Developing Tools to Study Racial and Human Equity In Higher Education

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Project Basis: Practical Learning Analytics

Practical Learning Analytics is the analysis of already-available data about learners and their educational institution in order to make informed decisions to improve learning outcomes.

Background Information

- We completed a MOOC course ‘Practical Learning Analytics’ from the University of Michigan
  - Contained R scripts to visualize different performance metrics among demographics
  - Contained sample data

- We also attended a *Sloan Equity and Inclusion in STEM Introductory Courses* meeting in June

Main Components of Project

- Create a reporting tool capable of producing visualizations of performance metrics
  - Refactor R scripts to work in Tidyverse with **sample data from UMich**
    - Efficiency, flexibility with Tidyverse
    - Design improvements
    - Add functionality

Analyzing Performance Among Demographics

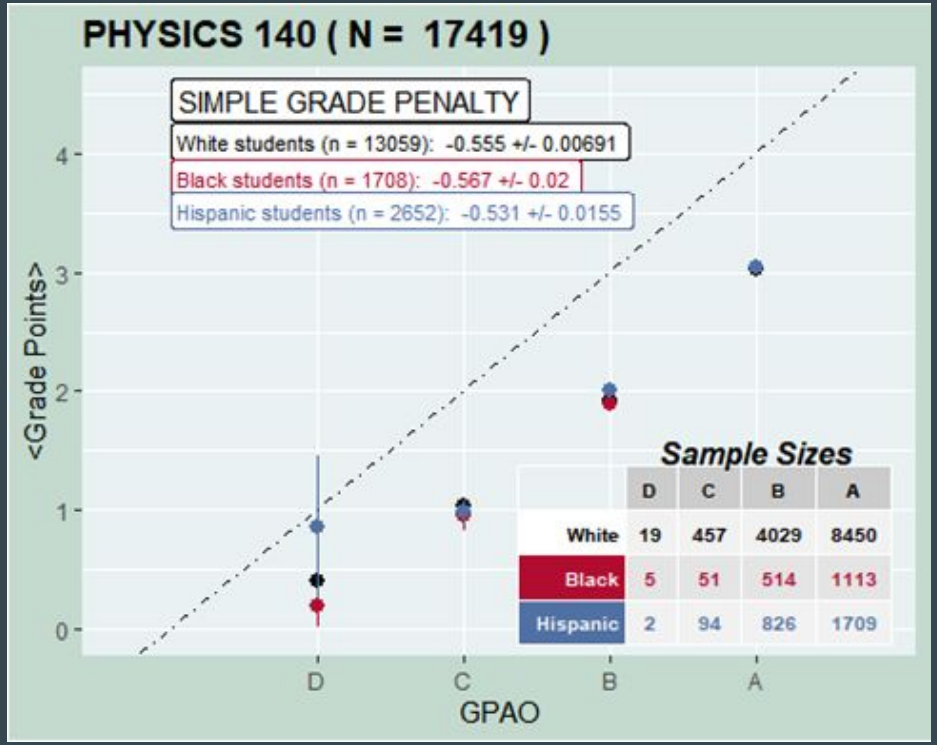
- Grade penalty: The difference between the average grade in the course, and the average GPA of students in their other courses
  - If average grade in MA-180 was a 3.5, but the average GPA of students in all other courses was 3.8, then MA-180 had a *grade penalty* of -0.3 grade points
  - **We can analyze how 'grade penalty' differs for different demographics in the same class**
  - **We can also 'bin' students into different GPA ranges and analyze separately**
- Course Persistence: The proportion of students in a particular class that go on to take some other specified class, based on their grade in the course
  - For example, '25% of students who received an A in MATH-100 went on to take MATH-101'
  - **We can analyze how 'course persistence' differs for different demographics in the same class**

Grade Penalty Example

How to read:

Hispanic students in the D range for their GPAO (n=2) average about a D in the course.

Hispanic students (n=2652) score about 0.531 grade points below their GPA in Physics 140

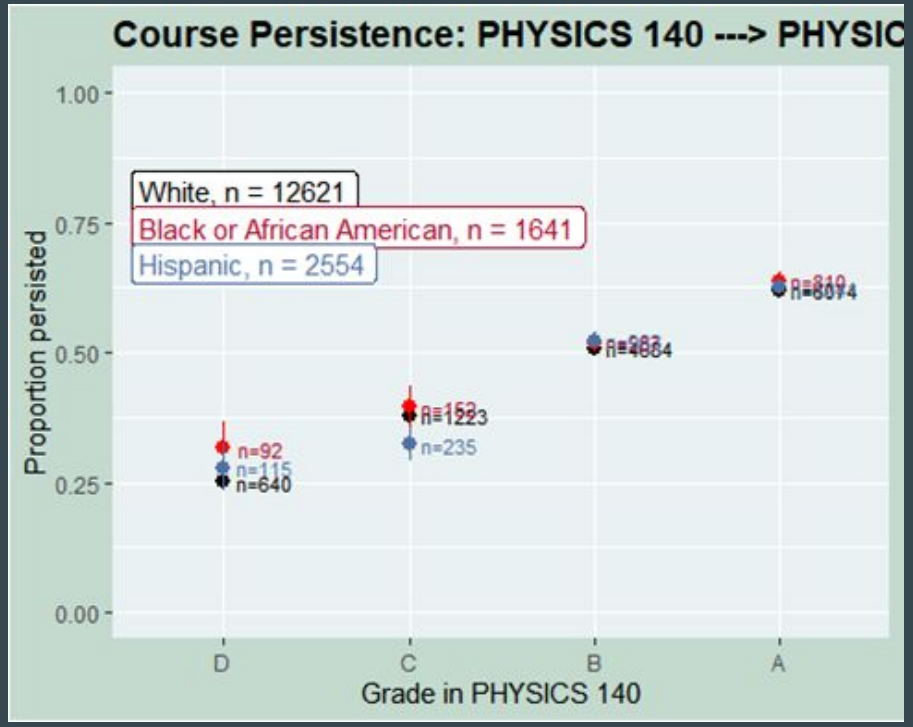


Course Persistence Example

How to read:

About 25% of White students who scored a D in Physics 140 (n=640) went on to take Physics 240

About 62.5% of Black students who scored an A in Physics 140 (n=810) went on to take Physics 240



Project Accomplishments

- grade.penalty.R
  - R script capable of taking sample data (and eventually WSU data) and generating a grade penalty visualization plot
- course.persistence.R
  - R script capable of taking sample data (and eventually WSU data) and generating a course persistence visualization plot

Reflection

In the process of completing this project, I gained or significantly improved skills in multiple areas:

- R programming
  - More advanced Tidyverse, GGplot coding
- Git version control
- Data visualization

Next Steps

We have developed a tool capable of reporting on specific performance indicators related to racial and gender equity.

We hope that as WSU continues to focus on equity issues, this tool and other data science tools will be used to lead data-driven changes toward Equity

THANK YOU

Dr. Aisiku
Dr. Barnard
Dr. Fowler
Dr. Larrivee

Worcester State University
STEM Center