Universities and Colleges: Enrollment, Tuition, Earnings, and Graduation Rate

David Williams

Montgomery College

Data 205

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**Introduction**

This project will analyze and visualize different aspects of colleges and universities, both locally and nationally. The project was completed in the R programming language and in Tableau and the theme of the project is universities and colleges. The project will start locally with Montgomery College, then Montgomery County, and finally, national colleges and universities. The project consists of four sections.

The first section of the project begins with Montgomery College enrollment. The Montgomery College analysis will look at the demographic makeup of each of the three campuses. The second section will look at a Montgomery County program that provides tuition assistance to Montgomery County employees. The third section will look at the average a student is expected to earn ten years after graduation. The fourth section will analyze the factors that influence graduation rates.

**Montgomery College Enrollment**

Montgomery College data comes from Montgomery College Enrollment Data on the Montgomery County website [1]. The dataset consists of 25,321 rows and 18 columns shown in appendix A. The data can be used by college officials to tailor their programs and classes based on the demographics of each of the three campuses.

**Method**. There was minor wrangling of the data for this dataset. One new column was added combining the three columns: “attending\_germantown,” “attending\_rockville,” and “attending\_takoma\_park\_ss,” into the column named “campus.” This column was used in most of the visualizations.

**Results**. The Montgomery College enrollment section contains seven R bar charts and one Tableau table.

The visualizations that will be presented:

1. Enrollment by campus.
2. Enrollment by age.
3. Enrollment by age and campus.
4. Enrollment by campus and gender.
5. Enrollment by campus and race.
6. Enrollment by campus and full time or part-time.
7. Enrollment by campus and day or evening.
8. Tableau table of cross-reference of the program taken and the campus.

**Conclusion.** Most of the conclusions are what is expected. The following are the conclusion from each of the visualizations in the same order.

1. Rockville campus has the highest enrollment, and Takoma campus has the lowest enrollment.
2. Highest enrollment is the 20 or younger age group, and the lowest enrollment is the 25 to 29 age group. This may be misleading because the next age group contains all ages above 29.
3. Rockville campus with age group 20 or younger is the highest enrollment, and Takoma campus with age group 25 to 29 has the lowest enrollment.
4. Females on all campuses have higher enrollment than males.
5. Whites have the highest enrollment in the Rockville and Germantown campuses and blacks have the highest enrollment in Takoma. Native has the lowest enrollment in all three campuses.
6. Part-time students outnumber full-time students on all three campuses.
7. Day time enrollment is the highest for all three campuses.
8. General Studies program has the highest enrollment for all three campuses.

**Tuition Assistance**

Montgomery County has a tuition assistance program for the Montgomery County employees. The data comes from the Tuition Assistance dataset located on the Montgomery County website[2]. The data consist of 3260 rows and seven columns shown in appendix B.

When cross-referencing with specific employees, this data can be used to answer several questions: are employees taking classes that are related to their current job description? What is the cost for each department? The data could be used for individual promotions and department funding.

**Method**. This section was completed in Tableau, so there was not any data wrangling, and the coding came directly from the dataset.

**Results.** Three Tableau Visualizations were created:

1. Tableau of the counts of types of degree by the department.
2. Tableau of the counts of major by degree.
3. Tableau of the average cost per department.

**Conclusion.** Below are the conclusions of the three Tableau Visualizations.

1. The Fire/Rescue Services department has the most bachelor’s degrees awarded.
2. Bachelor’s degree in Business Management and Criminal Justice are the most awarded degrees.
3. Management and Budget department has the highest tuition budget.

**Earnings after Graduation**

This dataset consists of 2,463 rows, which comes from the Opportunity Insight website [3], appendix C shows the columns. The data consist of most college in the country at the county level, including Montgomery County. The column scorecard\_median\_earnings\_2011, which is the mean earning of a student that graduated in the past ten years, is used in the visualizations.

The questions to answer are 1. What are the mean earnings after graduation from schools in Montgomery County, including Montgomery College? 2. What are the mean earnings after graduation from different tiers (Ivy league, private, public, etc.) college? 3. What are the mean earnings after graduation by a specific school?

**Method.** The section was completed in Tableau, so there was not any data wrangling, and the coding came directly from the dataset.

**Results.** Three Tableau visualizations were created:

1. Tableau of earnings after graduation from schools in Montgomery County.
2. Tableau of earnings by tier.
3. Tableau of earnings by the school.

**Conclusion.** Below are the conclusions of the three Tableau Visualizations.

1. The average earning in Montgomery County at Washington Adventist University is 46,800. The average earning for a Montgomery College graduate is 40,500.
2. Ivy Plus tier have the highest earnings after graduation.
3. Massachusetts College of Pharmacy and Health Science (MCPHS) University is the highest earnings after graduation.

**Graduation Rate**

This dataset consists of 2,463 rows, which comes from the Opportunity Insight website [3], appendix C shows the columns. The data consist of most college in the country at the county level, including Montgomery County. The goal is to identify some of the factors that affect the graduation rate. The graduation rate is important to the college, for grants, funding, ranking, and prestige. The graduation rate for the student effects which college or university a student may choose to attend.

**Method.** There are many factors other than what is included in this dataset, however, this project will analyze only three:

1. Tuition cost. Is the tuition affordable to continue? Did the student need to work a part-time job affecting grades? Did financial aid discontinue?
2. Faculty Salary. This assumes that the higher salary of the faculty is an indicator of the teacher’s ability to instruct the students.
3. SAT score. Did the student standardize test score indicate success in college?
4. The tier of the school. There are 14 tiers of schools, as shown in appendix C. The tier is a type of school: selectivity, private or public, two-year, or four-year.

**Results**

The graduation rate contains: two box plots, one scatter plot, and one tableau.

1. Box plot of graduation rate by tuition cost
2. Box plot of graduation rate by faculty salary
3. Scatter plot of graduation rate by SAT score and tier
4. Tableau of graduation rate by tier

**Conclusion.**

1. The highest graduation rate is the school where the tuition cost is between 40k and 50k.
2. The highest graduation rate is the school where the average faculty salary is greater than 100k.
3. The higher SAT score at an elite school has the highest graduation rate.
4. Ivy Plus schools have the highest graduation rate.

References

[1] Montgomery College Enrollment. dataMontgomery.

https://data.montgomerycountymd.gov/Education/Montgomery-College-Enrollment-Data/wmr2-6hn6

[2] Tuition Assistant. dataMontgomery.

https://data.montgomerycountymd.gov/Education/Tuition-Assistance/p7z5-tjrz

[3] College Level Characteristics from the IPEDS Database and the College Scorecard. Opportunity Insights

https://opportunityinsights.org/data/

Appendix A

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| --- | --- | --- |
| Column Name | Description | Type |
| **Fall Term** | Year of the School Term reported. | Number |
| **Student Type** | Status of student enrolled New, Continuing …. | Plain Text |
| **Student Status** | Part or Full time enrollment | Plain Text |
| **Gender** | Student Gender | Plain Text |
| **Ethnicity** | Student Ethnicity | Plain Text |
| **Race** | Student Race | Plain Text |
| **Attending Germantown** | Students attending Germantown campus | Plain Text |
| **Attending Rockville** | Students attending Rockville campus | Plain Text |
| **Attending Takoma Park/SS** | Students attending Takoma Park - Silver Spring campus | Plain Text |
| **Attend Day or Evening** | Time of Day primarily attended | Plain Text |
| **MC Program Description** | Program of Studies | Plain Text |
| **Age Group** | Age Range of Enrollee | Plain Text |
| **HS Category** | Description of High School attended | Plain Text |
| **MCPS High School** | Montgomery County Public School attended | Plain Text |
| **City in MD** | City High School was located in MD | Plain Text |
| **State** | State in which Enrollee resides | Plain Text |
| **ZIP** | Zip code enrollee resides | Number |
| **County in MD** | County in which enrollee resides | Plain Text |

Appendix B

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| --- | --- | --- |
| Column Name | Description | Type |
| **Department** | Name of the County Department to which the Employee is assigned | Plain Text |
| **Major** | Name of a Major to which employee is currently pursuing | Plain Text |
| **Degree** | Name of a Degree Program to which the employee is currently enrolled | Plain Text |
| **School** | Name of a school/institution where employee took the course(s) | Plain Text |
| **Course Title** | Name of a course/seminar/conference taken by the employee | Plain Text |
| **Course Description** | Brief description of the course/seminar/conference taken by the employee | Plain Text |
| **Cost** |  | Number |

Appendix C

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| --- | --- |
| **Variable** | **Description** |
| super\_opeid | Institution OPEID / Cluster ID when combining multiple  OPEIDs |
| name | Name of Institution / Super-OPEID Cluster |
| region | Census region  1 = Northeast  2 = Midwest  3 = South  4 = West |
| state | State |
| fips | State FIPS code |
| cz | Commuting Zone ID |
| czname | Commuting Zone name |
| cfips | Combined state and county FIPS code |
| county | County name |
| zip | 5-digit ZIP Code |
| tier | Selectivity and type combination (defined above): 1 = Ivy Plus  2 = Other elite schools (public and private) 3 = Highly selective public  4 = Highly selective private 5 = Selective public  6 = Selective private  7 = Nonselective 4-year public  8 = Nonselective 4-year private not-for-profit  9 = Two-year (public and private not-for-profit) 10 = Four-year for-profit  11 = Two-year for-profit  12 = Less than two year schools of any type 13 = Attending college with insufficient data 14 = Not in college between the ages of 19-22 |
| tier\_name | Name of college tier |
| type | Type :  1 = public  2 = private non-profit |
|  | 3 = for-profit |
| iclevel | College’s level of degree offering: 1 = Four-year  2 = Two-year  3 = Less than Two-year |
| public | Indicator for public universities |
| barrons | Barron’s selectivity index: 1 = Elite  2 = Highly Selective 3, 4, 5 = Selective  9 = Special  999 = Non-selective |
| exp\_instr\_pc\_[YEAR] | Instructional Expenditures per Student in [YEAR] = 2000, 2013 |
| multi | Indicator that equals 1 if multiple colleges (OPEIDs) are  grouped in this super OPEID |
| hbcu | Indicator that equals 1 if historically black college/univ. |
| ipeds\_enrollment\_[YEAR] | Total IPEDS undergraduate enrollment (full time + part time)  in Fall [YEAR] = 2000, 2013 |
| sticker\_price\_[YEAR] | Average Annual Cost of Attendance (Tuition + Fees) in  [YEAR] = 2000, 2013 |
| grad\_rate\_150\_p\_[YEAR] | Percentage of students graduating within 150 percent of normal time at four-year and two-year institutions in [YEAR]  = 2002, 2013 |
| avgfacsal\_[YEAR] | Avg. Faculty Salary in [YEAR] = 2001, 2013 |
| sat\_avg\_[YEAR] | Average SAT scores (scaled to 1600) in [YEAR] = 2001, 2013, defined as the mean of the 25th and 75th percentile of math+verbal SAT scores. Missing for institutions that do not  require SAT. |
| scorecard\_netprice\_2013 | Net Cost of Attendance for Bottom 20% Income Quintile in  2013 from College Scorecard |
| scorecard\_rej\_rate\_2013 | Rejection (one minus acceptance) rate in 2013 from College  Scorecard |
| scorecard\_median \_earnings\_2011 | Median earnings of students in 2011 who are working and not enrolled 10 years after entry using data from College  Scorecard |
| endowment\_pc\_2000 | Endowment Assets per Student in 2000 |
| exp\_instr\_[YEAR] | Total Instructional Expenditures in [YEAR]=2000, 2012 |
| asian\_or\_pacific\_share\_fall\_2000 | Share of Asian or Pacific Islander undergraduate students in  Fall 2000 |
| black\_share\_fall\_2000 | Share of Black undergraduate students in Fall 2000 |
| hisp\_share\_fall\_2000 | Share of Hispanic undergraduate students in Fall 2000 |
| alien\_share\_fall\_2000 | Share of Non-resident alien undergraduate students in Fall  2000 |
| pct\_arthuman\_2000 | Arts and Humanities Major Share in 2000 |
| pct\_business\_2000 | Business Major Share in 2000 |

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| --- | --- |
| pct\_health\_2000 | Health and Medicine Major Share in 2000 |
| pct\_multidisci\_2000 | Multi/Interdisciplinary Studies Major Share in 2000 |
| pct\_publicsocial\_2000 | Public and Social Services Major Share in 2000 |
| pct\_stem\_2000 | STEM Major Share in 2000 |
| pct\_socialscience\_2000 | Social Sciences Major Share in 2000 |
| pct\_tradepersonal\_2000 | Trades and Personal Services Major Share in 2000 |