

EXAMINING THE EFFECTS OF ONLINE DISTANCE EDUCATION ON AFRICAN AMERICAN STUDENTS' PERCEIVED LEARNING

By Lamont A. Flowers, Lawrence O. Flowers, Tiffany A. Flowers, and James L. Moore III

ABSTRACT

The purpose of this study was to estimate the effects of online distance education on African American college students' perceived learning in science courses. Results revealed that students taking traditional science courses self-reported greater affective and psychomotor learning gains than did students taking online distance education science courses. *This study was supported by grants from the National Science Foundation (HRD-0811728 and HRD-1332555).*

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The proliferation of computer technology in higher education has resulted in the utilization of online technologies in nearly every aspect of the instructional process as well as the expansion of distance education programs. Data from a recent report show that the number of colleges and universities offering distance education programs has increased in recent years.¹ For example, in 2011, nearly 47 percent of all Title IV postsecondary institutions offered some form of distance education, and there were approximately thirty institutions that offered distance education exclusively. Additionally, another national report revealed that 28 percent% of all undergraduate students enrolled in a distance education course while attending a public four-year institution.² Given the dramatic shift in the way that many postsecondary institutions now offer educational programs to students, it is imperative that researchers examine the effects of online distance education programs on student outcomes.

According to the U.S. Department of Education, distance education refers to "a formal education process in which the student and instructor are not in the same place."³ This definition includes educational experiences that involve the transmission of information between students and faculty and the assessment of student learning, which may occur in online and offline pedagogical contexts.⁴ Consistent with the integration of online distance education in academia, which is the focus of the present study, the expansion of online distance education courses in science, technology, engineering, and mathematics (STEM) disciplines challenges the higher education community to examine the efficacy of online courses on students' educational outcomes at postsecondary institutions. Therefore, it is imperative that researchers conduct studies that employ rigorous procedures to examine the cognitive effects and educational impact of online distance education experiences on student outcomes across institutional types, including historically Black colleges and universities (HBCUs).

LITERATURE REVIEW

In terms of impact on student development and educational outcomes, previous research has shown that online distance education may offer potential benefits to students versus traditional courses in which students and professors are in the same physical space interacting during the instructional process.⁵ Related to the complex issues associated with teaching and learning in online distance education, previous studies have investigated the extent to which students' learning gains in online distance education courses in STEM disciplines were comparable to traditional STEM courses. For example, Wuellner recently investigated college student learning outcomes for students enrolled in online and traditional wildlife and fisheries sciences courses.⁶ Findings revealed similar grade distributions regardless of course delivery method.

In another study focusing on learning outcomes in an online and traditional soil science course, the findings indicated that there were no significant differences in course grades between online distance education students and students in the traditional course.⁷ One major limitation of the research assessing the impact of online distance education is that many studies measure student learning outcomes using course grades. Utilizing course grades to measure learning outcomes may be an unreliable method due to the variability in course design, evaluation strategies, and other factors. In contrast, to determine if online distance education is commensurate with traditional modes of instruction, college faculty may need to utilize more valid and reliable forms of learning outcome measures such as students' perceptions of learning gains and standardized assessments.

STEM ONLINE DISTANCE EDUCATION AT HBCUS

Despite the significant amount of research pertaining to online distance education, studies examining the impact of online distance education in STEM disciplines at HBCUs are limited. However, a small body of research is beginning to emerge. For example, Flowers, Moore, and Flowers found that students enrolled in online distance education courses in STEM disciplines were more likely to prefer greater levels of structure than did students in traditional courses.⁸ Research has also shown that traditional courses may provide greater opportunities for student learning in STEM courses for HBCU students.⁹ Additionally, in a similar study, it was shown that HBCU students in online distance education and traditional STEM courses self-reported similar levels of academic self-efficacy.¹⁰

In contrast, research indicates HBCU students perceive greater learning gains while completing online laboratory assignments compared to traditional laboratory assignments.¹¹ While these investigations are informative and serve as foundational studies on this topic, there is a dearth of research designed to examine the differences in learning outcomes among HBCU students enrolled in online distance education science courses compared to students enrolled in traditional science courses. Therefore, the aim of the present study was to address this shortcoming in the educational research literature, utilizing quantitative data assessing students' perceived learning, to articulate implications for research and practice at HBCUs.

THEORETICAL FRAMEWORK

In light of the goal of college faculty to support student learning in online distance education environments, the equivalency theory provides a conceptual lens to better examine the complexity of the distance education process.¹² With respect to equivalency theory, Simonson noted, "Distance education's appropriate application should provide equivalent learning experiences for all students—distant and local—in order for there to be expectations of equivalent outcomes of the educational experience."¹³ Equivalency theory supposes that in order for distance education to support student learning efficaciously, it should be designed with the same objectives and level of complexity as traditional courses.

Thus, equivalency theory is based on the premise that if educators design distance education courses utilizing similar curriculum development strategies as they utilize to develop traditional courses, students may be more likely

to achieve similar learning goals. Highlighting this point, Simonson, Schlosser, and Hanson noted, "Education at a distance should be built on the concept of equivalency of learning experiences. The more equivalent the learning experiences of distant learners are to those of local learners, the more equivalent will be the outcomes of the educational experiences for all learners."¹⁴

According to Simonson, Schlosser, and Hanson, equivalency theory includes five components: (a) equivalency, (b) learning experiences, (c) appropriate application, (d) students, and (e) outcomes. The first component, equivalency, refers to the view that the instructional environments of distance education and traditional courses should be similar and include equivalent assignments, student-faculty interactions, and course learning experiences. The second component, learning experiences, suggests that faculty should properly select appropriate instructional materials to ensure that students' learning experiences are consistent regardless of the modality used to deliver the course information. The third component, appropriate application, emphasizes the notion that faculty should ensure that students have access to technologies and learning materials that enable them to understand the course content in light of their individual learning styles. The fourth component, students, acknowledges that all courses should include opportunities and academic experiences for students to enhance their knowledge of the subject matter.

The final component of equivalency theory, outcomes, suggests that the goal of developing online distance education and traditional courses is to enable students to accrue intellectual gains, which should be measured and evaluated. The present study, applying the principal tenets of equivalency theory, seeks to determine the extent to which online distance education science courses and traditional science courses at HBCUs resulted in equivalent perceived student learning outcomes.

METHODS

The sample for the present study consists of 103 students enrolled in online distance education science courses and 194 students enrolled in traditional science courses at a HBCU located in the southeast. Approximately 77 percent of the sample was female and 23 percent of the sample was male. In terms of their sample classification, 16 percent of the sample was classified as freshmen, 25 percent as sophomores, 27 percent as juniors, and 32 percent as seniors. Approximately 15 percent of the sample

was STEM majors and 85 percent majored in other fields. Because this study sought to examine whether online distance education and traditional courses resulted in equivalent learning outcomes, the methodological framework for the study is based on many research investigations on the effects of college on students' educational outcomes.¹⁵

Moreover, the data analysis techniques employed in this study build on and extend previous research by determining the impact of classroom environments on student learning.¹⁶ Consistent with previous research, variables were included in the analysis to statistically control for the influence of students' demographic characteristics, academic experiences, and nonacademic experiences. As a result, the methodological framework in this study is based on extensive research findings indicating that demographic factors influence educational outcomes among college students.¹⁷

Based on the educational outcomes research, control variables measuring students' academic and nonacademic experiences in college were also included in the analytical model. The primary independent variable was a categorical variable measuring course type (i.e. online distance education or traditional). The dependent variables consisted of the three subscales from the CAP Perceived Learning Scale (i.e., Cognitive subscale, Affective subscale, and Psychomotor subscale).¹⁸

RESULTS

Ordinary least squares regression was used to estimate the effects of taking online distance education science courses on students' perceived learning outcomes, while applying controls for age, gender, student classification, hours spent studying per week, and hours spent working per week. Due to the small sample size utilized in the present study, results were reported significant at $p < .10$. Table 1 summarizes the direct effects of taking online distance education science courses (versus traditional science courses) on students' CAP Perceived Learning Scale scores. Statistically controlling for factors such as parental education and institutional control, taking online distance education science courses yielded significant negative direct effects ($B = -.882, p < .05$) on the Affective subscale.

Effect size estimates were computed by subtracting the online distance education students' mean scores from the traditional students' mean scores and dividing the mean difference by the pooled standard deviation of the dependent variable.¹⁹ This effect size estimate measured the practical significance of the mean difference. According to general guidelines pertaining to effect sizes,²⁰ this computation resulted in a moderate effect size estimate of $-.315$ of a standard deviation on the Affective subscale.

Controlling for important variables such as a student's grade point average, taking online distance education science courses also yielded significant negative direct effects ($B = -.576, p < .10$) on the Psychomotor subscale. Employing the effect size calculation yielded an effect size of $-.273$ of a standard deviation on the Psychomotor subscale.

TABLE 1

Effects of Online Distance Education Science Courses on Students' Perceived Learning

CAP Perceived Learning Scale	Regression Coefficient	Effect Size
Cognitive Subscale	-.052	-.028
Affective Subscale	-.882**	-.315
Psychomotor Subscale	-.576*	-.273

* $p < .10$ ** $p < .05$

DISCUSSION AND IMPLICATIONS

Viewed collectively, the results of previous research designed to compare the impacts of online distance education and traditional instructional methods are mixed. Although numerous studies highlight the positive benefits



of online distance education, some studies suggest that online distance education negatively affects students' educational outcomes. Using equivalency theory, we found that students taking traditional science courses reported higher perceived learning gains than students enrolled in online distance education science courses. Thus, it was shown that African American college students perceived online distance education science courses and traditional science courses differently.

This finding suggests that the HBCU STEM faculty associated with our study may not be utilizing equivalency theory to develop online distance education courses. The finding also implies that the HBCU STEM faculty represented in our study may not be teaching online distance education courses the same way that they were teaching traditional courses. Employing equivalency theory, we hypothesized that there would be no statistically significant differences in students' perceived learning gains.

In light of the study's findings, future research should explore faculty perceptions of online distance education courses to determine if the equivalency theory holds. As a result, additional research studies should investigate the strategies and approaches HBCU STEM faculty employ to develop online distance education and traditional courses to determine if the equivalency theory holds as it relates to the actual development of curricula, syllabi, and lesson plans. To enhance the STEM workforce in the United States, HBCUs as well as other postsecondary institutions may need to utilize instructional strategies and innovative technologies to strengthen online distance education in the STEM disciplines.

Thus, in addition to improving course instruction in online distance education contexts in STEM, we may also need to investigate the extent to which online distance education can advance career development outcomes for HBCU STEM students. Also, future research may address the limitations of the study that the reader should be aware of when interpreting the results. For example, although this study sought to assess the effects of taking online distance education science courses on African American students' perceptions of learning, the institutional sample comprised one HBCU and the dependent variable was based on self-reported data rather than a more objective measure. Both of these limitations may affect the results and the interpretation of the study's findings. Additionally, the external validity of the findings may be constrained.

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FROM THE GRIDIRON TO THE IVORY TOWER: A CASE FOR CULTIVATING A STUDENT IDENTITY DEVELOPMENT CURRICULUM FOR AFRICAN AMERICAN MALE STUDENT-ATHLETES

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Research studies within the last fifteen years¹ have purported that an oppositional relationship is prevalent between athletic achievement and academic achievement. This relationship has its roots in popular culture and is enhanced by media representation. Overwhelmingly, media messaging and pervasive images related to sports are named as contributing factors of influence, particularly as it relates to African American males.² The effects of these influences on African American males who participate in intercollegiate athletics are numerous and varied: an over-identification with athletes and sports, the overvaluation of numerous other physical performance activities, and an under-identification with academic performance, scholar identity, and student development. By exploring this literature through the lens of a personal case study, I will elucidate how these influences can affect a student-athlete's development and present one model for improving the educational outcomes of Black male student-athletes.

As an African American male, former Division 1 athlete, and social science researcher, it is only now as I retrospectively analyze my college experience that I am able to identify numerous points of corroboration between student identity development literature and my personal narrative. I received a full athletic scholarship to play football, and my primary focus was on achievement on the gridiron, rather than in the classroom. To be sure, my academic performance as an undergraduate student in no way mirrors my current academic success, as my academic performance was often secondary to my athletic