

Assessing Students' Higher Education Performance in Minority and Non-Minority Serving Universities

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Abstract—Quality of the offered higher education for the next generations plays an important role to shape the future of United States. To improve American society, it is needed to pay profound attention to higher education of racial/ethnic minorities and ensure that all students belonging to different races have access to adequate professional resources and could enhance their academic knowledge in a similar way. Therefore, the aim of this study is to assess the semester-based academic performance of minority students and compare their performance progress with non-minority educators. To achieve this objective, junior level students' academic performances based on their assignment, midterm, and final exam grades in "Construction Engineering" course in one Hispanic-serving university, one Historically Black College and University (HBCU), and one non-minority university were compared and statistically analyzed. To control the variability of instructor's teaching quality, the same course across all the three institutions were taught by the same professor in three consecutive semesters. To conduct this analysis, Analysis of Variance (ANOVA) test was utilized to compare the minority and non-minority students' initial and final class performance as well as their rate of progress in each institution. The results indicate that there is a significant difference between the minority and non-minority students' progress in their assignment and exam grades throughout the semester. It is also revealed that minority students' performance had a rapid change and considerable improvement towards the end of the semester. This study suggests that the initial lower performance of minority students could be caused by insufficient earlier resources. The findings of this research will guide the government to allocate resources among universities more efficiently and effectively.

Keywords—Higher Education; Minority Racial/Ethnic Students; University Resource Allocation

I. INTRODUCTION

Paying attention to higher education issues is very crucial in a developed society. As United States is a multinational, ethnic and racial country, support the minority students to obtain higher education is in need. In addition, low level of academic achievements on the part of racial/ ethnic minority students are still considered as serious national concern, whereas the minority population is growing very fast compared to nonminority population. Many researchers and scientists believe that there are many reasons for this issue that one of the

most important factors among them is inequality opportunities and allocation of resources through ethnic/racial minority students. The minority students commonly suffer from unavailability of qualified teachers. This subject contained two important challenges. The first one is the negative effects of an inexperienced teacher for a long time through whole life of minority students. For instance, minority students in some cases may have got used to be taught by less experienced teachers. The next one is teacher expectations that not hold them to high standards or encourage them to take more higher education. "If you don't expect something, you don't search for it," Mr. Ferguson said. Teacher reasonable expectations lead to enhance educational performance. "My bottom-line conclusion is that teachers' perceptions, expectations, and behaviors probably do help to sustain, and perhaps even to expand, the black-white tests-core gap," Mr. Ferguson wrote in *The Black-White Test Score Gap*.

The goal of the study presented in this paper was to assess the performance of the minority and nonminority students in higher education. This end was obtained by attaining two specific objectives: (1) compare and analyze the students' performance in assignments, midterm, and final exams of "Construction Engineering" course with same instructor in Hispanic-serving university and African-American university. (2) compare and analyze the educational performance of students in one of the nonminority universities which is among top rank universities in U.S. (the same course and instructor), with two mentioned minority-serving universities. The outcomes of this study adds a significant value to help governments and schools to allocate more educational resources and provide proper environment for ethnic/racial minority students to decrease the achievements gap.

II. LITERATURE REVIEW

Education is an important dependable factor to improve the societies. Students requires sufficient appropriate resources and environment to gain confidence to believe they have ability to be successful through their education. In other words, everyone who makes an effort to succeed in education area should be involved in a continual procedure of learning and growth [1]. In this regard, schools and universities are responsible to support this process. According to 2008 report of the House Bill 2722 Advisory Committee states, "the education system

was never designed to educate the diversity of students currently in public schools.” As a result, there is a considerable gap between the successes and achievements of non-minority and minority students. Reference [2], in 1994, investigated that only 40%, and 47% of African American (HBCU students) and Hispanic students completed the degree, respectively. Obviously, leaving colleges and universities before completing a degree is still popular among minority students [3], whereas many ethnic/racial minority students such as African American and Hispanic are in the U.S students’ population. For instance, in 1998, one out of every ten inhabitants in U.S population was Hispanic [4], and in 2030, at least one in five persons will be Hispanic in U.S which consist of 25 percent of total school population (President’s advisory Commission, 1996). Although the population of minorities in U.S are going very fast, the number of their students at all levels of educational system have not kept pace with their population growth [4]. Through recent decades, researchers have tried to investigate the reasons that the minority students leave the schools and universities [5], [6], [7], [8], [9], [10]. National Center for Educational Statistics published a report in 1997 that the important barriers to higher education for minorities can be summarized as disproportionately lower socioeconomic status, high rates of poverty, unfavorable and disorderly school climate, and lack of resource equity for educational cost and supplies. In addition, other factors which frequently have been cited in the literatures are racial bias [11] [12], parental involvement and support [13] [9], the lack of enough number of experienced teachers [9] [13], low quality instruction and low teacher expectation [6], limited education resources [7], and lack of thorough academic coursework [14], and families’ poverty [15]. Generally, growing up under the mentioned circumstances have significant impact for likelihood of higher education [16]. However, based on the [17] [18], level of parents’ education is an important indicator to encourage them to have higher education.

Reference [19] mentioned that if science, technology, engineering, and mathematics are improved through racial/ethnic minority students, then the self-esteem in respect to math and science will inherently promote the skills and knowledge through improvement program activities. In addition, Reference [20] explained that one way to encourage students to have tendency to STEM higher education is that high schools establish a program during summer between high school and college to prepare students for college and university. Reference [21] has established the implementation of five year plan to close the academic gap by improving Hispanic students attained in the STEM subjects. In this plan, increasing the number of professional and experienced teachers, improving knowledge of families about importance of being involved in children’s education in Hispanic culture are two important objectives. Therefore, to obtain a solution to make closer the education achievements of ethnic/racial minorities and non-minorities needs to study the performance of two mentioned groups in the same situation such as same educational resources, as to investigate whether these achievement gaps are due to facilities and opportunities gaps or not.

III. RESEARCH QUESTIONS

The aim of this study is to monitor and evaluate the performance and progress rate of minority students and non-minority students. Homework/assignment, quiz, final and midterm exam, case study analysis and term project grades of junior level construction engineering students were considered as the evaluating criteria. To achieve this objective, the following questions need to be answered:

1. Do minority students yield the same progress rate as the non-minority students?
2. Do diverse types of minority students demonstrate different progress rates?
3. Do minority and non-minority students show the same progress level in their exams/quizzes compared to their assignments?

And finally, the most important outcome of this study:

4. How the instructional resources should be allocated among minority and non-minority universities to create a uniform educated society?

IV. DATA COLLECTION

To achieve the objectives of this study and analyze the progress rate and performance of students in minority and non-minority universities, the students’ assignment/homework, quiz, midterm exam, final exam, case study analysis and term project grades were collected. To control other external influencing variables, these data were obtained from three classes which were covered by the same non-minority female instructor in three consecutive semesters. This study was also controlled for the course contents and materials and the three samples data were collected from junior level construction engineering classes. The instructor had an opportunity to teach construction engineering course to the following type universities in the same order: (1) Top 10 Ranked University (TRU), (2) Historically Black Colleges and University (HBCU) (100% African American students registered in the selected course), and (3) Hispanic Serving University (HSU) (74% Hispanic students registered in the selected course). The instructor covered the same materials and utilized the same syllabus contents, requirements and assessment methods in all the three classes. In all cases, students were required to submit eight assignments, take two quizzes, two midterm exams and one final exam. In addition, students were obligated to voluntarily form teams of two to three and analyze one construction related case study in the middle of the semester. The case studies were provided by the instructor and randomly distributed among the class teams. Also, the teams were asked to submit a 10 page final research term project based on a construction topic at the end of the semester. It is worthwhile to mention that the provided case studies and research topics were the same in all the three construction engineering classes.

V. METHODOLOGY AND RESULTS

When all the grades and data were collected, they were categorized into the three sets of assignments, exams, and projects and were plotted. As it is illustrated in Figure 1, all the average assignment/homework grades of students from the three university types are illustrated and compared. As it is shown in this Figure, HSU students initially performed less well in the assignments compared to the TRU students but better than HBCU students. As it shown in Figure 1, it is also demonstrated that HBCU students early assignment grades were expressively lower than the other two groups. An interesting finding of this study is although students performed significantly different in the three universities early in the semester, at the end of the semester, all three groups of the students reached the same level and performed well. From all mentioned, it can be concluded that although minority students, specially HBCU ones, performed less than the expected compared to the other two groups, however, they showed a higher rate of progress throughout the semester.

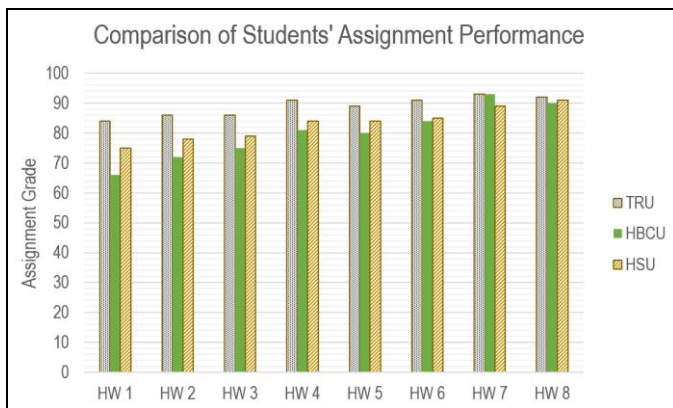


Fig. 1. Comparison of Construction Engineering Students' Assignment Performance in three School Types

Figure 2 shows the comparison of average students' quiz and exam grades. As it is shown in this Figure, all students received relatively lower grades in their first quiz compared to the second one which could be justified by the better understanding of the instructor's assessment method and course subject. This Figure also confirms the results which were obtained through the earlier assignment analysis of the three type universities. Students in the HBCU performed less well in their initial quiz and midterm exam, however, they progressed sharply and reached approximately the same level of performance as the TRU and HSU students. In other words, when minority students got adjusted with the course materials and content, they worked very hard and obtained the average scores and grades close to the top ranked non-minority university students.

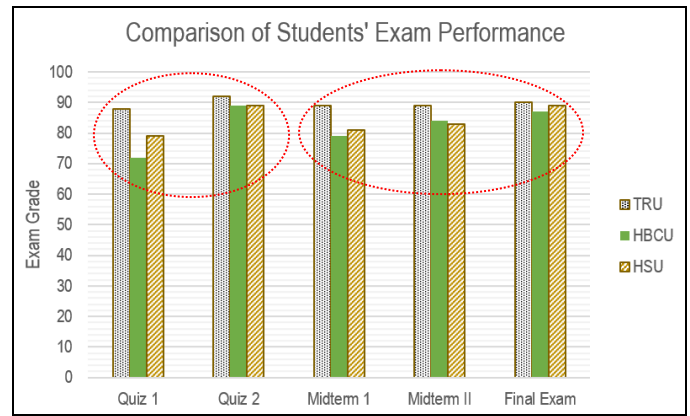


Fig. 2. Comparison of Construction Engineering Students' Exam Performance in three School Types

Figure 3 shows students' performance and progress rate for their assigned case study analysis and term project report. As it is shown in this Figure, since students in all three university types never encountered construction engineering course before, they performed less well in their case study analysis and significantly improved in their term project report. It is very noticeable that HBCU students performed less acceptable in their first case study analysis and received an average of less than 60. The reason behind their low grade was because it was the first time that they were assigned a case study analysis in the area of construction engineering and they were mainly involved with conceptual problems and numerical questions. However, both African-American and Hispanic students progressed significantly and got high grades for their later project.

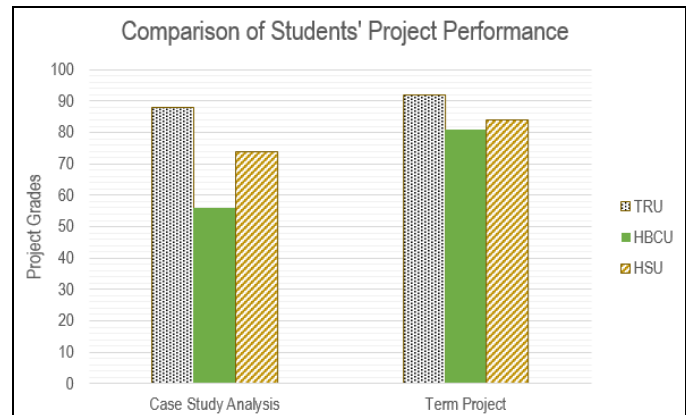


Fig. 3. Comparison of Construction Engineering Students' Project Performance in three School Types

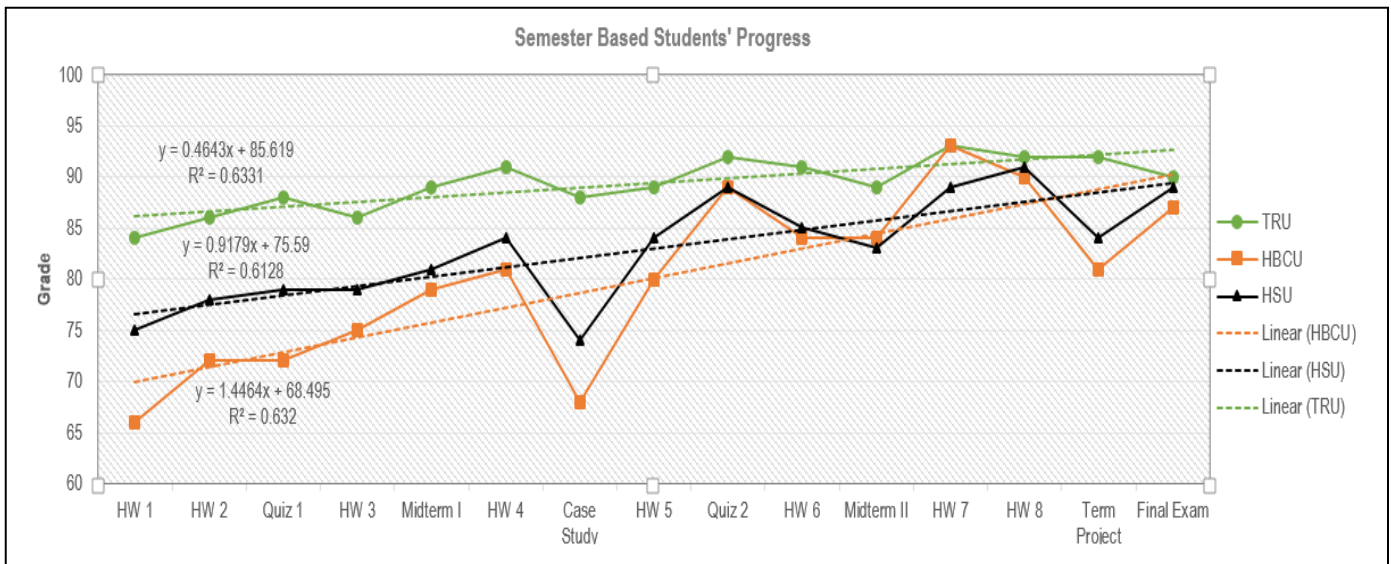


Fig. 4. Semester Based Students' Overall Progress

Figure 4 demonstrates the average assignments, quizzes, exams, and project grades for the students of the three type universities as well as the trendline of students' progress over the duration of one semester. The equations corresponding to their progress rates have also been calculated and inserted in this Figure. As shown in the Figure, TRU students' equation have a higher intercept (85.62) compared to the HSU students' intercept (75.59) which comes as the second place and HBCU students' intercept has the least value (68.50). However, as TRU students initially on average started at a higher level, they had a lower progress rate over the time (0.47) compared to the HSU (0.92) and HBCU (1.45) students.

As it is also highlighted in Figure 4, all students encountered a drop in their performance while they were analyzing the case study for the first time. However, this drop is very visible for minority students compared to the top ranked university students. At the end of the semester, all students could meet the term project expectations and received higher grades.

This study also conducted statistical analysis to investigate if there is a significant difference between the students' assignments', exams' and projects' grades of the three type universities. To perform this analysis, Analysis of Variance (ANOVA) Test was utilized.

As it is shown in Figure 5, ANOVA test was used to study if there is a significant difference between the average grades of the students in the three main categories. In this study, ten percent was determined as the significance level. As it is shown in Figure 5, there is a significant difference between assignment and exam grades of the students in three type universities. However, any significant differences between the students' project grades were not observed. Figure 6 depicts the boxplots for the assignments, exams and project grades for the three type university students. As it is shown in this figure, the least variability of the grades belongs to the top ranking non-minority students and the most improvement belongs to the HBCU students.

source	df	SS	MS	F	P-value
treatments	2	326.083	163.042	3.9917	0.0339
error	21	857.750	40.845		
total	23	1183.833			

5a. ANOVA Test Results for Differences between Assignment Grades

source	df	SS	MS	F	P-value
treatments	2	146.533	73.267	3.1311	0.0805
error	12	280.800	23.400		
total	14	427.333			

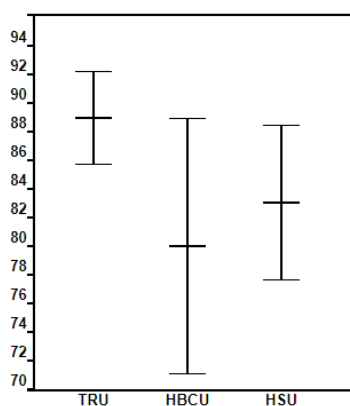
5b. ANOVA Test Results for Differences between Exam Grades

source	df	SS	MS	F	P-value
treatments	2	462.333	231.167	1.8718	0.2967
error	3	370.500	123.500		
total	5	832.833			

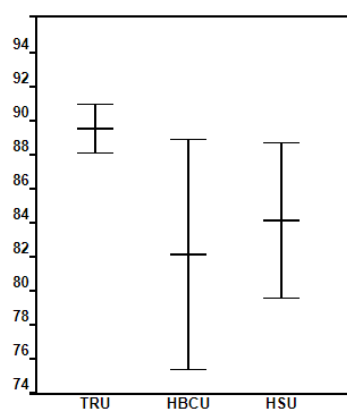
5c. ANOVA Test Results for Differences between Project Grades

Fig. 5. ANOVA Test Results for Differences between Assignment, Exam and Project Grades among Three Groups

Box Plots for Assignment Grades



Box Plots for Exam Grades



Box Plots for Project Grades

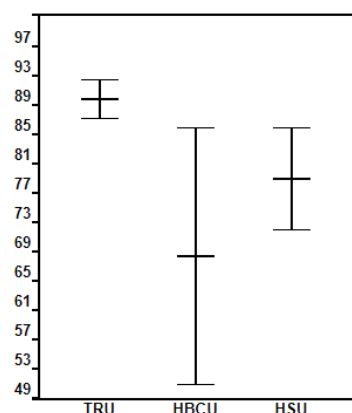


Fig. 6. Box Plots for Assignment, Exam and Project Grades for Three University Type Students

The results were validated through eight one-hour structured interviews and communicated with the HBCU students of the same targeted class (when semester was ended and grades were finalized). HBCU students expressed that although they pay the same tuition and fees as other non-minority students in other universities and are very interested in learning their subject concepts, sometimes they do not receive the same instructional resources as non-minority students. They indicated that sometimes their school faces difficulty in hiring very experienced faculties due to their budget limitations. However, it is worthwhile to mention that this conclusion could not be extended to all HBCU and/or HSU professors and instructors and many minority students already benefit from several qualified professor in many areas.

VI. CONCLUSION

This study conducted statistical analysis and performed pairwise study to evaluate and compare the progress rate of students in minority and non-minority universities controlling for course materials, syllabus requirement, and instructor's experience and style. The results indicated that although minority students, especially HBCU ones, initially performed less well in most course aspects and requirements, however, they progressed very sharply and reached the same level as the non-minority students. This study also concluded that the initial lower level performance of minority students could be described by receiving less experienced earlier instructors in some specific cases (which could be their earlier college, high school, or even primary school instructors). The achieved results could be justified due to the reason that some minority students are the first generation in their families who attend the college/university and they are less familiar with the higher educational environments or they may receive less financial and non-financial family support. Although the results of this study were achieved from small sample sizes, it is highly recommended that the government and other educational supervision entities pay more attention to minority students and allocate more resources to these universities.

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