and transparency in computer-mediated interactions” (Dow, 2008, p. 231). The use of these structures in an online setting provides students with the advantages of students’ ability to learn from others, structured course orientations to facilitate course work, tools to assist with course format, consistent human contact through the use of small group projects; and most importantly, faculty presence for effective communication for online course success (Dow, 2008). In turn, levels of student satisfaction with a course also predict successful completion of coursework (Herbert, 2006).

Student Characteristics and Motivation

The third tenet of transactional distance theory focused on learner autonomy (Moore, 1993). Learner autonomy was defined as the extent by which a learner must determine goals, learning experiences, and make decisions with the learning program (Moore, 1993). Moore (1993) wrote: “the greater the structure and the lower the dialogue in a programme the more autonomy the learner has to exercise” (p. 27). Student characteristics and motivation have a vast impact on learner autonomy. Studies have indicated that numerous factors can serve as predictors of student success and persistence in college, including, but not limited to: background and motivation (Wolfe, 1993; Vare, DeWalt, & Dockery, 2004); availability of faculty and support services (Tovar, 2015); greater emotional intelligence, self-awareness, self-regulation skills, self-discipline (Muilenburg & Berge 2005), a reflective learning style (Means, Toyama, Murphy, Bakia & Jones, 2010) and an internal locus of control (Berenson, Boyles & Weaver, 2008; Kerr, Rynearson, & Kerr, 2006). Students exhibiting these behaviors

were better able to take control of their learning, to develop appropriate metacognitive strategies such as planning, and to stay organized and motivated to complete coursework (Yukselturk & Bulut 2007). These skills also helped prevent online students from lacking a true understanding of the online learning environment and subsequent time management skills required to stay on task (Muilenberg & Berge, 2005).

A study by Stoessel et. al (2015) indicated how the current student profile for online learners lends to some specific characteristics. The authors found that older students, ages 50-years and above, and students who were parents had the lowest dropout rates. Additionally, older students had higher levels of intrinsic motivation towards personal development, and students who were also parents had a lower dropout risk, possibly due to having a support system for effectively dealing with the technologies often utilized in online courses. The authors also found that full-time employed students were the highest dropout risk due to balancing obligations.

Stoessel et al's (2015) study supports current information regarding student demographics and online learner profiling. According to Friedman (2017), the average student age among all online bachelor's degree students was 32-years-old, and a majority were employed at the time of enrollment. Interestingly, 95% of these new entrants, during the Fall 2015 semester were returning students who transferred in previously earned credit. The influx of returning students to postsecondary education has to do with the flexibility online courses offer with students' lifestyles, and being able to complete coursework as time permits (Kress, Thering, Lalonde, Kim & Cleeton, 2012; Stoessel et al, 2015). Therefore, in examining whether online and face-to-face programs are equivalent, this study addresses the notion that higher education adequately reflects on approaches to address all learners' needs as being vital to the typical student taking online courses.

CONCLUSION

Moore's (1997) transactional distance theory provided the first mechanism for viewing online learning environments in similar regard to those implemented in a face-to-face environment. Conceptually, Moore's theory proposed that distance is transactional and not spatial or temporal. With tenets focused on design, communication, and learner characteristics, transactional distance theory has been consistently regarded by practitioners as a practical framework for defining and understanding distance education (Jung, 2001; Garrison, 2000). Research has consistently shown that student success, in terms of degree attainment, has lent to the identification of best practices in each of these tenet areas (Kai et al, 2017; Herbert, 2006; Soffer & Cohen, 2018; Yukselturk & Bulut 2007; Stoessel et al, 2015). However, with the current state of higher education funding focused on enrollment, retention, and degree attainment (Hopkins, 2012), and not what specific best practices an institution employs, the question, then, remains as to how online learning is comparing to face-to-face or blended learning when removing specific tenet variables and focusing on a more holistic view.

METHODS

Sample

The data for this study was used from a larger data collection involving the Beginning Postsecondary Student Longitudinal Study (BPS) conducted by the National Center for Educational Statistics (NCES). NCES followed a cohort of 35,000 students enrolled in postsecondary education for the first time. The cohort in BPS 2012/2014 were students who began their postsecondary education in the 2011-2012 academic year, after completing high school between July 1, 2011 and April 30, 2012. To ensure accurate identification of first-time beginning (FTB) students, participating institutions and several administrative data sources were requested to provide data including FTB students' high school graduation date, date of birth, and student indicator (NCES, 2016, p. 17). Cohort members were followed up with a phone interview in 2014 (NCES, 2016; NCES, 2018a).

The BPS draws cohort information directly from the National Postsecondary Student Aid Study (NPSAS) (NCES, 2016). Specifically, the NPSAS is a cross-sectional complex survey utilizing a two-stage sampling design. First, institutions are sampled, and then students from those designated institutions are sampled from enrollment lists. The survey is nationally representative of students attending Title IV postsecondary institutions. Data are collected via multiple sources. Second, student financial aid is extracted from institutional records. Additional data regarding education, demographics, circumstances, student expectations and outcomes, financial aid, and career/employment information were collected directly from students through a web-based, multi-mode interview or via a telephone interview with a trained NCES staff member (NCES, 2016).

The sub-group of the BPS: 12/14 cohort having answered either “yes” or “no” to “all” or “not all” of the courses within the instructional program taken online, equated to 6,770 participants.¹ The following demographic information was provided to inform readers of the nature and characteristics of the participants, only (Table 1).

While age was assessed for the selected cases, only one participant reported age (BPS: 12/14). Therefore, age was excluded. However, participants' marital status was much more frequently reported with 6,760 total cases, as broken down in Table 2.

Additionally, of the 6,770 cases, 6,760 participants shared employment status: 2,870 were not employed while taking courses, while 3,890 reported at least working part-time. See Table 3.

Eight hundred thirty participants also identified as having or not having children that were being financially supported: one participant did not have children, 390 had no children or one child, 260 participants had two children, 110 had three children, 50 had four children, and 20 participants had five or more children.

Validity and Reliability

After data from the finalized survey were collected, NCES (2016) staff used procedures, such as confirming skip patterns and cross-tabulation of gate items and associated

Table 1. Participant demographics based on gender, ethnicity, and race

		Percentage
Gender	Female	50
	Male	50
Total		100
Ethnicity	Not Hispanic or Latino	75
	Hispanic or Latino	25
Total		100
Race	Caucasian	71
	Black/African American	14.5
	Asian	5.8
	Native American/Alaskan	4.35
	Hawaiian/Other Pacific Islander	4.35
	Total	100

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

Table 2. Participant demographics based on marital status

Marital Status	Frequency	Percentage
Single/never married	5,780	85.4
Married	510	7.6
Separated	50	.8
Divorced	140	2.1
Widowed	10	.1
Living with a Partner	270	4
Total	6,760	100

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

Table 3. Participant demographics based on employment status

Employment Status While Taking Courses	Frequency	Percentage
Unemployed	2,870	42
Employed at least part-time	3,890	58
Total	6,760	100

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

nest items, during the data processing stage to determine the validity of data (pp. 89-90). Reliability was tested via re-interviews of a random student sample of 370, approximately three to four weeks following the completion of the main BPS: 12/14 interview. However, only 200 students completed the re-interview. The re-interview consisted of 60 items from the original interview, in the areas of *Enrollment*, *Education Experiences*, *Financial Aid*, *Employment*, *Income and Expenses*, and *Background* (pp. J-39-41).

Relational statistics were used to quantify the strength of association between the pairs of items being compared, with 1.00 indicative of a perfect correlation. Cramer's *V* was computed for items with discrete, unordered categories, Kendall's tau-*b* was used for items with ordered categories, and Pearson product-moment correlation coefficient *r* was used for items yielding interval responses (NCES, 2016, pp. J-38-39). Items measured within *Enrollment* demonstrated agreement rates of 85 percent or higher. Items measured as part of *Education Experiences* ranged from 100 percent (spouse supportive of postsecondary education) to 61 percent on items indicating friends' level of support with the student's post-secondary education (NCES, 2016, p. J-40). However, NCES (2016) noted that low consistency may have been due to uncertainty about which individuals to include in the category of friends.

Data and Procedures

BPS: 12/14 data were collected and coded by NCES and made available on CD-ROM through an official request. The official request required data to be opened and analyzed on a stand-alone, non-networked computer, as well as provide a security plan for maintaining the disk(s). Authorized access was granted only to those on the research team via approved notarized affidavits.

The BPS:12/14 survey content comprised of data elements used in previous BPS interviews, as well as elements identified through the redesign process that used a human capital framework. New elements addressed the costs and benefits associated with enrolling and continued persistence in postsecondary education. Therefore, new questions were added that focused on a major field of study, nonmonetary benefits of education, and future expected earnings and occupation (NCES, 2016, p. 3). Students were able to complete the interview through an NCES created, and monitored, website, or via a telephone call with a trained NCES staff member. However, a calibration study commenced six weeks before the full data collection study, to evaluate optimal incentive amounts to retain respondents (NCES, 2016, p. 3).

The variables used as part of this research were categorical in nature. Thus, chi-square analyses, frequencies, and a log-linear analysis were used to determine the association between variables- degree status, degree type, and whether courses were taken wholly online or not as part of the degree program- in SPSS25. Before running analyses, it was determined that the variables were housed within two separate databases. These variables were isolated and merged into one database, excluding all other available variables not pertaining to the study. Cases were then sorted to ensure only participants who identified having taken courses wholly online, or not, were used.

Duplicate entries were eliminated, as deciphering which entry corresponded with the nature of each research question was not possible. This resulted in a maximum sample size of $n = 6,770$.

Statistical power for all data analyses was set to $p > .01$ to more adequately assess for statistical significance. Cramer's V was used to determine practical significance through effect size for chi-square analyses. Prior to running the log-linear analysis, an assumption test was conducted. Additionally, the degree programs used in the log-linear analysis were chosen based on the top five most frequently enrolled degree programs, by which courses were being taken online and blended. This represented 430 cases of the 630 total reported for students taking only online courses, or 69%, and 2,820 cases out of the 5,630 total reported for students taking courses blended, or 51%. The large sample size was more than adequate to determine an overall relationship between degree status, degree program, and course type for Research Question 2.

RESULTS

Comparing Overall Degree Attainment

A chi-square analysis was conducted to determine the association of comparing degree attainment of students taking all online courses and students taking a combination of online and face-to-face courses, which was found not to be statistically significant at an alpha level of .01, $\chi^2(1) = 5.53$, $p = .063$. Post-hoc tests using Cramer's V and Phi both indicated very weak associations between degree attainment and whether courses were taken wholly online or not, with $p = .03$, as shown in Table 4. Therefore, the hypothesis of an association between degree attainment and course type not existing is rejected, but the effect is weak.

Comparing Degree Attainment by Learning Program and Course Type

A crosstabulation analysis to check expected frequencies was conducted first to ensure the assumption for a log-linear analysis was met for the top five majors for both wholly online and blended courses. These included: Computer/information science and support; Biological and medical sciences; Psychology; Security and protective services; Visual/related performing arts; Health/related clinical sciences; and Business management, marketing, and related. The analysis indicated that assumptions were not met due to the Biological and medical sciences reportedly having zero cases for the variable combination of course type "online" and degree status "earned." Therefore, Biological and medical sciences were replaced with Education, as it was the next most frequently enrolled program for students not taking classes wholly online. Upon review of the updated contingency table, assumptions were met: 17.86% of the cells had values of less than five and no cells had values of zero (Field, 2013).

A log-linear analysis was conducted to determine the relationship between instructional programs of students taking all online courses and students taking a combination of online and face-to-face courses with degree status. The analysis produced a final model that retained all effects (Field, 2013). The likelihood ratio of

this model was $\chi^2(0) = 0, p = 1$. This result indicated that the highest-order interaction of instructional program \times course type \times degree attainment was significant, $\chi^2(6) = 18.86, p = .004$, as shown in Table 5. (To more effectively analyze degree status, the variable was limited to “still working on degree” and “degree earned”, as compared to attainment in Research Question 1 also noted “No longer enrolled”).

To break down this effect, separate chi-square tests on the course type and degree status were performed for each degree program (Field, 2013). For Computer/information science and support degree programs, there was not a significant association between degree status and whether or not the courses were being taken online, where $p < .01$, $\chi^2(1) = 1.07, p = .30$. This was also true for five other degree programs: Education, $\chi^2(1) = .06, p = .81$; Security and protective services, $\chi^2(1) = .01, p = .92$; Visual/related performing arts, $\chi^2(1) = .09, p = .77$; Health/related clinical sciences, $\chi^2(1) = .81, p = .37$; and Business management, marketing, and related, $\chi^2(1) = 3.92, p = .047$, as shown in Table 6. (Per NCES publication guidelines, all reported values of N for Degree Status were rounded to the nearest ten.) Therefore, the hypothesis of an association between degree attainment and degree program by course type not existing is rejected.

For Psychology, there was a significant association between degree status and whether or not the courses were being taken online, $\chi^2(1) = 26.39, p < .001$. Odds ratios were calculated for each degree program to determine the odds of having earned a degree after four years of post-secondary education by taking courses online, compared to not wholly online: Computer/information science and support (4.29), Security and protective services (1.05), Visual/related performing arts (1.37), Business management, marketing, and related (2.03), and Psychology (24.6). Education (.43) and Health/related clinical sciences (.74) had calculated odds in favor of likely earning a degree by taking face-to-face or a combination of face-to-face and online courses (“Not Online”), as also noted in Table 6.

DISCUSSION

The present study examined whether an association between courses taken online and blended formats (face-to-face and/or hybrid) with student degree attainment existed. The results indicated there was no difference between students taking courses for a degree program completely online compared to those who were taking a degree program in a blended format and the students’ status of degree attainment. Previous studies involving student retention and/or degree attainment with face-to-face versus online courses presented dissenting results (Garrett, 2018; Ice et. al, 2019; Carter, 2018), arguably perpetuating the debate about whether online learning is comparable to face-to-face and blended environments. The current study provided a more definitive assessment of the current debate of equitable pedagogy towards degree attainment. The current study’s results that no differences existed could be explained in part by Moore’s (1997) transactional distance theory and strategies related to course design, interaction and communication, and student characteristics that could overcome or

Table 4. Crosstabulation of degree attainment and courses taken online or not

Degree Attainment	Blended	Online	χ^2	Sig.
	Percentage	Percentage		
Not Enrolled	1.3	.9		
Working on Degree	93.8	92.3		
Earned Degree	4.9	6.8		
Total	100	100	5.526	.063

* denotes significant results at alpha level of $p < .01$

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

Table 5. K-Way higher-order effects for degree program, status, and course type

	K	Likelihood Ratio		Pearson	
		χ^2	Sig.	χ^2	Sig.
K-way Effects	1	7031.42	<.001*	9350.48	<.001*
	2	211.15	<.001*	203.76	<.001*
	3	18.86	.003*	28.98	<.001*

*denotes significant results at $p < .01$

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

Table 6. Crosstabulation of degree program by courses type and degree status

Degree Program	Course Type	Degree Status		Odds Ratio	χ^2	Sig.
		Still Working	Earned			
Education	Blended	30	10	.43	.06	.813
	Online	30	<10			
Business management, marketing, and related	Blended	860	30	2.03	3.93	.047
	Online	160	10			
Computer/information science and support	Blended	270	20	4.29	1.34	.248
	Online	60	<10			
Health/related clinical sciences	Blended	620	90	.74	.81	.368
	Online	100	10			
Psychology	Blended	330	<10	24.6	26.39	<.001*
	Online	30	<10			
Security and protective services	Blended	200	30	1.05	.01	.918
	Online	50	<10			
Visual/related performing arts	Blended	550	20	1.37	.09	.766
	Online	30	<10			

* denotes significant results at $p < .01$

Source: U.S. Department of Education, National Center for Education Statistics, 2011-12 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:12/14).

minimize barriers to learning regardless of the environment (Simunich et. al 2015; Trepal et. al, 2007; Stoessel et. al, 2015). The transactional distance that exists both in blended and online environments remains dynamic rather than dependent upon the geographical distance between learner and instructor.

However, the relationship between degree attainment and course type by specific degree programs did support students earning degrees in certain online programs. Specifically, students enrolled in online Psychology and Computer/information science and support programs were 24.6 and 4.29 times more likely, respectively, to earn a degree than students taking classes in a blended format. Therefore, understanding why certain degree programs yield better degree attainment rates for completing online versus blended formats is intriguing. Of the top seven degree programs identified in this study, each offers highly individualized content comparatively. Gillett-Swan (2017) noted that the translation of face-to-face courses into an online format becomes more difficult when a community of learning is necessary to realize the course content. The majority of degree programs identified as having lower odds ratios for being completed online versus a blended environment could arguably be more difficult to translate online due to the interaction-centric nature of the field (Education, Business, Health/clinical sciences, Security/protective services, and Visual performing arts).

While much of the literature supports the present study, some recent studies and surveys have also contradicted the results (Lederman & McKenzie, 2017; Xu & Jagers, 2013). Therefore, the answer as to whether or not online learning is comparable to traditional formats may lie within the constructs of the educational system itself. According to NCES (2018b), 4,360 post-secondary institutions operated during the Fall 2016 semester within the United States. Each of these institutions likely has an established and unique organizational culture. For newer institutions, the elements of what creates culture are converging to develop as the school moves towards its future (Owens & Valesky, 2011). Culture exerts a powerful influence on the development of perceptions held towards various aspects of an organization's environment (Owens & Valesky, 2011), including roles of distance education, online learning, and its impact on the institutions' strategies (Allen & Seaman, 2014).

Historically, change in schools has occurred through the process of natural diffusion (Owens & Valesky, 2011), and that newly invented educational practices can take fifty years to be generally diffused and accepted (Mort & Ross, 1957). Leadership, social context, and timing are also known factors to affect the rate of natural diffusion, causing the acceleration of best practices, programs, and policy (Dearing, 2009). Though online learning has been around since the 1990s (Sumner, 2000), it only started trending in the mid-2000s (Crotty, 2012); thus, best practices for online learning are not even two decades into the process of natural diffusion and acceptance, which may explain why overall degree attainment from online programs is just as comparable to those taken in a blended format for most fields, while some degree programs fare better compared to others due to the nature of the content and leadership within the different schools of study. With appropriate strategical direction and planning, adoption of best practices for online learning will eventually become

the norm. As post-secondary leaders continue to see the value of investing in online learning, and resources are allocated accordingly, online education will eventually become engrained within a school's culture.

Limitations

The study did have several limitations. First, the data used in the study was collected and provided by NCES; therefore, the study relied on how NCES constructed survey questions. Specifically, the survey framed the question regarding whether courses taken at the first institution towards a degree program were completely online. Thus, answers reported as “no” meant courses could have been taken strictly face-to-face or in a combination of online and face-to-face, resulting in blended learning. Subsequently, determining how courses were managed, via asynchronous or synchronous means, was also not reported by NCES. For the purpose of this study and literature review, a framework examining the management of online courses was not implored. While it could be argued that blended learning provides students a balance between access to online knowledge and face-to-face human interaction (Sener, 2015), as well as campus resources, discrepancies still exist between modalities. By not having more clarifying information to isolate this variable, results can only be generalized in comparing types of courses taken towards degree attainment.

Additionally, NCES also followed up with the same cohort in 2017 regarding degree attainment, again, and the transition into the workforce. Extending this study to examine degree type, and attainment after six years, as well as employment status, salary, and experiences would also lend to ensuring similar career-related outcomes regardless of the learning environment. According to NCES, data for this follow-up will be made available for request sometime soon.

Second, the survey provided participants the option to “skip” or “not answer” questions. Many of the cases in the dataset had no reported demographic information. Therefore, ensuring nationally representative data using only the selected variables within this study was not possible. However, the initial dataset was nationally representative, and the resulting number of cases, for all analyses was still large enough to provide generalizable results. Third, NCES required results to be rounded, or not reported in various forms, per the organization's disclosure avoidance standards. The results and tables in this paper were reviewed and approved by the IES Data Security Office before publishing.

Implications

To ascertain the efficacy of online learning, more large-scale studies focused on a wider variety of variables regarding specific modalities of learning about student success (outcomes, persistence, degree attainment, completion rates, etc.) should be conducted. Breaking down success by specific outcomes and modalities of learning within institutions and comparing may provide more generalizable results. Such examples might include nuances related to quality instructional design for courses, and consistency of such for entire programs of study, instructor presence, etc. More

importantly, researchers for the present study did not have access to nuanced data that could explain why certain degree programs indicated a higher likelihood of students graduating. Additional research to focus on similarities or differences between the programs' course design, student characteristics, and/or instructor immediacy is needed to determine if behavior patterns exhibited in the transactional distance between modalities was associated with degree attainment. In these avenues of inquiry, researchers would have more information to identify specific higher education institutions that have similar success rates between modalities. Thus, additional smaller-scale studies could be conducted to determine how each institution is implementing quality and what types of guidelines/processes are in place to oversee the various modalities of learning. Not only would this information support better alignment of perceptions to the current reality of trending practices in education, but it would also serve as the first step of isolating proven leadership tactics.

Importantly, leadership has a direct impact on the decisions affecting the types of courses and programming offered at an institution, as well as how online learning for the institution is defined. While the Online Learning Consortium has offered a standard set of definitions for the various modalities of learning (Sener, 2015), studies should be conducted to research how institutions are defining online, blended, and face-to-face courses for comparison and consideration in developing a standard that is universally used. For institutions that have found success in implementing programs of study through various modalities, smaller-scale studies could focus on the implementation of those practices, such as budgeting for, finding resources, quality control measures, policy development, hiring, etc. to manage a successful distance education program. Because online programs are complex and nuanced, leaders influence how all those pieces come together in contribution to better student success outcomes. Therefore, studying additional benefits students may be afforded from one environment (i.e. soft and hard skills necessary for successful integration into the workplace) over the other could offer insight to the process and policies needed to establish a quality online learning program within higher education institutions.

Finally, the results of the study should be considered as leaders continually re-evaluate programs offered at their respective institutions. If trends in enrollment favor online courses, and external factors (social, political, natural disasters, etc.), such as the COVID-19 pandemic, force adoption, considerations for how and where funding, resources, and emphasis should be directed more towards online learning environments, training for faculty, as well as the staff who support utilized technologies. If there is hope to curve the natural diffusion process time to less than fifty years (Mort & Ross, 1957), leaders must educate and share information with constituents to build buy-in towards a new vision (Kouzes & Posner, 2012). By organizing resources and building competence towards accepted pedagogical approaches, as well as providing ownership within the courses being offered through quality design and facilitation, leaders can offset many of the challenges faced when attempting to initiate change (Kouzes & Posner, 2012).

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ENDNOTE

- ¹ Per NCES publication guidelines, the total number of participants was rounded to the nearest ten.

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