Degree of Difference: College vs. Non-College Resources

Kesav, Nanda Vihari, Bringesh.

1. Introduction:

In today's digital age, students have access to an unprecedented variety of educational resources, both traditional (college-provided) and modern (online platforms). This study investigates students' perceptions of the effectiveness of college-provided resources (in-person classes, library books, and office hours) versus non-college resources (YouTube, ChatGPT, and online articles) on academic performance and engagement. The data was collected through a survey of 103 students across different departments and years of study at the university (CSUEB). The survey methodology ensured participant anonymity and voluntary participation, with responses gathered from various campus locations to maintain randomness.

2. Exploratory Data Analysis:

The data set included 103 responses from students at various academic levels (Freshman to Graduate) and different departments (e.g., Science, Business, Education, etc.). The frequency of resource usage and the perceived effectiveness of both college and non-college resources were explored. Visual analysis revealed that a higher proportion of students (54%) used non-college resources daily, compared to 35% who used college resources daily. A bar plot displayed the distribution of student responses about the perceived effectiveness of resources. Approximately 40% of students found both resources effective, 22% favored college resources, 15% favored non-college resources, 17% found both resources neutral, and the remaining 6% were split among other categories, as shown in Fig 1 below.

3. Results:

To compare perceptions of effectiveness, a two-sample proportion test was conducted. Hypothesis testing was performed to determine if there was a significant difference between the proportion of students who found college resources effective and those who found non-college resources effective. The large sample size condition was met for both groups. Without bootstrapping, the test revealed a p-value of 0.6206, indicating insufficient evidence to conclude a difference. With bootstrapping (1,500 samples), which involves resampling the data to create a larger simulated sample size, the test revealed a significant difference ($p < 2.2e-16$) with a 95% confidence interval of [3.82%, 4.70%], suggesting that college resources are perceived as more effective, but just with a smaller margin.

Another hypothesis test assessed whether students perceive both resources as equally effective or have a clear preference for one. Without bootstrapping, the test revealed that students perceived both resources to be equally effective. With bootstrapping, which provided a more robust and stable estimation of the sample statistics, the proportion of students finding both resources effective was significantly higher than those who found only one resource effective. Additional chi-square tests revealed that the effectiveness perception varied significantly by year of study ($p < 2.2e-16$) [Fig 2] and department ($p < 2.2e-16$) [Fig3] when bootstrapping was applied. Without bootstrapping, however, the results were less conclusive due to smaller sample sizes and unmet assumptions for the chi-square test.

4. Conclusion:

The study reveals that students perceive both college and non-college resources as valuable, but the perception of effectiveness differs significantly when accounting for larger sample sizes (via bootstrapping). Without bootstrapping, there was insufficient evidence to claim a difference. However, with bootstrapping, college resources were perceived as slightly more effective, and students favored using both resources simultaneously. Additionally, the effectiveness of these resources varied across academic levels and departments. The findings underscore the importance of providing students with access to both traditional and online learning resources. Limitations include reliance on self-reported data and a relatively small sample size before bootstrapping. Future research could explore specific factors influencing students' perceptions of each resource type

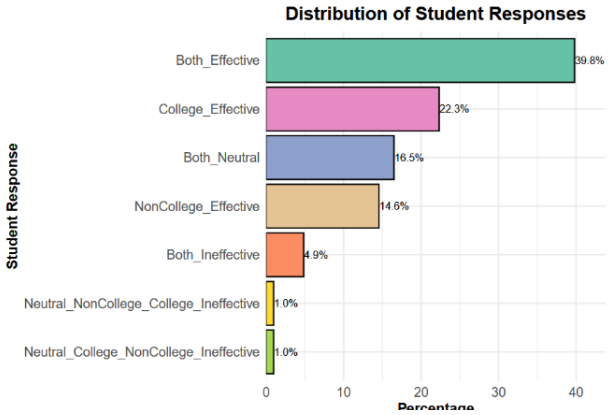

Fig- 1

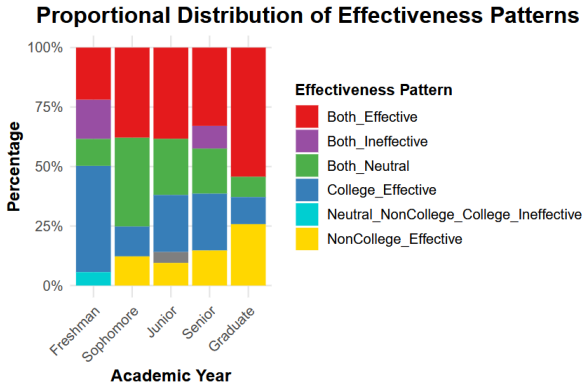

Fig- 2

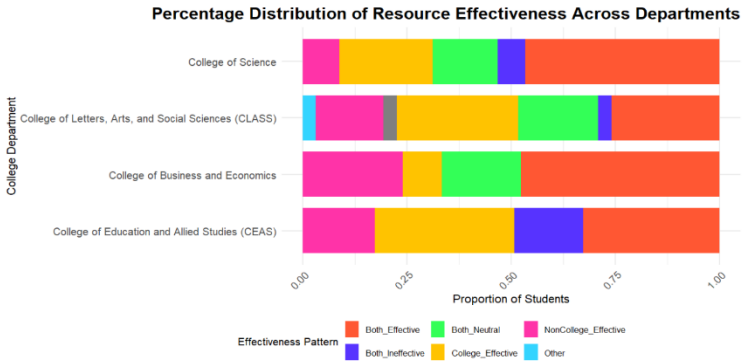

Fig- 3