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A Multivariate Analysis (MANOVA) of where Adult Learners Are in Higher Education

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Abstract. American institutions of higher education were originally established with the purpose of educating the advantaged youth. However, over time colleges and universities began to educate more adult students, those 25 years of age and older. Due to this increase in adults reentering the academy, it is appropriate and timely to ask where these students are attending school, what is known about their distribution in the higher education system, and whether they are assembled in one type of institution or evenly distributed among institutions. Therefore, the purpose of this study was to determine where undergraduate, adult students (25 years of age and older) are located within the 4-year private, public, and for-profit universities offering undergraduate degrees in the United States. This study utilized descriptive and multivariate analyses of variance (MANOVA) statistical analyses. Descriptive analysis provided the number, means, and standard deviations for college and university enrollments obtained from the Integrated Postsecondary Education Data System (IPEDS) of The National Center for Education Statistics (NCES) to answer two research questions. Two MANOVAs and comparative designs were employed to examine electronic data accessed through IPEDS. Undergraduate students under the age of 25 are enrolling in 4-year public and private universities in the United States at about double the enrollment rate as that of for-profit universities.

Keywords: Adult Learner; Adult Education; Nontraditional Students

Introduction

American institutions of higher education were originally established with the purpose of educating the advantaged youth (Rudolph, 1990; Thelin, 2004). However, over time colleges and universities began to educate more adult students, those 25 years of age and older. Adult education has been affected by changes in demographics since the launching of colleges and universities in the United States. In recent years higher education has experienced numerous and substantial changes in such demographics as the following: adults outnumbering those under 18 years of age for the first time ever, the percentage of the population over 65 is growing (U.S. Bureau of the Census [USBC], 2010), and the public is becoming more educated than in years past (Merriam, Caffarella, & Baumgartner, 2007).

Students 25 years of age and older are more complicated than traditional younger students, those younger than 25 years of age. Backgrounds, educational histories, levels of maturity, reasons for returning to school, experiences with technology, and individual responsibilities of adult students are more complex (Clemente, 2010). Many facets of higher education, regrettably, are not designed with adult learners in mind in spite of the reality that almost half of current college and university students are adults (Tannehill, 2009). Furthermore, there is minimal literature on how to instruct students in multigenerational class settings. With traditional and nontraditional students enrolled together in classes consideration is seldom given to how to teach these two distinct groups of students. In addition, there is comparatively little thought given to how these traditional and nontraditional students work together, how professors endeavor to link the differences between these two diverse groups, or how the two unique groups may be united during classroom discussions. Finally, there is a shortage of empirical research on how multigenerational students interact with each other in higher education and how to enhance effective learning between the two separate groups (Clemente, 2010). This minimal exploration into the field of adult learning is bewildering, taking into account that educating adults has been a focus of higher education in the United States and in Europe soon after World War I (Knowles, Holton, & Swanson, 2011). Therefore, the purpose of this study was to determine where undergraduate, adult students (25 years of age and older) are located within the 4-year private, public, and for-profit universities offering undergraduate degrees in the United States.

Significance of the Study

There has been an emerging trend in enrollment of adult students in higher education. The percentage of adults student enrolled in higher education is at an all time high (Altbach, Berdahl, & Gumport, 2005). This percentage has increased from 29% in 1970 to 43% in 2009 (NCES, n.d.b).

It is apparent that more adults are in search of learning opportunities in this increasingly educated society. The burgeoning need for adult learning has produced a lucrative endeavor for education and practitioners in the field of adult learning and development (Merriam et al., 2007). Enrollments in higher education have been significantly impacted due to the increase of older nontraditional students within the higher educational system (Knowles, 1984). In a study by Schaefer (2010), there are overwhelming consequences for colleges and universities with the anticipated escalation of college and university enrollments of adult students and their return to higher education. Schaefer focused on adult students earning bachelor's degrees at a public 4-year university. According to Schaefer, this area of study presents a crucial area for empirical research because there is minimal literature on older adult students returning to undergraduate college and university classrooms.

The number of adults is greater than the number of youth for the first time in the history of the United States (Merriam et al., 2007, USBC, 2010). In 1987, Americans 65 years and older outnumbered those younger than 25 and

Americans 85 years of age and older are the fastest growing sector of the older population (Merriam et al., 2007). Americans are growing older and living longer. The public has realigned the concentration from youth to adults as a result (Knowles, 1984). The Digest of Education Statistics in 2010 published the 46th in a series of education statistics publications. Using these data, Table 1 compares the enrollment of undergraduate students 18-24 years of age and students over 25 years of age for years 2007 and 2009.

Table 1. Fall Undergraduate Enrollments in Degree-granting Institutions by Age for 2007 and 2009

Age	2007	2009
18 to 24 years old	10,047,905 (68%)	10,995,900 (66%)
25 - 29	1,710,195 (12%)	2,044,157 (12%)
30 - 34	944,123 (6%)	1,177,534 (7%)
35 - 39	709,012 (5%)	841,719 (5%)
40 - 49	935,783 (6%)	1,097,374 (7%)
50 - 64	445,568 (3%)	536,289 (3%)
65 and older	70,608 (0.5%)	61,650 (0.4%)
25 years old and older	4,815,289 (32%)	5,758,723 (34%)
Total	14,863,194 (100%)	16,754,623 (100%)

Source: NCES (n.d.c)

Due to this increase in adults reentering the academy, it is appropriate and timely to ask where these students are attending school, what is known about their distribution in the higher education system, and whether they are assembled in one type of institution or evenly distributed among all types of 4-year institutions. Nontraditional adult learners have different experiences and backgrounds compared to traditional students (Clemente, 2010). Also of significance is the question of what higher education is doing to prepare for this proliferation in adult learners in the college and university classrooms. Adult education has experienced immeasurable growth in enrollment and number of colleges and universities that acknowledge adult learning as a chief function of higher education. Adult learning is a lucrative endeavor (Knowles, 1968). However, it is thought that higher education is not doing a sufficient job in effectively educating adult students (Harper & Ross, 2011; Knowles, 1968) and that the very continued existence of society necessitates learning beyond youth (Knowles, 1968).

The growing diversity of the student body has also impacted higher education outside of the classroom. Higher education administrators are encouraged to consider the needs of nontraditional students when developing university services and programs. Higher education administrators are also encouraged to take advantage of the knowledge and experiences of nontraditional students (Tatum, 2010). For example, university orientation programs are generally not designed with the older adult students in mind. These nontraditional students frequently have more complicated lives than do younger students. Orientation programs should be designed and provided at times and locations appropriate for older students. Adult learners, in addition, should have advisors who are

accustomed to the needs of older students. Also, older adult students can be a valuable resource for younger students as mentors or role models (Tatum, 2010). Institutions that focus on nontraditional students will be the ultimate survivors in education according to Tannehill (2009).

College and university administrators are not responsive to the educational needs of the adult learners. Empirical research generally neglects the older, adult students by focusing on traditional students. What research there is focuses on descriptive analyses. Further multivariate analysis, according to Cruce & Hillman (2012), is needed "to confirm the findings of descriptive analyses" (p. 596). This growth in enrollment of adult students requires further research. This group of students is a neglected section of the total student body (Schaefer, 2010). There is little if any research on where these students are attending school. In order to fulfill the needs of these students it is time to identify where they are in the 4-year private, public, and for-profit universities offering undergraduate degrees in the United States.

Research Design

This research study was an archival, quantitative, data mining study that utilized data retrieved from the Integrated Postsecondary Education Data System (IPEDS) of The National Center for Education Statistics (NCES), which is located within the U.S. Department of Education and the Institute of Education Sciences. NCES is the main federal body that collects and analyzes educational data in the United States and other nations. NCES carries out a Congressional directive to examine the state of American education by collecting, collating, analyzing, and reporting comprehensive statistics; completing and publishing reports; and analyzing and reporting on education internationally (NCES, n.d.a).

This study identified differences between and among the percentages of enrollments of undergraduate, adult students, traditional students, and students ages 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older in 4-year private, public, and for-profit universities offering undergraduate degrees in the United States. This study utilized descriptive and multivariate analyses of variance (MANOVA) statistical analyses. Descriptive statistics were employed to identify common tendencies (Creswell, 2012). Descriptive analysis provided the number, means, and standard deviations for college and university enrollments obtained from IPEDS to answer the two research questions. Two MANOVAs and comparative designs were employed to examine electronic data accessed through the IPEDS. MANOVAs were used to analyze the grouping differences between and among the percentages of enrollments in 4-year private, public, and for-profit universities offering undergraduate degrees in the United States. MANOVA is a statistical method for determining whether independent groups differ on more than one dependent variable (Gall, Gall, & Borg, 2007). The intention of this study was to ascertain whether there are statistically significant differences in enrollment between and among the percentages of undergraduate, adult students and traditional students in 4-year private, public, and for-profit universities with an archival research method using data extracted from IPEDS.

Target Population and Participant Selection
IPEDS gathers data from nine interconnected surveys that are conducted over three collection stages (fall, winter, and spring) each year from institutions that participate in federal student aid programs. During the spring, IPEDS collects data on fall enrollment, graduation rates, and finances. During the fall, IPEDS collects data on institutional characteristics (including pricing data), completion rates of postsecondary certificates of less than 1 year to doctoral degrees, and 12-month graduate and undergraduate enrollment data. During the winter, IPEDS collects data on human resources and student financial aid.

Instrumentation
Data for this study were obtained from IPEDS. The data were extracted from the interrelated surveys completed each year by NCES. IPEDS is a database for data from colleges, universities, and technical and vocational institutions that participate in federal student financial aid programs. The Higher Education Act of 1965, as amended, required institutions that participate in federal student aid programs to submit data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid (The Higher Education Act of 1965). These data are made available to the public through IPEDS.

Research Questions
The following research questions were used to guide this study:
1. What are the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 further broken down into the following subcategories of 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older in private, public, and for-profit universities offering undergraduate degrees in the United States?
2. Do differences exist in the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 further broken down into the following subcategories of 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older between or among private, public, and for-profit universities offering undergraduate degrees in the United States?

Hypothesis
The following hypothesis was tested at the .05 significance level:
No differences exist in the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 further broken down into the following subcategories of 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older between or among private, public, and for-profit universities offering undergraduate degrees in the United States.

Methods and Procedures
University undergraduate student enrollments for the year 2010 included a total of 1,494 4-year universities that were downloaded from IPEDS into an Excel spreadsheet. Universities reporting no enrollment information were deleted. Totals and percentages were calculated. Of the 1,494 universities, 544 were

public, 599 were private, and 351 were for-profit universities participating in federal student aid programs in the United States.

Collection of the Data

Data were obtained for 4-year private, public, and for-profit universities in the United States for the year 2010. The data were downloaded from IPEDS and converted into an Excel document. The Excel document was formatted and copied to a Statistical Package for Social Sciences (SPSS) Version 19.0.0 spreadsheet for analysis. The data were stored on a flash drive under the control of the researcher.

Analysis of the Data

The statistical analyses were conducted using SPSS to answer the research questions using the purged dataset obtained from IPEDS. Descriptive data were calculated for each grouping of dependent and independent variables. Descriptives included the number, mean, and standard deviation. Two MANOVAs were completed. The first MANOVA was to determine the differences between undergraduate, adult students under the age of 25 and undergraduate, adult students 25 years of age and older in 4-year private, public, and for-profit universities offering undergraduate degrees in the United States. The second MANOVA was completed to investigate possible differences in enrollment percentages between and among the subcategories of the students ages 25 and older broader category. The subcategories of age were: 25-29, 30-34, 35-39, 40-49, 50-64, and 65 years and older.

The first step was to conduct descriptive statistics to determine what the enrollment percentages were of undergraduate adult students according to age and university type. Descriptive analysis presented the number, mean percentages, and standard deviations for university enrollments obtained from IPEDS to answer the research questions. The second step was to test the null hypothesis that no significant differences exist for the three groups of universities. This test was significant. Therefore, the second step was to complete follow-up tests to explain the group differences (Bray & Maxwell, 1985). Assumption one of MANOVA concerning independence was met because the IPEDS database presents responses for all universities participating in the federal student financial aid programs in the United States. No pattern for the selection of universities was used for this research study because all universities in the United States were included (Caruth, 2013). Assumption two of MANOVA concerning level of measurement of the variables was met because independent variables were categorical according to university type. The dependent variables were percentages that are continuous between the lower bounds of 0% and the upper bounds of 100%. Both independent and dependent variables satisfied the second assumption (Caruth, 2013).

Assumption three of MANOVA, linearity of dependent variables, required correlation between the dependent variables. Linearity of the dependent variables was tested by calculating a Pearson Correlation Coefficient within each sector of private, public, and for-profit universities. The categories of ages within the larger variable of 25 years of age and older overall also resulted in

high correlations with the other dependent variables. While the weaker age group 65 and older (mean 0.15%) resulted in smaller correlations with the other dependent variables, robustness is increased when comparing difference between the averages of the stronger and weaker variables if strong and weak variables were identified prior to collecting the data (Cole, Maxwell, Arvey, & Salas, 1994, p. 472). Because it was easily recognized from the descriptive statistics that the 65 years of age and older age group was a weak variable due to the small percentage of enrollments of undergraduate students in 4-year private, public, and for-profit universities in the United States, assumption three was also satisfied (Caruth, 2013).

Results

Research Question 1

The first research question was, What are the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 subcategories (25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older) in private, public, and for-profit universities offering undergraduate degrees in the United States? The enrollment numbers of undergraduate, adult students by the denoted age categories in each of the three sectors (private, public, and for-profit) of 4-year universities in the United States were obtained from IPEDS. Once obtained using the IPEDS Data Cutting Tool, data were cleaned to include only those institutions that served undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 further broken down into the subcategories (25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older). Enrollment totals and percentages were calculated in SPSS. The names of the institutions were removed and data were coded according to private, public, or for-profit institution. Descriptive statistics were completed for each sector in SPSS as shown in Table 2 (Caruth, 2013).

The data for public 4-year universities included 544 institutions. The mean enrollment percentage for undergraduate students under the age of 25 was 76.1%, with a standard deviation of 15.4 percentage points. In the private sector, 599 universities reported a mean enrollment rate of 77.5% for undergraduate students under the age of 25 with a standard deviation of 23.8 percentage points. In the for-profit sector, 351 universities reported a mean enrollment rate of 35.5% for undergraduate students under the age of 25 with a standard deviation of 16.5 percentage points. A total of 1,494 universities reported a mean enrollment rate of 67.1% for undergraduate students under the age of 25 with a standard deviation of 25.2 percentage points (Caruth, 2013).

In the public sector, 544 universities reported a mean enrollment percentage of 20.8% for undergraduate students age 25 and older with a standard deviation of 13.1 percentage points. In the private sector, 599 universities reported a mean enrollment rate of 19.1% for undergraduate students age 25 and older with a standard deviation of 19.9 percentage points. In the for-profit sector, 351 universities reported a mean enrollment rate of 54.7% for undergraduate students age 25 and older with a standard deviation of 13.4 percentage points. A total of 1,494 universities reported a mean enrollment rate of 28.1% for

undergraduate students age 25 and older with a standard deviation of 21.9 percentage points (Caruth, 2013).

Table 2. Undergraduate Enrollment Percentages for 2010

	Public		Private		For-Profit		Total	
Age Group	Mean %	SD	Mean %	SD	Mean %	SD	Mean %	SD
Under 25	76.1	15.4	77.5	23.8	35.5	16.5	67.1	25.2
Over 25	20.8	12.1	19.1	19.9	54.7	13.4	28.1	21.9
25-29	9.9	5.4	7.3	6.8	22.8	4.9	11.9	8.5
30-34	4.9	3.4	4.4	5.0	15.3	4.4	7.1	6.3
35-39	3.1	2.4	3.4	4.6	9.9	3.8	4.8	4.7
40-49	3.9	3.5	4.9	6.8	12.0	5.6	6.2	6.4
50-64	1.9	2.0	2.4	4.7	4.5	2.8	2.7	3.6
65 & above	0.2	0.4	0.2	0.7	0.1	0.2	0.1	0.5

Enrollment data were further broken down according to the following sub-categories of undergraduate students age 25 and older: 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older. The purpose of this descriptive analysis was to provide in-depth descriptive details on adult students 25 years of age and older who are enrolled in 4-year private, public, and for-profit universities offering undergraduate degrees.

Older undergraduate students tend to enroll in private and for-profit 4-year universities. Once adult students reach the ages of 35-39, data revealed that enrollments shift from public (3.1%) to private (3.4%) 4-year universities. Enrollment for students aged 65 and older are equal (0.2%) among institution type. Enrollment percentages for adult students over the age of 25 at for-profit 4-year universities are higher than both public and private 4-year universities until the age of 65 and older. For this older age group, the data revealed that the percentage of adult students at for-profit 4-year universities is 0.1% (Caruth, 2013).

Research Question 2

Research question 2 asked, Do differences exist in the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 subcategories (25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older) between or among private, public, and for-profit universities offering undergraduate degrees in the United States? The response to this question was determined by testing the accompanying hypothesis, which stated:

No differences exist in the enrollment percentages of undergraduate, adult students by the age categories of under 25, 25 and older, and students over the age of 25 subcategories (of 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older) between or among private, public, and for-profit universities offering undergraduate degrees in the United States. This hypothesis was tested at a significance of $\alpha < 0.05$ by performing a MANOVA in SPSS. The independent variable was the type of institution and the dependent variable was the percentage of enrolled students in each age group.

Levene's Test revealed significant differences in the error variances across groups (Caruth, 2013). However, Bray and Maxwell (1985) found that MANOVA is robust when this assumption is violated if a large sample is used. The large sample size used in this study meets the expectations addressed by Bray and Maxwell (Caruth, 2013). Bray and Maxwell also claimed that it is unlikely that all assumptions of MANOVA will be met; therefore, "violating the assumptions does not necessarily invalidate the results" and "MANOVAs are relatively robust to violations of assumptions" (Bray & Maxwell, 1985, p. 33).

Differences by Under and Over 25 Years of Age

The MANOVA findings for undergraduate students under the age of 25 and students 25 years of age and older showed a statistically significant difference [Wilks' Lambda = 0.537, $F(4, 2980) = 271.913$ $p < .001$, $\eta^2 = .267$] in enrollment percentages among the groups. Effect size indicated that 27% of the variance in enrollment percentages of students according to age could be attributed to university type. Between-subjects effects revealed a significant difference in enrollment percentages for undergraduate, adult students by the age categories of under 25 and 25 and older in 4-year private, public, and for-profit universities in the United States (Caruth, 2013). This finding results in a rejection of the null hypothesis that no differences exist (see Table 3).

Table 3. Between-Subjects Effects for Enrollment Percentages by Age Groups

Source	SS	df	MS	*F*	*p*	η^2
Under 25	459743.969	2	229871.985	607.958	.000	.449
Over 25	324806.587	2	162403.293	618.935	.000	.454

Differences by the Seven Age Group Subcategories

The MANOVA findings for undergraduate students under age of 25, 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older showed a statistically significant difference [Wilks' Lambda = 0.410, $F(12, 2972) = 139.255$, $p < .001$, $\eta^2 = .360$] in enrollment percentages among the groups (see Table 4). Effect size indicated that 36% of the variance in enrollment percentages of students according to age could be attributed to university type. Between-subjects effects revealed a significant difference in enrollment percentages for undergraduate, adult students by the age categories under 25, 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older enrolled in 4-year private, public, and for-profit universities in the United States. However, enrollments of students age 65 and older were not

statistically significant. Even so, these results also lead to a rejection of the null hypothesis that no differences exist (Caruth, 2013).

Table 4. Between-Subjects Effects for Enrollment Percentages by Age Group Subcategories

Source	SS	df	MS	F	p	η^2
Under 25	459743.969	2	229871.985	607.958	.000	.449
25-29	56515.856	2	28257.928	815.899	.000	.523
30-34	30473.059	2	15235.530	805.258	.000	519
35-39	11779.158	2	5889.579	423.694	.000	.362
40-49	15866.310	2	7933.155	263.779	.000	.261
50-64	1509.924	2	754.962	62.802	.000	.078
65 up	1.194	2	.597	2.357	.095	.003

A simple contrast was completed with public universities as the reference category to test the hypothesis (see Table 5). This method was chosen because adjusting the alpha level sufficiently to reduce the chance of a Type I error would result in an alpha level that was too strict. Findings indicated that a statistically significant difference in enrollments for undergraduate students between public and private institutions exists for age groups 25-29, 30-34, 40-49, and 50-64. There were no significant differences of enrollments between private and public universities for age groups under 25, 35-39, and 65 and older. These findings indicated that a statistically significant difference in enrollments for undergraduate students between public and for-profit institutions for all age groups (Caruth, 2013).

Table 5. Simple Contrast Results

Age Group	Significance of Comparison between Public and Private	Significance of Comparison between Public and For-profit
Under 25	.211	.000
25-29	.000	.000
30-34	.033	.000
35-39	.207	.000
40-49	.004	.000
50-64	.005	.000
65 & above	.756	.040

Summary

Descriptive statistics presented general trends and tendencies in undergraduate, adult student enrollments in 4-year private, public, and for-profit universities in the United States. Results of the descriptive analysis indicated that of the 1,494 universities that participated in this research study, 599 were private, 544 were public, and 351 were for-profit universities that participate in federal student aid programs in the United States. The overall means for the two main groups of undergraduate student enrollment totals were 67.1% for students under the age of 25 and 28.1% for students age 25 and older. However, the overall means for undergraduate student enrollment totals for the six subcategories of the 25 years

and older group were as follows: 25-29 (11.9%); 30-34 (7.1%); 30-34 (4.8%); 40-49 (4.8%); 50-64 (6.2%); and over 65 years of age (.1%). Results also indicated that public university enrollment percentages yielded an overall mean of 76.1% for students 24 years of age and younger and 20.8% for students 25 years of age and older. Private university enrollment percentages yielded an overall mean of 77.5% for students 24 years of age and younger and 19.1% for students 25 years of age and older. For-profit university enrollment percentages yielded an overall mean of 35.5% for students 24 years of age and younger and 55.7% for students 25 years of age and older (Caruth, 2013).

Findings from the first MANOVA for undergraduate students under the age of 25 and students 25 years of age and older showed a statistically significant difference between the two age groups. Differences according to adult students under 25 and 25 and older suggested that enrollment percentages for adult students over the age of 25 in 4-year for-profit universities are higher than enrollment percentages for adult students over the age of 25 in both 4-year public and private universities. The effect size (the measure of the strength of the relationship between age and university type) indicated that 27% of the variance in enrollment percentages of students according to age could be attributed to university type (Caruth, 2013).

Findings from the second MANOVA for enrollment percentages for undergraduate students under age of 25, 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older showed a statistically significant difference between and among 4-year private, public, and for-profit universities in the United States. Based on these findings, there is a difference in enrollment percentages among the various age group subcategories. Specifically, differences according to the age group subcategories suggested that once adult students reach the ages of 35-39, their enrollments begin to shift from public (3.1%) to private (3.4%) 4-year universities; enrollment percentages become equal between institution types for students 65 and older (0.2%). Enrollments of students age 65 and older are not statistically significant between and among the various university types. For the 65 and older student population, percentages of adult students at 4-year for-profit universities are slightly lower (0.1%) than the percentages for adult students at public and private universities (0.2%). There is a statistically significant difference in enrollments for undergraduate students between public and private institutions for age group subcategories 25-29, 30-34, 40-49, and 50-64. There are no significant differences in enrollments between public and private universities for age groups under 25, 35-39, and 65 and older. Findings also suggested a statistically significant difference in enrollments for undergraduate students between public and for-profit institutions for all age group subcategories. The effect size (the measure of the strength of the relationship between age and university type) indicated that 36% of the variance in enrollment percentages of students according to age could be attributed to university type (Caruth, 2013).

Overall findings suggested a statistically significant difference in percentages of enrollments for undergraduate students between and among the three types of

universities according to age. However, enrollments of students age 65 and older were not statistically significant. Even so, these results led to a rejection of the null hypothesis that no differences exist. A simple contrast analysis suggested differences in the percentage of enrollments of undergraduate students between private and public universities according to the age groups 25-29, 30-34, 40-49, and 50-64. There were also differences in the percentages of enrollments of undergraduate students between public and for-profit universities according to age groups 25-29, 30-34, 35-39, 40-49, 50-64, and 65 and older (Caruth, 2013).

Discussion

Undergraduate students under the age of 25 could be enrolling in 4-year public and private universities in the United States at about double the enrollment rate as that of for-profit universities because of family tradition (other family members have attended the same university), lack of awareness (not knowing what other universities have to offer), or institutional reputation (selecting a university based name). The most astonishing finding was that as undergraduate, adult students increase in age, they tend to enroll in 4-year for-profit universities at a significantly higher rate and this is particularly true for students between the ages of 25-29. This could be because of credential needs, convenience, employment advancement opportunities, or customer orientation and student satisfaction. Adult students are enrolling in for-profit universities at almost double the enrollment rate of public or private universities (Caruth, 2013).

Cost factors could be the reason for students between the ages of 25-29 enrolling in public universities at higher rates than in private universities. While students ages 40-49 are enrolling in private universities at a higher rate than in public universities. This could be because of institutional reputation and perception of degree value. An interesting finding is that the majority of adult students tend to enroll in for-profit universities at higher rates than either public or private universities, except for the 65 and older age group. These older students enroll in 4-year public and private universities at a higher rate than they enroll in 4-year for-profit universities. This may be a statistical aberration and in the face of such low number difficult to explain.

For-profit universities appear to be meeting the needs of adult students more effectively than either public or private universities with those age 25 and older enrolling in 4-year for-profit universities at more than double the rate of enrollments at either 4-year public or private universities. This finding may indicate that for-profit universities may also provide an environment that encourages adults to continue learning (Finn, 2011). As Tannehill (2009) suggested, universities that fulfill the needs of adult learners will be the ultimate survivors. Considering the finding of the 65 and older age group, public and private universities may be meeting the needs of these adult learners more effectively than for-profit universities. While this group is small in number, it is on the rise. Adult learners ages 65 and older are looking for something to do in retirement that has meaning and provides opportunities for continued

development (Merriam et al., 2007). This aspiration indicates that the needs of these adult learners may be different from the needs of students in the younger subcategories (Caruth, 2013).

Students ages 30 and older are enrolling in private universities at a higher rate than they are in public universities (Caruth, 2013). This suggests that private universities are meeting the needs of adults who recognize the importance of additional education to improve job skills (Merriam et al., 2007), enjoy a hobby, or simply to cope with life (Knowles et al., 2011). Private universities seem to understand that timing is crucial for nontraditional students and that adult learners tend to be ready to learn the things they need to know and do as the need develops in their already complex lives (Knowles et al., 2011).

Assumptions

This study was based on two assumptions. The first assumption was that the individuals who completed report information for their universities and colleges to IPEDS were competent and knowledgeable of their organizations' information. The second assumption was that the individuals who reported information for their universities and colleges to IPEDS were open, honest, and provided accurate information.

Limitations of the Research

In light of the completed study, a review of these limitations and delimitations that were understood at the inception of this research is essential. The quantitative data for this study were obtained from the 2010 academic year of institutions that reported to IPEDS. An investigation of previous or subsequent years may have yielded different results. Data were only collected from institutions that report to IPEDS. Although the IPEDS Data Center offered large sample sizes in all sectors of 4-year institutions, including data from institutions that do not report to IPEDS may have also altered the results of this study. Furthermore, the data for this research included only undergraduate students and 4-year private, public, and for-profit universities. Including data from graduate students or colleges and universities other than 4-year private, public, and for-profit universities might produce different results as well. Lastly, it is possible that data were reported to IPEDS incorrectly as with all self-reported data. The MANOVA would yield inaccurate results if this were the case (Caruth, 2013).

Implications

The findings of this research study have widespread implications, from opportunities that exist for the future practice of educating adult learns to benefits for students, faculty, and universities because of higher educations' recognition of the unique needs of nontraditional students in the classroom. One such opportunity is that public and private universities can review current programs and services. With the predictions of increasing college and university enrollments of adult students, this is a feasible market (Caruth, 2013). Private and public universities are encouraged to develop programs and services that align with the needs of adult students (Tatum, 2010). For example, Chan (2010)

suggested that universities replace pedagogical methods of instruction with andragogical methods to construct more engaging learning environments.

Another opportunity is that colleges and universities can take into account the precise needs of adult students ages 30 and older. For-profit universities enrollments almost double the number of adult students than private or public institutions, while private universities are attracting older adults at increasing rates and public universities are attracting adult students at decreasing rates. Public universities could examine the possible reasons for the low numbers of adult students, study actions taken by other universities to attract these nontraditional students, and imitate those actions (Caruth, 2013).

Recommendations for Further Research

The completion of this research study has presented a number of questions for further research. The first question comes to light from the first limitation of this research. This study collected data for a single academic year. While this may be the first study to compare the enrollment percentages of undergraduate, adult students by the age categories it should not be the last. Therefore, it is recommended that this study be replicated to verify the findings. In addition, a longitudinal study could be completed to compare the enrollment percentages. Investigating these data over an extended period may yield worthwhile information for all institutions to assist in identifying trends in adult enrollments in higher education. The quantitative data for such a research investigation are easily obtainable through IPEDS. This study looked at enrollment percentages in the United States. It is recommended that this study be replicated on enrollment percentages in various states in the United States to compare these national findings with individual state findings. Therefore, it is also recommended that a study conducted to include 2-year colleges, trade schools, etc. enrollment percentages. In addition, qualitative research methods could be conducted to identify reasons why students over the age of 25 are enrolling in for-profit universities at such a considerable rate. Questions could be answered as to why students over the age of 35 tend to enroll in private universities rather than public universities and students over the age of 65 tend to enroll in private and public universities rather than in for-profits.

References

Altbach, P., Berdahl, R., & Gumport, P. (2005). *American higher education in the twenty-first century* (2nd ed.). Baltimore, MD: Johns Hopkins University.

Bray, J. H., & Maxwell, S. E. (1985). Analyzing and interpreting significant MANOVAs. *Review of Educational Research, 52*(3), 340-367. doi:10.3102/00346543052003340

Caruth, G. (2013). *Andragogy in higher education: Identifying 2010 adult learners in baccalaureate degree-granting institutions*. (Unpublished doctoral dissertation). Texas A & M University-Commerce, Commerce, TX.

Chan, S. (2010). Applications of andragogy in multi-disciplined teaching and learning. *Journal of Adult Education, 39*(2), 25-35.

Clemente, K. A. (2010). *Experiences of adult students in multi-generational community college classrooms* (Unpublished doctoral dissertation). Pennsylvania State University, University Park, PA.

Cole, D. A., Maxwell, S. E., Arvey, R., & Salas, E. (1994). How the power of MANOVA can both increase and decrease as a function of the intercorrelations among the

dependent variables. *Psychological Bulletin, 115*(3), 465-474. doi:10.1037/0033-2909.115.3.465

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson Education, Inc.

Cruce, T. M., & Hillman, N. W. (2012). Preparing for the silver tsunami: The demand for higher education among older adults. *Research in Higher Education, 53*(6), 593-613. doi 10.1007/s11162-011-9249-9

Finn, D. (2011). Principles of adult learning: An ESL context. *Journal of Adult Education, 40*, 34-39.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introductio*n (8th ed.). Upper Saddle River, NJ: Pearson.

Green, G., & Ballard, G. H. (2011). No substitute for experience: Transforming teacher preparation with experiential and adult learning practices. *SRATE Journal, 20*, 12-20.

Harper, L., & Ross, J. (2011). An application of Knowles' theories of adult education to an undergraduate interdisciplinary studies degree program. *The Journal of Continuing Higher Education, 59*, 161-166. doi:10.1080/07377363.2011.614887

The Higher Education Act. 20 U.S. C. §1001. (1965)

Hughes, B. J., & Berry, D. C. (2011). Self-directed learning and the millennial athletic training student. *Athletic Training Education Journal, 6*, 46-50.

IPEDS Data Center. (n.d.). The integrated postsecondary education data system [Database]. Retrieved from http://nces.ed.gov/ipeds

Knowles, M. S. (1968). Andragogy, not pedagogy. *Adult Leadership, 16*(10), 350-352, 386.

Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult learning*. San Francisco, CA: Jossey-Bass.

Knowles, M. S., Holton, E. F., & Swanson, R. A. (2011). *The adult learner: The definitive classic in adult education and human resource development* (7th ed.). Burlington, MA: Butterworth-Heinemann.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). San Francisco, CA: Jossey-Bass.

National Center for Education Statistics. (n.d.a). *IPEDS data center*. Washington, DC: Author.

National Center for Education Statistics, (n.d.b). Digest of education statistics, 2010, *Chapter 3: Postsecondary education enrollment, table 199*. Washington, DC: Author.

National Center for Education Statistics, (n.d.c). Digest of education statistics, 2010, *Chapter 3: Postsecondary education enrollment, tables 199 & 200*. Washington, DC: Author.

Rudolph, F. (1990). *The American college and university: A history* (2nd ed.). Athens, GA: University of Georgia Press.

Schaefer, J. L. (2010). Voices of older baby boomer students: Supporting their transitions back into college. *Educational Gerontology, 36*, 67–90. doi: 10.1080/17419160903057967

Tannehill, D. B. (2009). *Andragogy: How do post-secondary institutions educate and service adult learners?* (Unpublished doctoral dissertation). University of Pittsburgh, Pittsburgh, PA.

Tatum, C.G. (2010). *An explanatory mixed methods inquiry into the academic experience of nontraditional community college students* (Unpublished doctoral dissertation). Texas A&M University-Commerce, Commerce, TX.

Thelin, J. R. (2004). *A history of American higher education.* Baltimore, MD: Johns Hopkins University Press.

U.S. Bureau of the Census. (2010). *The older population: 2010.* Retrieved from http://2010.census.gov