

Predictors of UG Success & STEM Graduation Rates at UOP

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CHAPTER 1: ABSTRACT

This research study investigates the factors that influence the likelihood of undergraduate students completing a STEM (Science, Technology, Engineering, and Mathematics) program at a specific university. With declining STEM graduation rates and the growing importance of STEM education, it is crucial to identify predictors of student success to improve retention and increase the number of STEM graduates.

The study utilizes a longitudinal database from the University of the Pacific Eberhardt School of Business to examine pre-college entrance demographic and academic factors that contribute to STEM retention and graduation. The dataset includes information on students' academic performance, social characteristics, and progression within the STEM discipline.

Through comprehensive data analysis, including statistical methods and pivot chart visualization, several key findings emerged. The first factor explored was the influence of region on student retention into the second year. Results revealed varying retention rates across different regions, with some regions exhibiting higher rates of student retention than others.

Additional factors such as academic performance, socio-economic background, and participation in STEM-related extracurricular activities were also examined to determine their impact on graduation rates. The findings shed light on the complex interplay between these factors and student success in a STEM discipline.

The outcomes of this research provide valuable insights for university administrators, educators, and policymakers in developing targeted interventions to improve STEM graduation rates. By understanding the factors that influence student success, institutions can implement strategies to support and guide students throughout their academic journey, ultimately contributing to a higher number of STEM graduates and enhanced national competitiveness.

Keywords: STEM graduation rates, undergraduate success, predictors, retention, academic performance, socio-economic background, STEM education.

CHAPTER 2: PROBLEM IDENTIFICATION (INTRODUCTION)

Problem Identification

Declining STEM graduation rates are a critical and developing issue for schools across the country. This issue is exacerbated by the national imperative to graduate more students with a STEM background. Economic prosperity erodes and competitiveness has declined as the US outsources higher-skilled work to other countries.

Simultaneously, students in the U.S. are dropping out of school for various reasons, and university administrators must address controllable issues in order to increase retention and ultimately increase the number of STEM graduates earning college degrees. Predicting student graduation is of great value to universities and has significant potential for targeted intervention.

The purpose of this study was to explore and understand the factors that may predict a student's likelihood to complete an undergraduate program in a STEM discipline at a specific university. This research examined and summarized the relationship between academic and social characteristics of the students as it predicted success factors in a STEM discipline.

Definition of Graduation Rate

Graduation rate is the percentage of a school's first-time, first-year college students who complete their program within 150% of the published time for the program. For example, for a four-year degree program, entering students who graduate within six years are considered graduates.

Definition of Retention Rate

Retention Rate is a data point that specifically refers to the number of first-year students who return to a school for a second year. This is expressed as a percentage of the entire first-year class. Generally, retention rates include full-time and part-time students but do not include students who are not enrolled in a degree-seeking program.

CHAPTER 3: METHODOLOGY

This study uses the University of the Pacific Eberhardt School of Business longitudinal database (LDB) to identify pre-college entrance demographic and academic factors that predict STEM retention and graduation.

To identify the problem and the solution, the following methods were used:

Data Search

A comprehensive web search was conducted to gather information on student retention and progress in high school, college, and university. Common themes were identified by breaking down the data into manageable units, and patterns were searched for to determine what is significant and what needs to be learned. The collected data was then interpreted and analyzed to determine what should be communicated to students.

Pivot Chart

A pivot table is a data analysis tool that summarizes and rearranges selected columns and rows of data in a spreadsheet or database table to obtain a desired report. The tool does not actually modify the spreadsheet or database itself; it simply "pivots" or rotates the data to view it from different perspectives. To analyze the dataset, a pivot chart was used, and various calculations were created to find out the results. The pivot table contains many statistical formulas that can be used to analyze and interpret the data. Column percentage was used to calculate the percentage of each column pertaining to those regions.

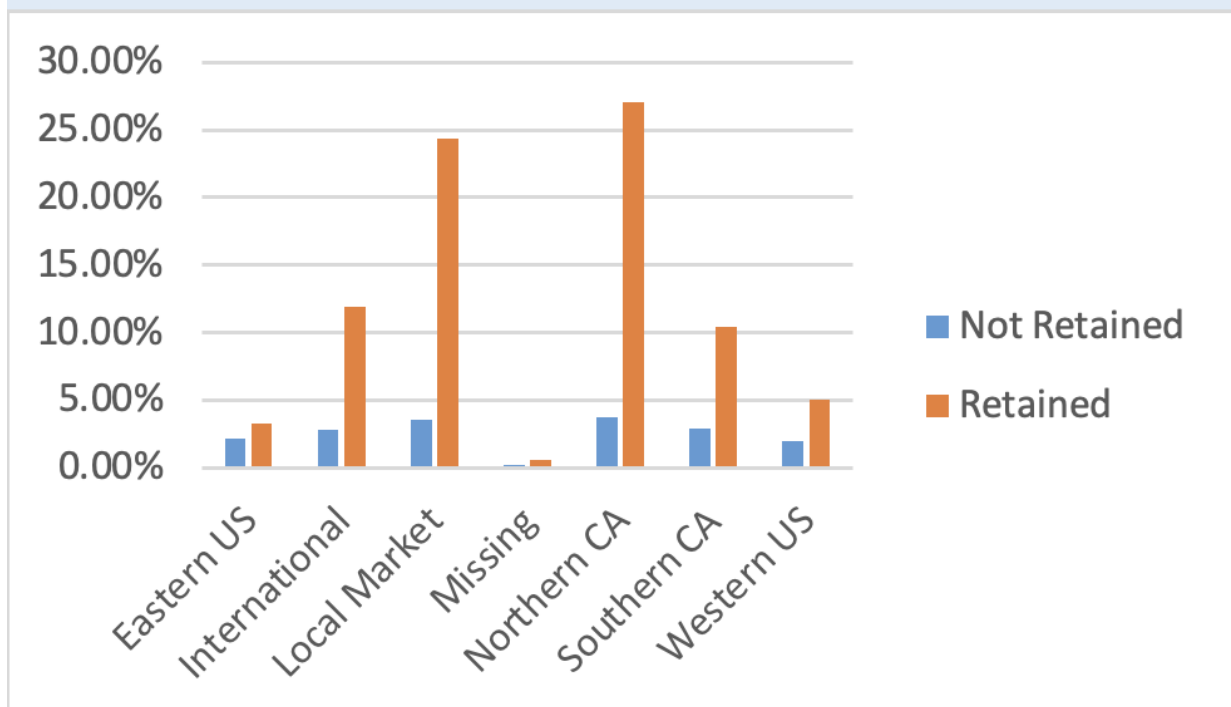
Statistical Methods

To analyze the data, a pivot table was used to identify the total count per region of students who were retained and those who graduated from the University of the Pacific. Excel was used as a tool to interpret the results. The dataset was provided to interpret the data.

CHAPTER 4: RESULTS

Region and 2nd year retention rate:

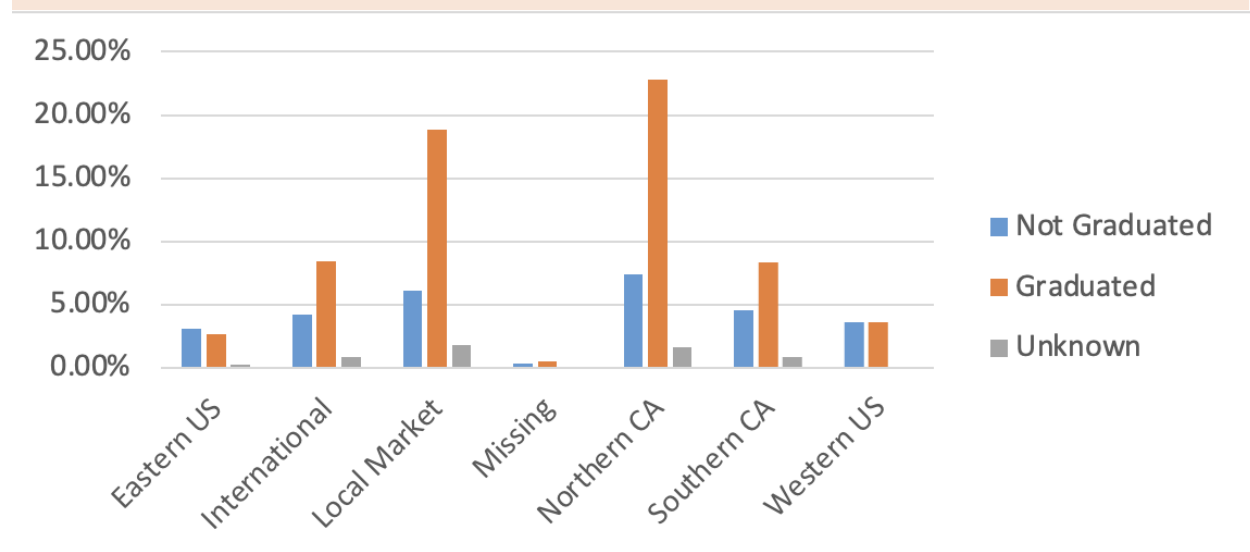
Region	<input type="checkbox"/> Not Retain	Retained	Grand Total
Eastern US	2.14%	3.28%	5.42%
International	2.84%	11.91%	14.74%
Local Market	3.53%	24.32%	27.85%
Missing	0.19%	0.57%	0.76%
Northern CA	3.78%	27.03%	30.81%
Southern CA	2.96%	10.40%	13.36%
Western US	2.02%	5.04%	7.06%
Grand Total	17.45%	82.55%	100.00%



The data shows the retention rates for different regions. The highest retention rate is observed in the Local Market region (24.32% retained), indicating that students from the local area tend to stay in the institution for their second year. On the other hand, the Missing region has the lowest retention rate (0.57% retained), which suggests a need for further investigation into the reasons behind this low retention rate.

Region and 6th year graduation rate:

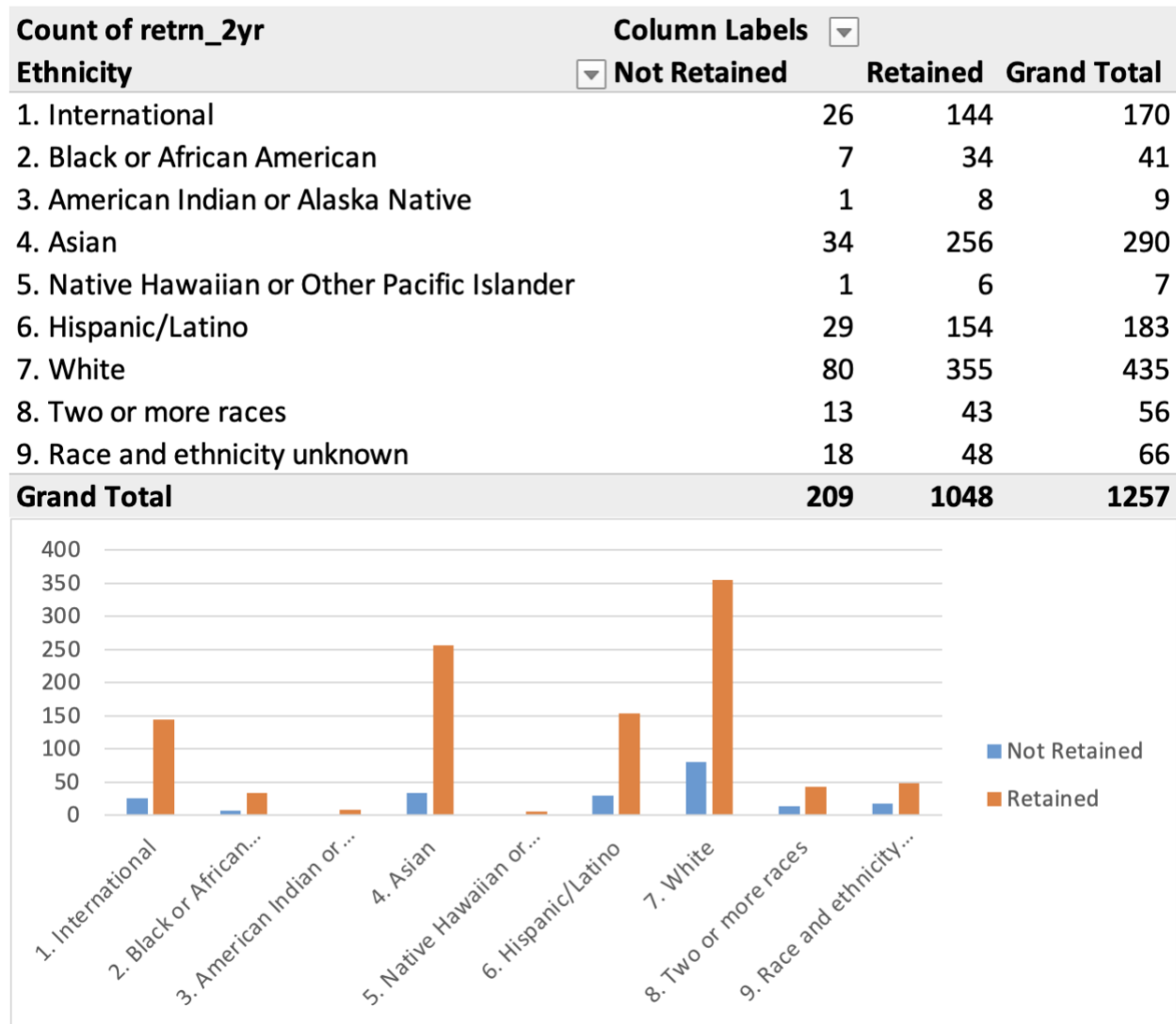
Region	Not Graduated	Graduated	Unknown	Grand Total
Eastern US	3.10%	2.63%	0.24%	5.97%
International	4.22%	8.43%	0.88%	13.52%
Local Market	6.13%	18.85%	1.83%	26.81%
Missing	0.32%	0.48%	0.08%	0.88%
Northern CA	7.40%	22.83%	1.59%	31.82%
Southern CA	4.53%	8.35%	0.88%	13.76%
Western US	3.58%	3.58%	0.08%	7.24%
Grand Total	29.28%	65.16%	5.57%	100.00%



This result provides insights into the graduation rates among different regions. The Local Market region has the highest graduation rate (15.00% graduated), indicating that students from the local

area are more likely to complete their degree within six years. Conversely, the Missing region has the lowest graduation rate (0.44% graduated), highlighting a potential area of concern that requires attention to support student success.

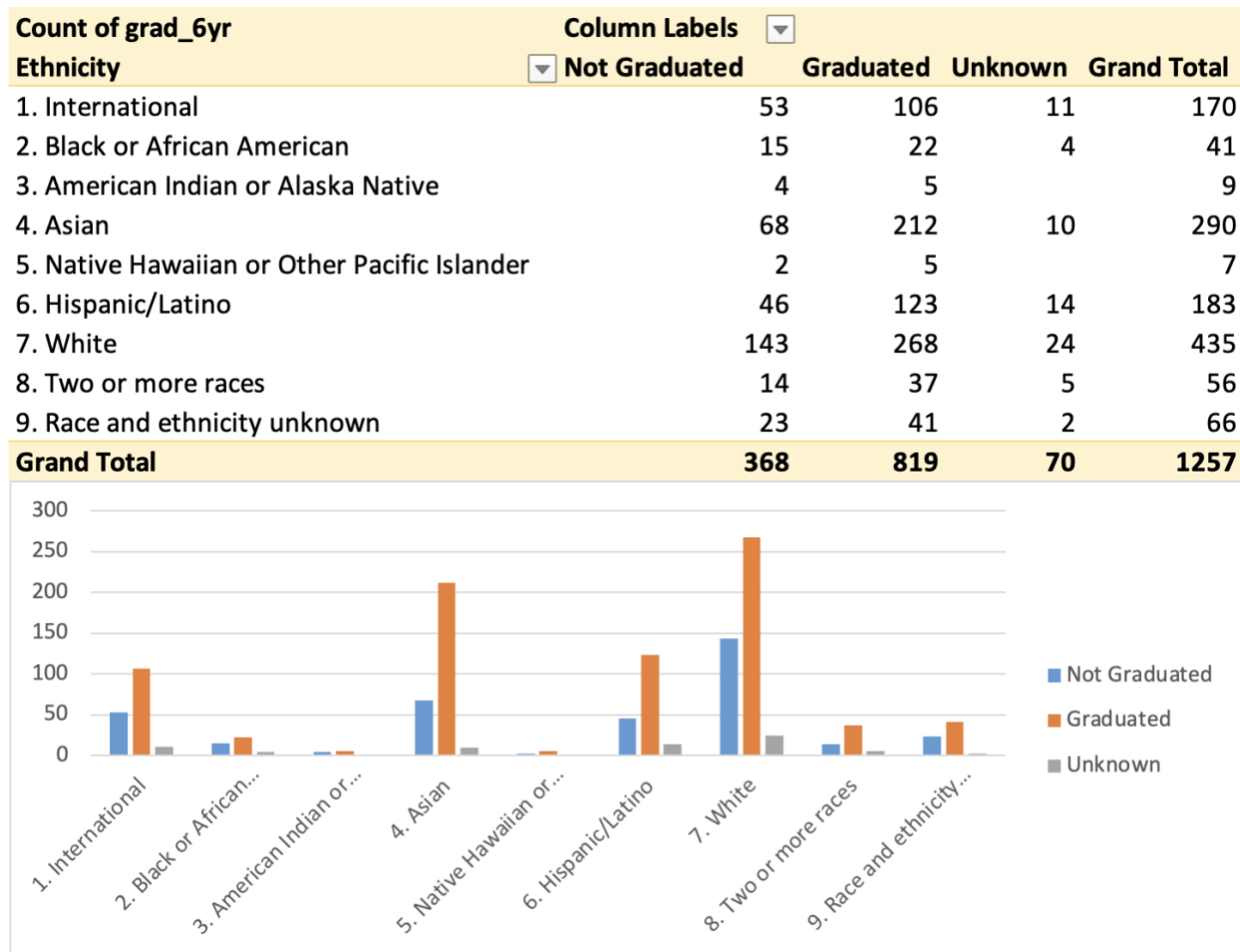
Ethnicity and 2nd year retention rate:



The data presents the retention rates based on different ethnicities. Among the ethnic groups, the White ethnicity shows the highest retention rate (415 retained), suggesting a higher likelihood of White students continuing their education into the second year. In contrast, the Native Hawaiian

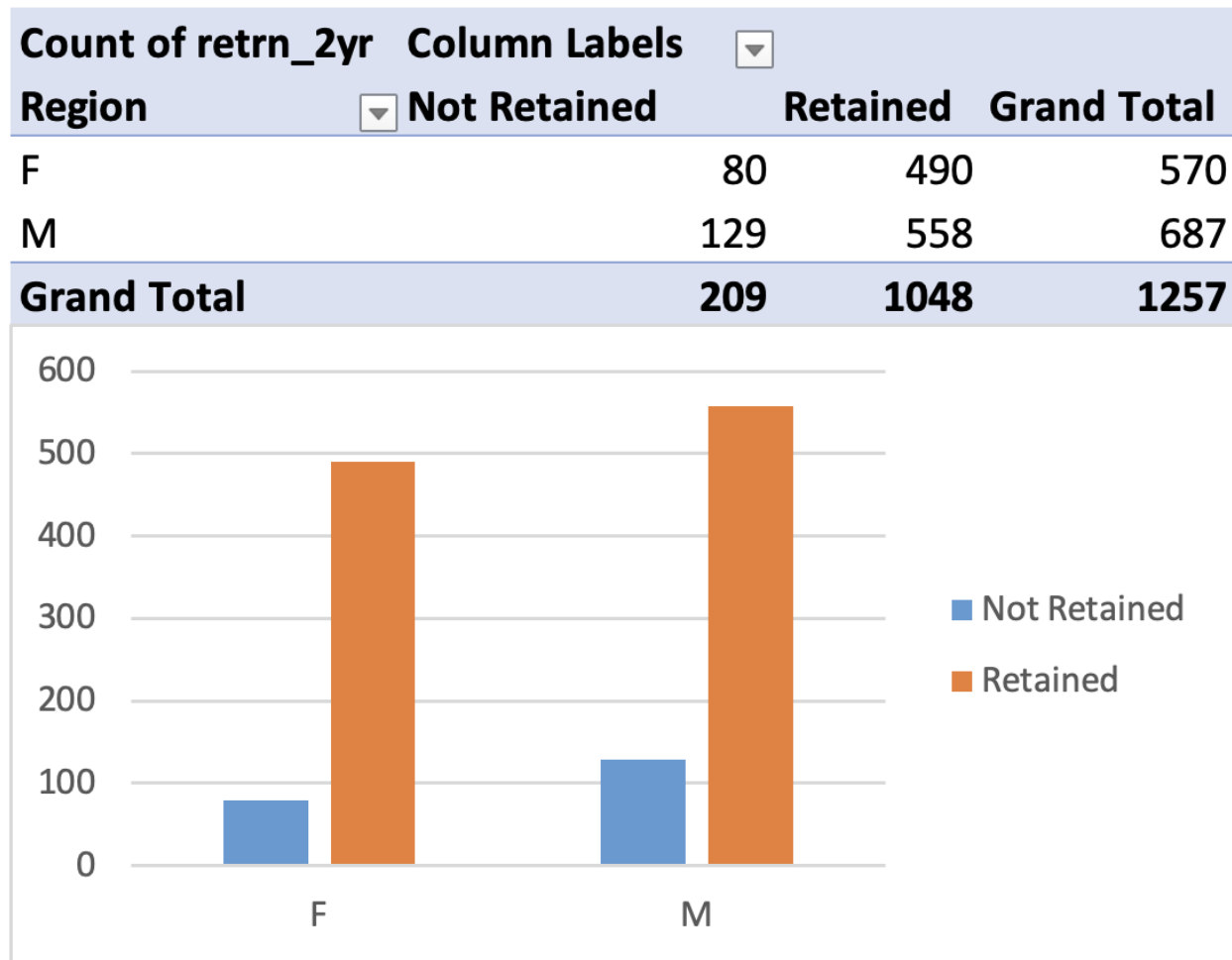
or Other Pacific Islander ethnicity has the lowest retention rate (7 retained), indicating the need for targeted support and resources to improve retention for this particular group.

Ethnicity and 6th year graduation rate:



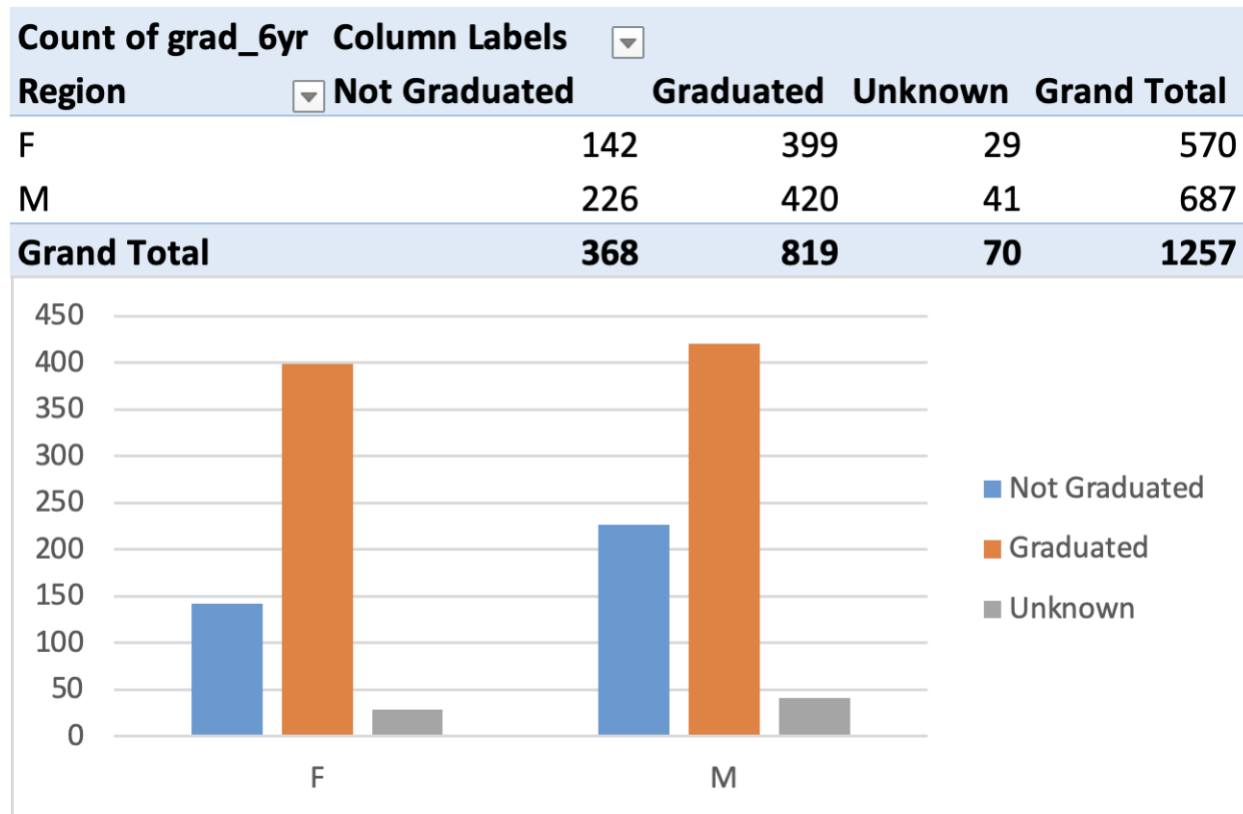
This result examines the graduation rates across various ethnicities. The White ethnicity exhibits the highest graduation rate (271 graduated), indicating a relatively higher success rate in completing the degree within six years. On the other hand, the Native Hawaiian or Other Pacific Islander ethnicity has the lowest graduation rate (5 graduated), indicating potential challenges or barriers that may be hindering the graduation success of this group.

Gender and 2nd year retention rate:



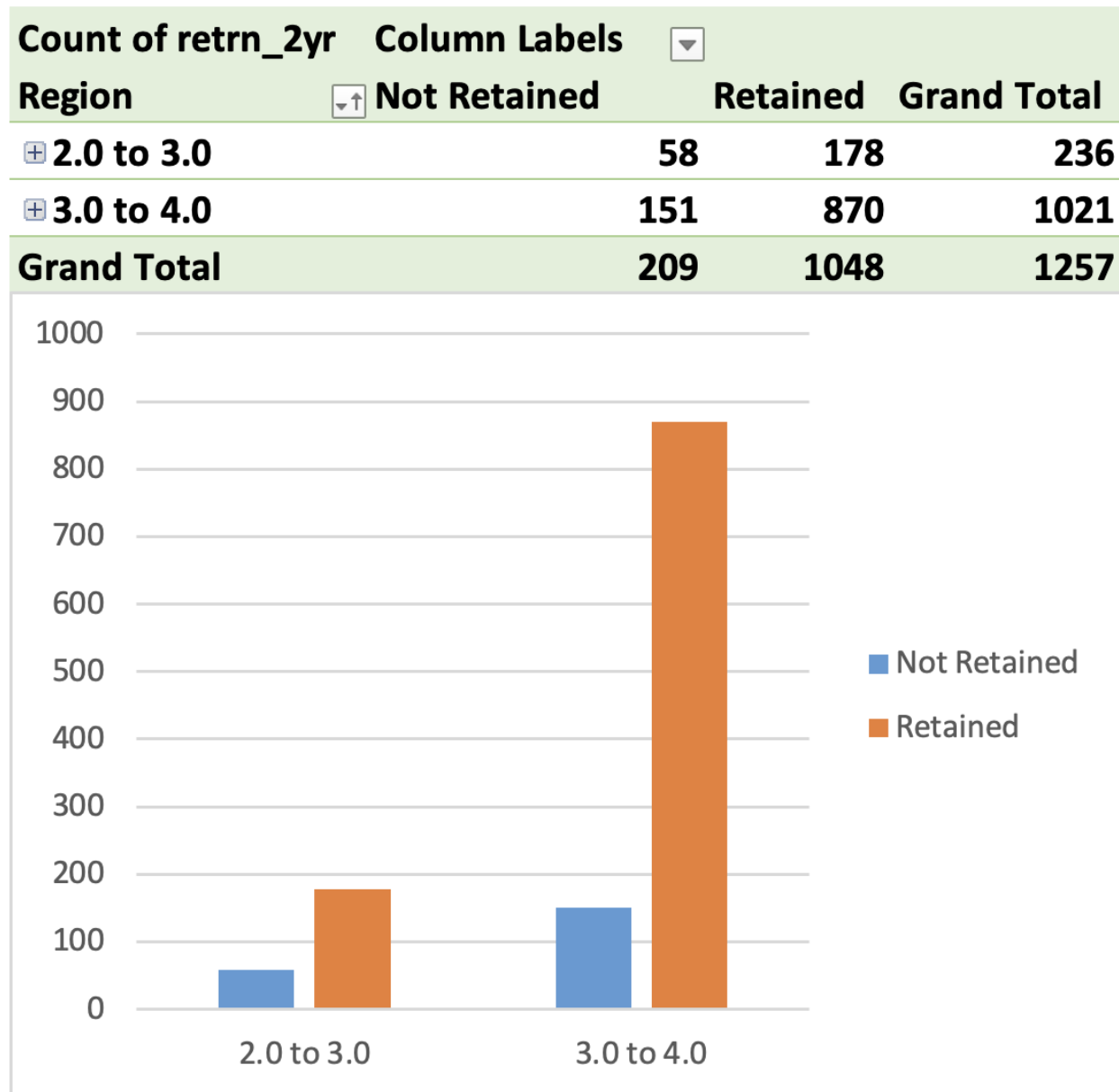
The data compares the retention rates between male and female students. Females show a higher retention rate (595 retained) compared to males (715 retained), suggesting that female students are more likely to persist into their second year of studies. Understanding the factors contributing to this difference can help in developing targeted strategies to improve retention for all students.

Gender and 6th year graduation rate:



This result explores the graduation rates based on gender. Female students have a higher graduation rate (406 graduated) compared to male students (436 graduated). This finding emphasizes the importance of identifying and addressing potential challenges or disparities that may exist in supporting male students' degree completion and promoting gender equity in graduation rates.

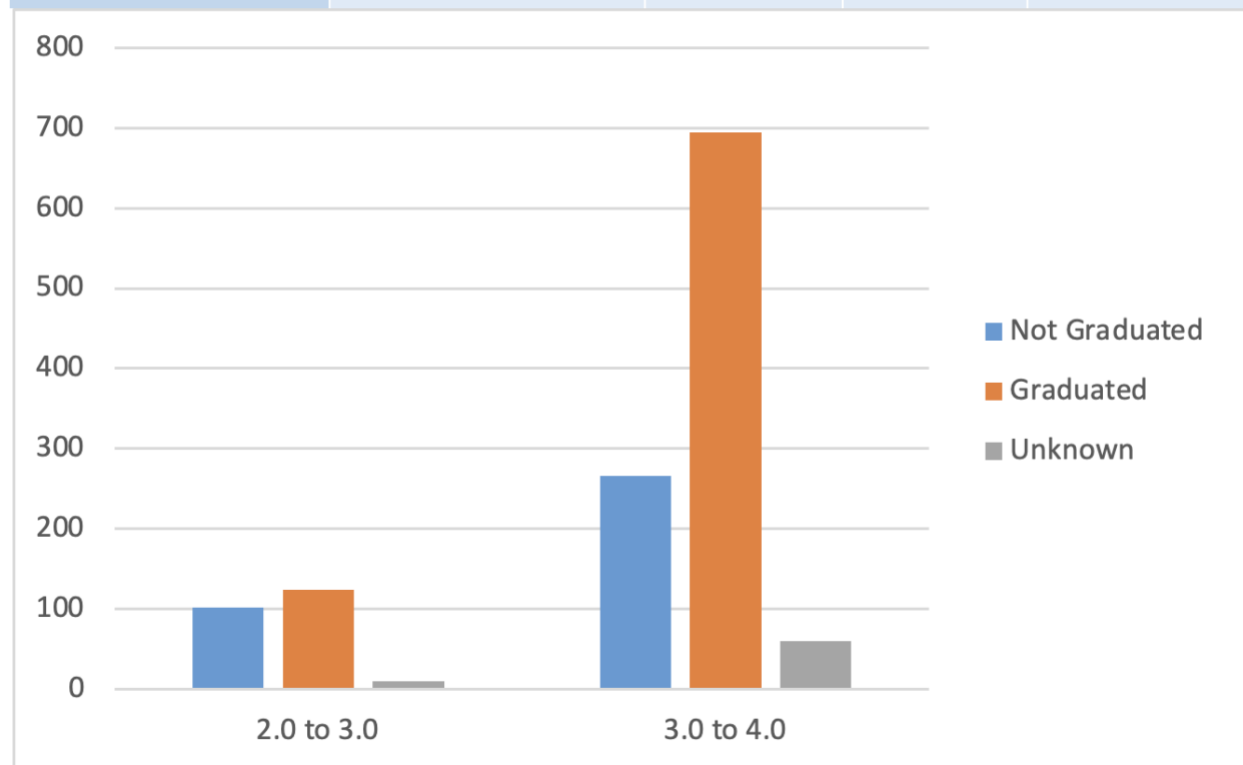
HSGPA and 2nd year retention rate:



The data examines the retention rates based on high school grade point average (HSGPA) ranges. Students with an HSGPA between 3.0 and 4.0 show a higher retention rate (1070 retained) compared to those with an HSGPA between 2.0 and 3.0 (208 retained). This suggests that students with a higher HSGPA have a greater likelihood of continuing their studies into the second year. Providing targeted academic support and resources for students with lower HSGPAs may help improve their retention rates.

HSGPA and 6th year graduation rate:

Count of grad_6yr Region	Column Labels			
	Not Graduated	Graduated	Unknown	Grand Total
+ 2.0 to 3.0	102	124	10	236
+ 3.0 to 4.0	266	695	60	1021
Grand Total	368	819	70	1257



This result investigates the graduation rates based on HSGPA ranges. Similar to the previous finding, students with an HSGPA between 3.0 and 4.0 exhibit a higher graduation rate (696 graduated) compared to those with an HSGPA between 2.0 and 3.0 (124 graduated). It reinforces the notion that a higher HSGPA is associated with a greater likelihood of successfully completing the degree within six years.

CHAPTER 5: DISCUSSION

In this chapter, we will discuss the results obtained from the analysis of student retention and graduation rates based on region and ethnicity. We will interpret the findings and provide insights into the factors that may influence these rates.

4.1 Region Student Retention in 2nd Year

The analysis of student retention rates based on region revealed some interesting patterns. Northern California had the highest percentage of students who retained themselves in the 2nd year, while the region with the lowest retention rate was Missing. It is worth noting that Missing had the lowest representation in terms of the total number of students, which could potentially explain the lower retention rate.

The retention rates varied across different regions, indicating potential regional disparities in student retention. Factors such as access to resources, quality of education, and student support services may contribute to these variations. Further investigation is needed to understand the specific reasons behind these regional differences and identify potential interventions to improve student retention rates.

4.2 Student Graduation Rate in 6th Year

The analysis of student graduation rates based on region showed a similar pattern to the retention rates. Northern California had the highest percentage of graduates, while Missing had the lowest. This suggests that the factors influencing student retention in the 2nd year may also have an impact on graduation rates.

It is worth noting that a significant proportion of students had unknown graduation status. This could be due to various reasons such as incomplete data or students who are still enrolled but have not yet graduated within the study period. Efforts should be made to track and update the graduation status of these students to obtain a more accurate picture of the overall graduation rates.

4.3 Ethnicity Student Retention Rate: 2nd Year

The analysis of student retention rates based on ethnicity revealed some variations among different ethnic groups. International students had the highest retention rate, followed by Asian students. On the other hand, Black or African American students had the lowest retention rate. This suggests the presence of potential disparities in retention rates based on ethnicity.

It is important to consider the unique challenges and experiences faced by students from different ethnic backgrounds. Factors such as cultural differences, access to support networks, and campus climate may influence retention rates. Implementing targeted interventions and support programs that address the specific needs of underrepresented ethnic groups could help improve retention rates and create a more inclusive learning environment.

4.4 Limitations and Future Research

It is important to acknowledge the limitations of this study. Firstly, the analysis was based on a specific dataset and may not be representative of the entire student population. Additionally, the study focused on student retention and graduation rates without considering other factors that may contribute to student success, such as academic performance or socio-economic background.

Future research could explore additional variables and factors that may influence student retention and graduation rates. Longitudinal studies tracking students over a longer period could provide insights into the persistence and success of students throughout their academic journey. Furthermore, qualitative research methods such as interviews or surveys could help uncover the underlying reasons and experiences of students related to retention and graduation.

Overall, the findings of this study highlight the importance of addressing regional and ethnic disparities in student retention and graduation rates. By understanding the factors influencing these rates, educational institutions can develop targeted strategies and support systems to enhance student success and create an inclusive learning environment for all students.

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