Relationship between Factors and Graduation Rates for Student Success in the U.S. College

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Abstract
Graduation rates are essential indicators of students' success and the indicators defined as the percentage of a school's first-time, first-year college students who continue their studies at the school next year. Graduation rates are essential for student's learning accountability purposes, and graduation rates need to be improved. The purpose of this study aims to find out the relationship between graduate rate and other predictors such as retention, student-to-faculty ratio, enrollment, tuition and fees, library and grants, and explore how these independent variables predict the graduation rate. It also aims to determine what factors most influence student graduation rates for college success. The study will employ a quantitative research design to examine the relationship between factors and graduation for student's progress. The study aims to find out what factors influence student graduation rates and provide practical implementations, leadership frameworks, and strategies such as a coherent leadership frame, collaborative culture, trust for school leaders. The student success helps the school leaders to implement the school program, policy, and culture. The finding of the study finally expects to find out the school implementation on the school curriculum, student learning, staff professional development needs, collaborative learning culture, and teacher leaders. The future study can explore the dynamic of peer-led leadership and peer-driven activities between culture and school leadership to improve student academic performance and graduation rate.

Keywords: Graduation Rate, Student Success, Retention, Regression Analysis Leadership

Introduction

Graduation rates are essential indicators of students' success and the indicators defined as the percentage of a school's first-time, first-year college students who continue their studies at the school next year. Fass-Holmes (2016) stated that graduation rates are essential for student's learning accountability purpose and graduation rates need to be improved (Crawford, 2015). Improving graduation rates have been coming more intricate due to many challenges (Fass-Holmes,2016), such as language proficiency (Dagley,2015), lack of familiarity with academic integrity standards (Simpson,2016), unfamiliar with western teaching methods (Reardon, 2015), tuition fees (Dagley et al.,2015), requirements of regulations (Fass-Holmes, 2016), amount of library and student-to-faculty ratio, and grants. Fass-Holmes (2016) found that nonacademic factors such as learning goals, self-confidence, social involvement, institutional commitment, and academic factors such as grade point average (GPA), test results, socioeconomic status had a positive relationship predicate graduation. Attention to the first-year students' needs can gear them to become accustomed to academic life and increase their sense of belongs to the school (Eng & Stadler, 2015). Reason (2001) stated that the variety of student characteristics such as gender, ethnicity, family background, have been found to influence retention and graduation rates.

Reardon et al. (2015) stated college administrators and public policymakers need to develop programs for college student success in terms of graduation as well as Dagley et al. (2015) said that universities need to foster a unique learning environment to increase graduation rates of learning. Crawford (2015) indicated that college and university graduation rates are extensive and there was a high correlation between graduation and academic and non-academic factors (Wilson et al.,2012). Graduation rates have a strong association with retention (Crawford,2015) aided by a good support network and relationships with faculty, administers, and librarians (Fass-Holmes,2016). The library can serve as a bridge between social and academic engagement to produce a learning outcome. Library instruction serves as an asset in two ways. Through technology training, library instruction is an ancillary student experience assisting retention. Library instruction has a greater significance in student retention and graduation rates (Eng & Stadler, 2015). Crawford (2015) emphasized that there was a sign between using the library and graduation and retention rates. McAndrew and And (2018) mentioned that there was a relationship between graduation rate and the ratio between faculty and students by their study. Little research has examined how a financial regulatory strategy such as resource allocation may provide insight into increasing undergraduate graduation and retention rate (Gansemer-Topf & Schuh,2006) Therefore, school leaders and policymakers need to increase the graduation rate as a factor of estimating the school performance (Scott-Clayton, 2015).

Research Questions

The current study will explore the two research questions below:
1.   How do the independent variables predict graduation (y)?
2.   What does the best regression model fit the graduation rate in the study?

Purpose of the Study

Therefore, the current study aims to find out the relationship between graduation rate and other predictors such as retention, student-to-faculty ratio, enrollment, tuition and fee, library and grants and explore how independent variables predict the graduation and estimate what is the best model to fit the graduation rate in college success, respectively.

Methodology

Research Design

The study will utilize quantitative research design through statistical analysis to determine the relationship between factors and graduation for student's success and to find out what factors influence student graduation rate and provide reasonable implementations for school leaders.

Sampling

Data on college and universities collected from different online resources which are National Center for Education Statistic (NCES), Government Publishes Graduation Rate Data (GPGRD), Consortium for Student Retention Data Exchange (CSRDE), Integrated Postsecondary Data System (IPEDS), National Academic Advising Association (NAAA), National Symposium on Postsecondary Student Success (NSPSS), and high-school and beyond database. The dependent variable is graduation rate which will collect from total 1021 schools in bachelor's degree within 6 years nationwide and the independent variables include full-time retention, student-to-faculty ratio, undergraduate enrollment, tuition and fees from 2016 to 2019 academic school year, database of library, percent admitted, the average salary of full-time faculty, and grants offered.

Table 1 shows that the dependent variable was graduation rate (N=1021, M=52.70, SD=19.70)in bachelor degree within 6 years nationwide and the independent variables include full-time retention (N=1018, M=74.94, SD=14.55), student-to-faculty ratio (N=1047, M=15.24, SD=5.20), undergraduate enrollment total (N=1063, M=6196.25, SD=8000.25), tuition and fee from 2016 to 2017 academic school year (N=1029, M=20448.48, SD=13172.49), database of library(N=1060, M=.46, SD=6.65), percent admitted (N=929, M=66.78, SD=18.83), average salary of full-time faculty (N=1039, M=74007.91, SD=21399.94), and grants offered (N=1021, M=40.30, SD=18.51). Currently, the study will explore the relationship between independent variables and dependent variable and estimate which regression is the best fit between them.

Table 1: Descriptive Statistics

Variable	Description of Variables	N	Minimum	Maximum	Mean	SD
GBA6RTT	Graduation Rate-bachelor's degree within 6 years, total	1021	0	53807	52.70	19.70
RET_PCF	Full-time retention rate, 2016	1018	0	100	74.94	14.55
STUFACR	Student-to-faculty ratio	1047	0	70	15.24	5.20
EFUGFT	Full-time undergraduate enrollment	1063	0	103711	6196.25	8000.25
TUFEYR3	Tuition and fees, 2016-17	1029	0	55056	20448.48	13172.49
LEDATABP	Databases as a percent of the total library collection	1060	0	100	.46	6.65
DVADM01	Percent admitted, total	929	5	100	66.78	18.83
SALTOTL	Average salary of 9 months for full-time instructional staff-all ranks	1039	9555	199387	74007.91	21399.94
PGRNT_P	Percent of full-time first-time undergraduates awarded Pell grants	1021	0	100	40.30	18.51

This table defines each variable and provides general statistics giving an overview of factors that are relevant in explaining colleges and universities graduation rates.

Data Analysis

The multiple regression was conducted to analyze the relationship between dependent variable and independent variables, the regression utilized to estimate the relationship between graduation rate (N=1021, M=52.70%, SD=19.70%) and others independent variables including full-time retention (N=1018, M=74.94%, SD=14.55%), student-to-faculty ratio (N=1047, M=15.24%, SD=5.20%), undergraduate enrollment total (N=1061, M=6196.25, SD=8000.25), tuition and fee (N=1029, M=20448.48, SD=13172.49), total libraries (N=1060, M=.46%, SD=6.65%), faculty salary (N=1039, M=74007.91, SD=21399.94), Percent accepted rate (N=929, M=66.78%, SD=18.83%), and Percent of full-time first-time undergraduates grants awarded

(N=1021, M=40.30%, SD=18.51) among the schools in the United States. The multiple regression model takes the form: y $GBA6RTT = \beta_0 + \beta_1 RET\_PCF + \beta_2 STUFACR + \beta_3 EFUGFT + \beta_4 TUFEYB3 + \beta_5 LEDATABP + \beta_6 SALTOTL + \beta_7 DVADM01 + \beta_8 PGRNT\_P + \varepsilon$. The descriptive statistics were used to categorize the dependent and independent variables to estimate the mean and standard deviation shown in the table 1 above.

Results

Regressions below examine the impact of different variables and determine what influences the graduation rates among colleges and universities in the United States. Therefore, the dependent variable, the graduation rate of schools is a function of independent variables of the full model shown as y $GBA6RTT = \beta_0 + \beta_1 RET\_PCF + \beta_2 STUFACR + \beta_3 EFUGFT + \beta_4 TUFEYB3 + \beta_5 LEDATABP + \beta_6 SALTOTL + \beta_7 DVADM01 + \beta_8 PGRNT\_P + \varepsilon$ and the results found in the study discussed below.

Question 1: How do the independent variables (x) predict graduation (y)?

The regression was conducted to estimate the relationship between dependent variable graduation rate and the independent variables and the results in table 2 showed that there was at least one independent variable significant relationship of predicting the graduation rate because of the $F_{(8,912)}=458.718$, p=.0001 (<.05), R=89.5%, R2=80.1%, Adjusted R2=79.9%, Durbin-Watson=1.702. Therefore, the independent variables explain 80.1% of the variation in the dependent variable of graduation rate in the current study. In terms of the model trimming, the results also showed that STUFACR and LEDATABP are not significant predictors of the graduation rate in the current study. According to the histogram of residuals show a reasonably normal distribution and the VIF is less than three which means that the multicollinearity is not a concern in the study. Therefore, the results show that there was a significant relationship between the variables in the study.

Table 2: Regression-Dependent Variable: Graduation Rate

Independent Variables	Coefficients	Std. Error	T-Statistic	P-value
Constant (B$_0$)	4.852	3.811	1.273	.203
RET-PCT	.679	.036	18.691	.000
STUFACR	-.154	.084	-1.838	.066
EFUGFT	.000	.000	6.853	.000
TUFEYB3	.000	.000	11.102	.000
LEDATABP	.188	1.525	.123	.902
SALTOTL	7.303E-5	.000	4.141	.000
DVADM01	-.055	.015	-3.587	.000
PGRNT_P	-.263	.021	-12.313	.000
Number of observations: 921	R-squared:.801	F statistic:458.718		
*statistically significant at				

the 5% level

This table shows the regression, graduation rates as a function of relevant variables.
y GBA6RTT = β_0 + β_1 RET_PCF + $\beta2$ STUFACR+ $\beta3$ EFUGFT +$\beta4$ TUFEYB3+ $\beta5$ LEDATABP+ $\beta6$ SALTOTL+ $\beta7$ DVADM01+ + $\beta8$ PGRNT_P + ε

Question 2: What is the best regression model fit the graduation in the study?

Since student-to-faculty ratio (STUFACR) and whole school library (LEDATABP) have no statistically significant predictors to the graduation rates in the study, the current study decides to remove the two independent variables to compare the two regression models below. Through comparing the two-regression models below, the study will decide which regression model best fits the current study. The two regression shows below:

Regression Model 1: *y GBA6RTT = β_0 + β_1 RET_PCF + $\beta2$ EFUGFT +$\beta4$ TUFEYB3+ β 4SALTOTL+ $\beta5$ DVADM01+ + β 6PGRNT_P + ε*
Regression Model 2: *y GBA6RTT = β_0 + β_1 RET_PCF + $\beta2$ STUFACR+ $\beta3$ EFUGFT +$\beta4$ TUFEYB3+ $\beta5$ LEDATABP+ $\beta6$ SALTOTL+ $\beta7$ DVADM01+ + $\beta8$ PGRNT_P + ε*

Table 3: Regression-Dependent Variable: Graduation Rate for Regression Model 1

Independent Variables	Coefficients	Std. Error	T-Statistic	P-value
Constant (B_0)	2.290	3.537	.647	.518
RET-PCT	.681	.036	18.775	.000
EFUGFT	.000	.000	6.617	.000
TUFEYB3	.000	.000	13.133	.000
SALTOTL	7.388E-5	.000	4.187	.000
DVADM01	-.058	.015	-3.845	.000
PGRNT_P	-.265	.021	-12.391	.000
Number of observations:921	R-squared:.800	F statistic:610.139		
*statistically significant at the 5% level				

This table shows the regression, graduate rates as a function of relevant variables. y GBA6RTT = β_0 + β_1 RET_PCF + $\beta2$ EFUGFT +$\beta4$ TUFEYB3+ β 4SALTOTL+ $\beta5$ DVADM01+ + β 6PGRNT_P + ε (1)

Table 3 showed that the results of the regression model 1 has a better fit for the current study compared with model 2 shown in table 2 above. The model 1 better fits the current study due to value of F $(6,914)$ =610.139, p=.0001 (<.05), R=89.5%, R^2=80%, Adjusted R^2=79.9%. However, the model 2 has the value of F $(8,912)$ =458.718, p=0.001 (<.05), R=89.5%, R^2=80.1%, Adjusted R^2=79.9%. Specifically, the mean square from model 1 is 35812.977 which is more than the value of 26884.498 from model 2. Both 89.5% from model 1 was correlated with the graduation rate as well as about 80% of the variability of graduation rate in the study explained. Therefore, the study concluded that the regression model 1 is a better fit the current study on college students' graduation rate.

Discussion, Conclusion, and Recommendations for Future Studies

The current study found that there is a statistically significant relationship between graduation rate and other independent variables including full-time retention rate, full-time undergraduate enrollment, tuition and fee, faculty salary, percent acceptance rate and percent grant offered which is compatible of the previous studies. The study found similar results as Gansemer-Topf & Schuh (2006) said that institutional grants play a significant role between graduation rates and grants offered. Cooter et al. (1998) mentioned that the availability of grant funding might be a significant factor for students' academic success and grant-funding can be one of the factors related to graduation rate. Aside from the grants offered by the institution, the graduation rate has correlated with retention rate, cost, salary, and acceptance rate as Crawford (2015) stated that graduation rate has correlated with academic and non-academic factors as well as Reardon et al. (2015) indicated that graduation retention is a significant predictor to estimate the graduation rate.

Since the graduation rate has a significant impact on various dependent variables such as grants, enrollment, salary, and acceptance rate founded in this study, the school leaders need to use a multilevel leadership framework to both provide better support and increase graduation rates. This framework could improve the graduation rates through collaboration, creativity, and virtue leadership in building a supportive community in a cultural context (Zhang & Koshmanova, 2020). Also, the school principals tend to use the backward curriculum approach to redesign an effective teaching plan to provide a quality of education to the students (Zhang & Koshmanova, 2020). Importantly, Zhang & Koshmanova (2020) stated that gritty leadership with peer-driven activity and peer-led could guide the school stakeholders to create a better community for not only maintaining but also increasing the graduation rate and school social reputation.

However, the current study found that there was no significant relationship between student-to-faculty ratio and graduation rate which contradicted with Dagley et al. (2015) stated that there was a relationship between graduation rate and student-faculty ratio. The study also found there was no relationship between school library collection and graduation and also contradicted with the previous studies as Eng and Stadler (2015), and Fass-Holmes (2016) stated that the library could increase the students' graduation rate because the library could make a school like home.

Therefore, the study suggests that the future study would utilize multiple regression analysis to explore the relationship between graduation and the function of library use regarding the gender and economic status (Reardon et al., 2015). The future study aims to discover the reasons why library use can increase students' graduation rate and why the current study contradicted the previous studies. Generally, once the university has a higher graduation rate, the university has better performance and vice versa (Gold & Albert, 2004), thus driving the school leader to implement the school setting for excellence effectively. A mixed research design would also help the school leaders determining what types of leadership frameworks such as virtue, transformative, adaptive, or peer-led leadership (Zhang & Koshmanova, 2020) to not

only increase graduation rates but also to build a supportive community in the future study recommended.

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