

Research Review: Educational Technologies and Their Impact on Student Success for Certain Racial and Ethnic Groups

The National Research Center for
Distance Education and Technological
Advancements (DETA)

WCET – the WICHE Cooperative for
Educational Technologies



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Introduction

WCET is a national, member-driven organization that brings together colleges, universities, higher education organizations, and companies to collectively improve the quality and reach of digital learning. WCET members have long sought to overcome the barriers of geography and time in pursuing postsecondary education.

WCET members believe that it is now time to turn our attention to racism and other systemic barriers that limit educational access and success. Institutional changes that address racism and inequity should be based upon research and evidence. This belief sparked WCET to partner with DETA to review what recent analyses can teach us about what has worked or failed in lifting students to maximize their educational opportunities.

DETA is an organization that supports and conducts research to identify key factors that influence student access and success in education that is technology-enhanced, blended, and fully online. Working with WCET, DETA devised an effort to support the WCET community's efforts to advance equitable learning within postsecondary education.

The purpose of the review is to identify institutional, instructional, and learning practices mediated by educational technology that positively influence the success of certain racial and ethnic groups of American students, including students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, American Indian, Alaskan Native, Indigenous American, Native Hawaiian, or Pacific Islander. The rationale for the review is to better understand what recent and relevant research-based practices in the educational technology field can be replicated and scaled across postsecondary education in the United States (U.S.) to create equitable and inclusive learning experiences.

The objective of this research is the identification of practices and/or interventions that are positively influencing student outcomes (e.g., access, learning, grades, course completion, satisfaction, persistence, and others) for the population of interest to encourage implementation across the WCET community.



Executive Summary

Community organizations in education are launching new initiatives to advance efforts of equity and inclusion for students who identify with certain groups that are traditionally considered racial and ethnic minorities. Generally, postsecondary institutions in the U.S. that are enrolling these students have relied on historic instructional and student support models that do not meet the needs of minoritized student populations. Organizations and institutions are examining support services, course design, instruction and pedagogy, programming, and curriculum to transform the education experience to be more equitable and inclusive.

Traditional systems are limiting for some learners and can even be considered elitist - systems created for the privileged majority in higher education. These systems tend to place a burden primarily on the shoulders of students to overcome the inequitable structures they may face daily. However, the responsibility for rectifying inequities in higher education systems lies with the institution rather than the student who has been disenfranchised or marginalized by the system. By focusing on the actions of institutions – administration, faculty, and staff – the organizational system and the culture can be altered and can, instead, become empowering for these students.

Research Questions

While every higher education institution must commit to ongoing institution-wide conversations and strategic efforts in this area, there are immediate actions that different stakeholder groups within institutions can take to alter the structures, rules, and resources within which students learn and achieve. These actions focus on how institutions of higher education, including administrators, faculty and instructors, and instructional and student support staff, can reduce barriers, create new opportunities, and empower student success.

Thus, this research is guided by these four questions:

- 1.) What can administrators do to better serve students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander through learning and instructional effectiveness?
 - a.) What instructional-level practices, such as student and instructional supports, can be implemented that are proven to improve student access and success?
 - b.) How can offering student services through supporting improvements in instruction and/or through education technology help improve equity in education?
- 2.) What can instructors and instructional support staff do to better serve students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander through learning and instructional effectiveness?
 - a.) What course-level and instructional practices and interventions create inclusive opportunities for learning and are proven to better serve students?
- 3.) What can student support staff do to better serve students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander through learning effectiveness?



Research Questions continued.

4.) What can all stakeholders do to better serve students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander at the course-, program-, and institutional-level?

By implementing and scaling research-based strategies, policies, processes, practices, and technologies that positively influence student outcomes, institutions of higher education will begin to change the traditional structural characteristics that are oppressive and limit success of students who identify with these racial and ethnic groups to advance student progress.

Educational Technology Impact on Student Access and Success

Educational technology has the potential to improve processes and practices, such as instructional and learning effectiveness, that can positively impact student outcomes, such as access and success. Yet, it is important that institutions of higher education, especially researchers and practitioners in the education field, recognize that educational technology is not the solution. Rather, it is an element of a solution that should be carefully and intentionally considered as well as implemented as it is possible that educational technology could exacerbate the existing inequities or create new inequities. Research-based interventions and practices need to be identified, verified, and scaled across programs, institutions, and the nation and supported with evidence that they specifically serve these groups of students.

Background

Historical and contemporary context

The succession of killings of Ahmaud Arbery (February 23, 2020), Breonna Taylor (March 13, 2020), and George Floyd, Jr. (May 25, 2020), triggered new waves of protests against police violence and racism around the world, bringing these issues to the forefront as America faces how deeply ingrained racism is within its citizens and within society as a whole. Black Lives Matter (BLM) protests were witnessed in cities throughout the world, such as London, Paris, Auckland, Nairobi, and Tokyo (see Porterfield, June 2, 2020). Some of these protests continue; for example, in Milwaukee, Wisconsin and the surrounding area, “protestors have marched for over 200 consecutive days demanding an end to systemic racism and calling for racial equity” (Torres, December 19, 2020, para 4). It is urgent that America and the world end institutional racism, including racism inherent in educational systems such as higher education institutions. To empower racial and ethnic groups who experience systematic racism, efforts need to be undertaken to transform education systems to provide equity and inclusion.

Efforts to address access and equity in higher education are not new. Through decades of social movements and activism, judicial rulings, and legislative acts, America has worked to address the inequalities in education, yet they still exist today. Bensimon and Malcom (2012) ask, “How could it be, one might ask, that fifty years after the passage of the Civil Rights Act, our institutions of higher education have not found ways of reducing the higher education gaps for racial and ethnic groups?” (p. 1). Disappointingly, education systems remain inherently racist after decades of efforts to create more diverse institutions to better serve students, including students who identify with racial and ethnic groups that are underrepresented, while Longanecker (2012) remarks that “...we find little evidence of intentional inequality and few examples of deliberate efforts to prevent equality of opportunity within our system...most educators, be they faculty, administrators, or policy folks, believe passionately in bridging equity gaps—a goal that should be achievable but has proved to be remarkably challenging” (p. xi). Decades of initiatives to promote access and equity are not enough, and education institutions must consider and make new efforts.

Early efforts focused on creating diverse institutions and supporting underrepresented students. The goal was to increase access and diversity in racial and ethnic composition of predominately White institutions while providing services to support these students to ensure equitable experiences (see Benitez, 2010). However, while these efforts were successful and created higher enrollments of students belonging to racial and ethnic groups that were underrepresented, a gap existed between the outcomes of underrepresented and represented students (Bensimon, 2005). Unacceptably, there is a long history of blame being placed on the student for this lower level of achievement or viewing underrepresented students in a manner that has influenced the achievement gap (Bensimon, 2005; Ogbu, 1990). Efforts were and continue to be made to identify barriers and challenges for students from underrepresented racial and ethnic groups while also providing support to help students overcome these barriers and challenges. Admittedly, some of the support is more akin to a patch while recognizing that larger systemic structures of racism need dismantling for equitable education to be the norm.

To move beyond diversifying the student body and supporting students through cultural centers and services, institutions need to identify the institutional structures and actions of individuals at institutions that are influencing the success of students who are racially and ethnically underrepresented in order to change the systems to create greater access and equity. Specifically, there is a need for efforts that identify the structures and actions, especially those inside and outside of the classroom, that have the potential to positively influence student success.



Historical and contemporary context continued.

Change to end racism in education systems requires an acknowledgement that racism exists. Actions are then needed that will alter the structures and practices of racist systems through critical and postmodern paradigms. Bensimon, Dowd, and Witham (2016) recommend enacting equity by design through language, measures and goals, equitable practices, and equity-mindedness. They note that “inequalities might be created or exacerbated by taken-for-granted practices” (para 14).

By identifying what practices work for these students and scaling them across programs and institutions, practice can become transformed and more equitable, leaving behind old practices that can exacerbate inequity.

Role of language

“The notion of minority is very complex” (Deleuze & Guattari, 1980/1987, p. 105). As we examine the use of language for our research and this report, it became clear that there is no consistency, but it did become clear that “[i]nequality in higher education is a structural problem that is hidden or revealed through the use of language imbued with political and social meaning” (Bensimon, Dowd, & Witham, 2016, para 5). Language reveals an organization’s espoused values and should be carefully considered. From a critical and postmodern lens, minority has become more than a term of a statistical presentation to a larger whole, but as a group of people that do not meet a standard (Deleuze & Guattari, 1980/1987). Language and use of the term minority to explain a racial and ethnic grouping of people needs to be reconsidered.

Traditionally, many may believe that these groups of students are referred to as minority or underrepresented students since their demographic characteristic of racial and ethnic group was statistically smaller in percentage than the majority racial group, usually referred to as White, Caucasian, or European American, in comparison to the overall composition of racial and ethnic identities and demographics. For instance, according to The Condition of Education, a congressionally mandated annual report from the National Center for Education Statistics, “[o]f the 16.6 million undergraduate students enrolled in fall 2018, some 8.7 million were White, 3.4 million were Hispanic, 2.1 million were Black, 1.1 million were Asian, 647,000 were of Two or more races, 120,000 were American Indian/Alaska Native, and 45,000 were Pacific Islander” (Hussar, Zhang, Hein, Wang, Roberts, Cui, Smith, Bullock Mann, Barmer, & Dilig, 2018, p. 128). However, in some education systems, Whites are no longer the majority. In the California State University System, according to the fall 2019 enrollment data, Hispanic and Latinx students (43%) make up the majority of the student population in comparison to other racial and ethnic groups, and White students (22%) are a statistical minority compared to Hispanic and Latinx. Although nationally racial and ethnic groups that are non-White are statistically the minority, the term minority needs to be reconsidered not only for the change in demographic composition of minority groups (Benitez, 2010), but also because of the cognitive constructs and social implications that have developed regarding the term minority.

Language for identifying and referring to racial and ethnic groups has been often revisited by the government, researchers, academics, journalists, and activists. We considered the following:

How should we refer to each different racial and ethnic group?

What terminology should be used to describe students as an aggregate, if at all, who are historically referred to as minority students?

¹The notions of “equity” vs. “equality” are central to this discussion could be discussed at length. For the purposes of this research, the authors are taken by the simple definitions used by The George Washington University Milken Institute School of Public Health: “Equality means each individual or group of people is given the same resources or opportunities. Equity recognizes that each person has different circumstances and allocates the exact resources and opportunities needed to reach an equal outcome.”

It, again, has become a topic in postsecondary education as educators seek to use more inclusive and equity-minded language in institutions of higher education. For instance, some scholars have advocated for the use of racially minoritized students rather than minority students to recognize systemic oppression (see Benitez, 2010; Bensimon & Malcom, 2012). Through the decades, the language used has not always garnered consensus. The language the privileged have decided to use (e.g., government, academics) and the language of a common American identifying as a non-White racial or ethnic group have not always aligned (see Cummings, 2019; Gillborn, 2005). While there was a push in the 1980s for Americans whose ancestors were of African heritage to be identified as African Americans rather than Black Americans, there was resistance by these individuals in America as they referred to themselves as Black Americans. Now, government agencies and journalists have reverted to the term Black Americans (Byers, 2013; U.S. Census Bureau, 2020). Recently, there is similar momentum for Americans who identify as Hispanic, Latino, or Latina to be referred to as Latinx, yet the majority of Hispanic and Latino Americans have not heard the term (Meraji, 2020). The best advice may be to ask individuals to which group they self-designate (Vincenty, 2020).

There are structures that limit our language and data measures of different racial and ethnic groups of students. Early in this report, we have referred to groups of students as underrepresented students, and we have discussed the implication of referring to these students as minority students. These students are considered by the government in legislation as underrepresented or minorities, since they are demographically less prevalent in postsecondary education than their counterparts. Because of the implications of minority, we have chosen to not use that term as a descriptor. However, this term is often used in the research of students in postsecondary education and must be considered in any research project. Moreover, we have chosen to describe students of the racial and ethnic groups of interest as identifying as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander. This decision was made based on a review of research and data collected that examines racial and ethnic groups and other relevant arguments made in popular media and academic research as well as on first-hand discussions that we had with our students as to how they describe their own racial and ethnic identity while avoiding a claim to be all inclusive.

Expanding the research

In research practice, we cannot ignore or disregard the systems that do identify racial and ethnic measures, categorization, or terminology for these groups, such as the government. Data are grouped by common characteristics that help researchers statistically identify relationships between those characteristics, the behaviors, actions, and process of actors within education and student achievement. Yet, as we evolve as a country, defining these common characteristics, such as race and ethnicity, is becoming more complex and nuanced, and new systems have not been developed to capture these idiosyncrasies that would lead to richer data and findings. Researchers also need to build more complex statistical models examining characteristics of students that consider more than a student's race or ethnicity and instead build profiles of students that include race and ethnicity, income or Pell grant eligibility, first generation status, and other important variables and measures (see Joosten, 2020). Race and ethnicity alone are not yielding robust findings of the relationships of influence on student achievement. Moreover, research needs to move beyond the black box phenomenon and examine more process variables rather than purely examining input variables of race and ethnicity and outcome variables of achievement in order to identify behaviors and activities that lead to equitable outcomes (Joosten, 2020).

Most often the data that can be collected through student information systems regarding students racial and ethnic identity does not capture the distinctions that we describe here nor are they evident in the research conducted as part of this report.

Background

Additionally, these racial and ethnic groups are often not examined individually to better understand the phenomenon related to achievement in postsecondary education. Instead, they are aggregated or lumped together as a group of numerous racial and ethnic groups that are historically unrepresented, minoritized, or marginalized to explore commonalities in their experiences and outcomes. As one will discover in reviewing this research, several of the studies are comparative and are deficit-minded rather than equity-minded. At time it is necessary to retain the original deficit-minded language to reflect the research design and findings of that work. As a result, the study is designed, to the best of our ability, based on the research and data that is available. Future design of variables and measures at a national and institutional level that influence postsecondary institution data collection needs to consider these complexities.

These students are a priority for educators across the U.S. as more attention is given to the need for dismantling inequitable systems and practices that limit their access and success. While attention has been given to Black students through the decades, institutions have moved beyond the dichotomy to focus on other racial and ethnic groups that experience these same implicit racist systems and practices, such as Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander (see Benitez, 2010). These students can experience similar barriers and challenges as Black students face, yet they also have their own unique experiences that may differ from Black students. Most often, however, multiple racial and ethnic groups are aggregated and studied together, typically through comparison, to their privileged counterparts rather than examining just one racial group. As educators examine institutional systems to reduce barriers for these students and to create new processes and practices that are inclusive, it is pertinent to consider multiple racial and ethnic groups to identify research-based practices and to be cognizant of the importance of studying groups separately as to avoid the trap of monolithic stereotyping in research. There are similar challenges for some students, but there are also unique barriers for certain racial and ethnic that should be explored. There is more research that is needed to understand these unique experiences.

Methodology

A protocol was developed to conduct a systematic review. The context, setting, or institutional characteristics of interest included institutions of higher education (IHE) within the United States. The institutions included 2-year or 4-year and public or private.

The population of interest was students who identify racially or ethnically as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander who were enrolled and taking for-credit courses at an institution of higher education.

The interventions of interest were specific to educational technology interventions, including courses that incorporated digital courseware and/or courses (e.g., adaptive learning technologies) and course modes, including blended or hybrid, and online learning.

Variables of interest were not limited based on comparators or outcomes. Rather, evidence of impact and improvement on student experience or outcomes (e.g., scores or grades) was required. Only peer-reviewed articles written in English were selected.

Peer-reviewed studies were selected for inclusion based on their source and time of publication. Studies selected for inclusion were between January of 2017 to September of 2020 (the time of the systematic review). Sources for peer-reviewed research included 18 journals and six (6) databases relevant to educational technology and higher education.

Peer-reviewed studies were selected for inclusion based on the presence of a series of a key terms search related to race and ethnicity and a term related to education technology, such as digital learning or online learning.

After reviewing hundreds of articles, the systematic review produced 12 studies that included students of interest. These studies were merged with a previous systematic review that produced five (5) articles specific to Minority Serving Institutions (MSIs) for a total of 17 articles.

Study participants included undergraduate students enrolled at a postsecondary institution, 2-year or 4-year, who identify racially or ethnically as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander. Or, students who were enrolled at an MSI, including Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HISs), and Tribal Colleges and Universities (TCUs), and Asian American and Pacific Islander Serving Institutions (AAPISIs). Additionally, students who participated in the studies where demographic information was shared were often represented as low income and first generation.

The findings include practices that were identified as effective in showing a relationship or improvement of student outcomes.

²Three years is the chosen time frame since that is the standard duration for systematic reviews.

Findings

The students who are participants in the studies below are students who identify racially or ethnically with traditionally underrepresented groups such as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander and/or are enrolled at an MSI, HBCU, HSI, TCU, or AAPISIs. The following findings and recommendations have excluded the majority or represented study body (e.g., White, Caucasian, and/or European American). Again, the findings are specific to students who identify with traditionally unrepresented racial and ethnic groups.

The following studies examined practices and interventions, including course mode, course load, and type of course, academic and learning preparation and learner characteristics, instructional and pedagogical characteristics, and curriculum. Digital courseware and associated interventions included Learning Management Systems (and their associated functionality), adaptive learning technologies, and technologies that facilitate dissemination of open education resources. Studies specific to course mode compared modes (face-to-face, blended or hybrid, and/or online) or examined a mode and the impact on student outcomes. These studies may have examined other variables related to the relationship between mode and outcomes (e.g., course load). Courses related to science, such as biology and chemistry, were most prominent. A brief summary of findings by study are followed by recommendations of practice as relevant to specific stakeholder groups.

Summary of findings by area of inquiry

The findings are organized from characteristics that are higher level and structural to lower level student activities. None of the studies examined institutional-level characteristics, such as leadership and administration of programs, and the relationship to student access and success. Additionally, the studies did not examine program-level characteristics; however, one study did report findings regarding program curriculum from student reports. The participants in these studies are students identifying with traditionally underrepresented racial and ethnic groups or enrolled at a MSI.

Curriculum. Students wished for more culturally inclusive material and curriculum that provided opportunities to express their identity (Hunt & Oyarzun, 2019). Hunt and Oyarzun (2019) state, “Since students want to talk about themselves and their cultural backgrounds, professors might use their introduction modules as a space for students to tell a story about themselves or their culture. Professors should work to make their assignments and texts relevant in some way to the lived experiences of all students in their course” (p. 330). Curriculum, whether or not specific to mediated learning, can be reviewed across campuses to assure that it is culturally inclusive.

The most prominent series of findings included an array of course characteristics, such as course mode, that indicate a potential practice to increase one’s potential for success in postsecondary education. These characteristics included course medium or mode, course level, course load, and type of course, such as blended and online course modes, lower and upper level courses, and courses in technical education. The research tended to be conducted using student information system or enrollment data. The participants in these studies are students identifying with traditionally underrepresented racial and ethnic groups or enrolled at a MSI.

Findings

Beyond the course type, name, mode, or level, little additional information regarding the courses (e.g., design, instruction, pedagogy, education technologies) were gathered. The research models examined course inputs and their effect on student-level outputs. These research studies can be considered black box research where inputs and outputs are examined, but the research model does not include the complexity of the instruction, learning, or design. These research studies can be considered black box research where inputs and outputs are examined, but the research model does not include the complexity of the instruction, learning, or design.

Please note: Students who are participants in the studies identify racially or ethnically as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander and/or are enrolled at an MSI, HBCU, HSI, TCU, or AAPISIs.

Course modality

Research indicated that the course modes, discipline, and level could influence outcomes. Under certain circumstances, students were more likely to succeed in blended and online courses than in their face-to-face (face-to-face) counterparts (e.g., Wladis, Conway, & Hachey, 2017; Gavassa, Benabentos, Kravec, Collins, & Eddy, 2019). For instance, in one study in entry level blended STEM courses, students did better than in fully-online or face-to-face courses (Gavassa, Benabentos, Kravec, Collins, & Eddy, 2019). Yet, in another study, students had a higher success rate in their upper-level online courses that are part of their degree program, but they had a lower success rate in their lower level courses or elective courses that are online when compared to face-to-face (Wladis, Conway, & Hachey, 2017). Although lower level blended courses increase likelihood of success for the population of interest, lower level online courses do not.

It seems clear that blended entry level and STEM courses, as well as online upper level courses and courses within the student's major, show promise. Online entry level courses and their relationship to student success are not as clear. Research specifically examined online courses and indicated again that course level can influence success. According to Wladis, Conway, and Hachey (2017), "[f]or institutions looking for practical ways to address online course outcomes...interventions targeted at specific types of courses may be an effective way to eliminate or significantly reduce any differences in online versus face-to-face course outcomes" (p. 196). Further investigation exploring delivery mode (i.e., blended and online), level of learning outcomes and experience of the student (i.e., entry or upper and advanced levels), course relationship to a student's program (i.e., major or elective), and discipline (e.g., STEM) is needed. However, blended lower level courses, online upper level courses, and online courses within the major demonstrate evidence of inclusive learning and success.

Blended lower level courses, online upper level courses, and online courses within the major demonstrate evidence of inclusive learning and success.

Although research indicates that blended and online courses can lead to greater success than face-to-face courses, load of courses can have a negative effect on student outcomes. According to one study, students are more likely to complete their degree if they are successful in their online courses. Disappointingly, students who are high academic achievers with large course loads are less likely to complete online courses and are at higher risk of dropping out (Shea & Bidjerano, 2019). According to Shea and Bidjerano (2019), "More research is needed using methods that will help us understand why this was the case" (p. 20). Therefore, blended and online courses can be encouraged in certain circumstances, but students should not overload their courses, especially with enrollment in online courses (possibly with the assumption that they are easy and can be finished in less time).

Instructional characteristics and design

Course characteristics (i.e., course mode) most often use student information system data (i.e., enrollment data) to understand relationships with inputs and outputs, course characteristics and student outcomes. However, a few studies investigated the process or what is inside the box. The process can be referred to as instructional characteristics and interventions to improve instruction, including the use of open education resources (OER), adaptive learning, course design, and others. Instructional characteristics are decisions faculty and instructors make to the design of their course to facilitate instruction and learning and the interactions that take place within their courses. The participants in these studies are students identifying with traditionally underrepresented racial and ethnic groups or enrolled at a MSI.

In a study across institutions (2-year and 4-year), programs, and courses, students' experience within their online courses positively impacted student outcomes. This learning experience includes design, organization, learner support, interactions with their instructor, and interaction with content as well as assessment approach (grading and feedback) and peer interaction. The experience was measured by quality active learning and online learning indicators. There were no significant differences based on their racial or ethnic group and in their perceptions of their course design or delivery (Joosten, Cusatis, & Harness, 2019). According to Joosten, Cusatis, and Harness (2019), “[i]nstructional characteristics of a course that are indicative of quality indicators of online course design influence student success in a course and should be of great importance in the practice of instruction in online courses” (p. 373). Research indicates that various aspects of how the course is structured as well as the interactions of students (with the content, each other, and the instructor) can influence student outcomes, creating an inclusive experience and outcome.

Another study further supports the claim that course structure and design can influence student's success. Research indicated that students identifying with traditionally underrepresented racial and ethnic groups are successful with blended and online courses but have even greater success when the courses are well structured or when they are part of the student's degree program. For example, at a HSI that is large in size and a research university, students performed best in the hybrid class format with substantial course structure when compared to face-to-face and online modes for an entry level biology course.

The mode alone is not the factor that influences student success, but it is also dependent upon the course design and pedagogical or instructional approach.

Specifically, the courses were designed using an active learning pedagogy approach that focused on enhancing student engagement and interactions with each other and the material rather than focusing on lecture-based instruction (Gavassa, Benabentos, Kravec, Collins, & Eddy, 2019). Therefore, the mode alone is not the factor that influences student success, but it is also dependent upon the course design and pedagogical or instructional approach.

In a study that specifically examined content, OER (e.g., course website with multiple resources linked, study guides, videos, articles, case studies) helped students engage with the content, participate in the course, and complete their assignments, which led to improved learning habits and student motivation to learn (Cooney, 2017). Cooney (2017) argues, “[c]onvenient access to course materials is an issue of particular gravity among...populations and urban commuter students who typically balance many commitments in addition to their studies. The manner in which students discussed their satisfaction with the convenience of having all the course materials organized pragmatically in one location suggests it is worth considering how the scaffolding of the course on the OER impacts students' academic motivation and agency” (p. 175). Research indicates content that is OER positively influences outcomes. Student access to and interaction with content should be considered in creating inclusive learning experiences.

Findings

Interactions with instructors and peers are another consideration in online and blended courses that has historically been explored due to the theoretical relevance and previous evidence noting its importance in improving student outcomes. Research indicates that students require interactions with their instructors and with each other to improve their learning and other outcomes. Students require more information from their instructor to help clarify expectations, and they need more frequent feedback and interaction. Students reported they encountered learning challenges because they were not provided enough examples, timely feedback or response to questions, instructor-directed instructions, and general instructor interaction (Salvo, Shelton, & Welch, 2019). Salvo, Selton, and Welch (2019) and Joosten, Cusatis, and Harness (2019) both indicate the importance of communication and interaction with faculty, including faculty and instructor's role in supporting students by clarifying expectations, including clear instructions and examples, and providing timely and meaningful feedback to correspondence and assessments. While these studies were directly related to traditionally racially and ethnically underrepresented students, it is important that future research focuses on the role of interaction in courses particularly as it pertains to these groups.

Moreover, students expressed wanting a more supportive online environment and interaction with the instructor and peers (Hunt, & Oyarzun, 2019). Hunt & Oyarzun (2019) state, "...students prefer an education that is more reciprocal in nature. The participants expressed a desire to meet face-to-face with instructors and to have more quality discussions online rather than responding to questions in silos. The participants wanted to be given more challenging work and more ownership of discussion board assignments. Though grades were important to these students, working with peers and interacting with professors were repeatedly emphasized" (p. 331).

Additionally, students reported that they liked their online courses because of the non-prejudicial nature that provided a supportive and encouraging environment, rather than competition among peers, and the freedom to go at their own pace (Salvo, Shelton, & Welch, 2019). Research indicates that creating a supportive climate can improve student outcomes.

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In addition to the role of the instructor, research findings indicate that collaborative learning is a potentially effective instructional and pedagogical approach to improve student outcomes. Students report satisfaction with online collaborative activities. Also, students prefer to work in smaller groups than with the entire class. These students reported liking online collaborative activities because they allow them to contribute to the knowledge-making process and share, or lead, discussions with their peers (Kumi-Yeboah & Dogbey, 2017). The researchers suggest, "[c]ollaborating with students from a different culture and having designed time to get to know each other can be very rewarding for students looking to understand a new culture" (p. 19). Clearly, students from traditionally underrepresented racial and ethnic groups benefit from an intentionally designed inclusive environment that favors respectful and meaningful collaboration and attention to all aspects of course design that avoids favoring a dominant culture and its learning norms.

Findings

Student-level characteristics

Finally, the last series of findings illustrate student-level characteristics that can influence student outcomes. The participants in these studies are students identifying with traditionally underrepresented racial and ethnic groups or enrolled at a MSI.

Research indicates students need interventions to ready them for online learning, and the lack of research related to creating inclusive learning environments is negatively impacting student success rates.

These findings include

student or learner readiness and academic and learning preparedness. They report on the previous experiences and or skills that help students succeed as well as interventions that can be implemented by faculty, programs, or institutions to prepare students or create an equitable experience for student success. Technology access and experience is a theme across several studies examining student characteristics. Although the argument can be made that students have substantial experience and access to technology, research disagrees.

One study explains that students reported that previous academic success (e.g., dual enrollment) and previous technology experience (e.g., courses, technology familiarity) influenced their success (Salvo, Shelton, & Welch, 2019). Another study tested an intervention to improve student readiness as students did not meet requirements for technological competency. These students received a multi-pronged intervention (study guides, online preparation opportunity, computer application course, and a more advanced technology course to help students develop technological skills needed for their coursework) that enhanced their skills, confidence, and their academic achievement in their courses (Buzzetto-Hollywood, Wang, Elobeid, & Elobaid, 2018). Buzzetto-Hollywood et al. (2018) suggest, “[i]nstitutions of higher education should invest in a thorough examination of the information and technology literacy skills, needs, and perceptions of students both coming into the institution as well as following course completion” (p. 78). Interventions to prepare students to gain the skills needed to be successful in courses using educational technologies have shown a positive impact on outcomes.

Another study examined a readiness intervention. Students taking a supplemental series of online preparation modules changed their study behaviors, had a greater use of self-assessment quizzing than the control group, and outperformed on quizzes and exams compared to the control group (Bernacki, Vosicka, & Utz, 2019). Interventions can provide students with technology and study skills.

Again, research, although deficit-minded, indicates that students from certain race or “underrepresented” categories benefit from interventions to prepare them for online learning. These students have statistically lower perceptions of their organization, self-directedness, and online work productivity skills than their counterparts. Also, they had a greater need for socialization than their counterparts. They did not differ in their online efficacy or beliefs that online can be as effective as face-to-face. Intervention is needed since these skills can influence student outcomes (Joosten & Cusatis, 2020). The authors note, “there is a lack of research that has examined the difference between the student characteristics of preparedness and readiness among different groups of...students,” such as racially minoritized learners. The authors also write, “[w]ithout empirical evidence that focuses on the possible relationship between...students and their learning success in online environments, it is difficult for instructors, staff, and institutions to recognize possible interventions to assist this student population” (p. 12). Again, research indicates students need interventions to ready them for online learning, and the lack of research related to creating inclusive learning environments is negatively impacting student success rates.

Findings

Along with skills needed, technology access is still a challenge and should be addressed to ensure equitable learning. Access to the Internet is a challenge for students in online courses, especially classes that require Internet access to course materials, such as OER (Cooney, 2017; Ikahihifo et al., 2017). OER is a popular intervention to improve access and equity, yet technology access can be a barrier to the OER just as cost for copyrighted textbooks can be an obstacle to equitable education.

Finally, research indicates that academic preparation and adaptive learning may impact student outcomes. For instance, a summer preparation course that uses adaptive learning may help students perform statistically better than students in a remedial course (Hickey, Robinson, Fiorini, & Feng, 2020). Also, in an online preparatory short course that used OER for chemistry, students performed better in the subsequent course than those students who did not participate in the preparatory short course (Fischer, Zhou, Rodriguez, Warschauer, & King, 2019). Fisher, Zhou, Rodriguez, Warschauer, & King (2019) state, “[T]his online preparatory course provides an approach to support [racially minoritized] student populations.

Although...student populations often have additional challenges in online settings, this study did not indicate that the examined student groups are further disadvantaged in this particular online course” (p. 862). Again, more research is needed that focuses on the responsibility of the institution to provide equitable learning experiences for all students. Preparation experiences, modules, or courses that integrate digital technologies or are delivered partially online can have a positive impact on students' success in future courses.



Recommendations

Recommendations for higher education administrators and staff, faculty and instructors, and students

Research findings need to drive practice. By turning findings into research-based practices, educators can begin to create equitable and inclusive learning experiences for students. The findings in the previous section were translated into potential practices to be implemented by different stakeholders in institutions of higher education to better serve students who identify racially or ethnically as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander. Moreover, as institutions continue efforts and recommit to those efforts to create equitable learning environments, there are recommendations that can be used by students to increase their success in classes that use education technology. While these recommendations may be beneficial to all students, this report is specifically focused on students identifying with traditionally underrepresented racial and ethnic groups or enrolled at a MSI. Thus, the studies analyzed for this report focused on how these practices are particularly important for serving these students of interest. These recommendations are not presented in any particular order.

Administrators and staff

Administrators and staff can build capacity to design and implement strategies, processes, and resources that are based on research to ensure student success for students who identify racially or ethnically as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander.

Administrators and staff should address technology access and use when education technology is being used in the curriculum and within courses and programs. Administrators and staff should assess students' access to technology, broadband, and an effective learning environment. They should provide resources when needed. Also, students' previous experiences with technology should be assessed prior to taking an online course and/or demonstrating proficiency in using technology, such as work productivity applications (e.g., Word, PowerPoint) and communication tools (e.g., email, threaded discussions, synchronous chat).

Recommendations

In addition to understanding student needs, interventions should be implemented to address any potential gaps within a student's learning environment, if at a distance, along with their technology access and use. Students should be provided with an online learning readiness opportunity (e.g., online modules, short courses) to gain behaviors, attitudes, and beliefs that will prepare them for success in their online courses. Curriculum for experiences with online learning readiness should include opportunities for students to learn how to 1.) self-direct their learning, 2.) communicate effectively online, 3.) use different technologies effectively for communication, collaboration, and work productivity, 4.) organize time and classwork intentionally 5.) motivate themselves, and 6.) develop the belief that online learning is as efficacious or at least equal to face-to-face.

- 1 Self-direct their learning.
- 2 Communicate effectively online.
- 3 Use different technology tools.
- 4 Organize time and classwork.
- 5 Motivate themselves.
- 6 Believe in efficacy of online learning.

Recommendations

Along with skills preparation, students should receive academic preparation as needed. Administrators and staff should offer support (e.g., instructional design, incentives) to programs and faculty to provide *online* summer academic preparation courses to prepare students for STEM courses rather than remedial courses, including using adaptive learning or other personalized learning approaches.

However, institutions should avoid choosing the traditional solution of investing in more student support services, such as tutoring, without robust investigation into their current institutional structures that may be impeding the success rates of all students. Sometimes the solution is not *more* student support services, but, rather, a re-envisioning of the current institutional structure and cultural norms characterizing that structure in its entirety (see Benitez, 2010).

Students should be advised as to effective enrollment strategies when taking online courses. When students are enrolling in their courses, they should be advised to:

- 1.) avoid taking too large of a course load,
- 2.) take online courses, but should consider primarily enrolling in online courses in their degree program, and
- 3.) take blended entry-level courses with intentionally designed structures. Intentionally designed courses are courses that have a deliberate course design that is based on evidence-based research of sound pedagogical practices.

As discussed earlier in the report, some examples of these pedagogical practices include a diverse curriculum, frequent interaction with peers, and activities that provide traditionally racially and ethnically underrepresented students the opportunity to equally participate in class without fear of reprisal, etc.

There is an array of course decisions that should be made regarding what courses are redesigned and offered in an alternative mode than the traditional face-to-face course. First, administrators and staff should support entry-level courses that are designed using a structured blended model of instruction. Second, administrators and staff should support blended technical education courses that blend online training modules and traditional onsite and face-to-face instruction, and third, administrators and staff should invest in examining interventions for entry-level fully-online courses.

The redesign of these courses needs to be supported to ensure quality. Administration and staff should provide resources (e.g., faculty development program, professional development, instructional design support, incentives) to faculty and instructors related to designing and teaching technology-enhanced, blended, and online courses. These resources should include:

- 1.) how to appropriately design and organize courses, such as alignment of learning objectives, assessments, and activities,
- 2.) how to remove barriers to learning, navigate and provide access to information with ease, and state clearly what is expected of students (e.g., interactions, performance),
- 3.) how to create a supportive and collaborative environment, including using smaller size groups in collaborative learning projects, and
- 4.) how to communicate effectively with students, including frequent communication and timely feedback to questions and discussions.



Recommendations

Finally, administration and staff should provide meaningful and robust development opportunities so that faculty can attain the skills needed to help implement equitable solutions in distance education. These

Administration should provide meaningful and robust faculty development opportunities so that faculty can attain the skills needed to help implement equitable solutions in distance education.

professional development opportunities should also be incentivized as a means for inviting faculty to invest in these vital strategies. Faculty should be given resources informing how to create a more culturally inclusive curriculum and pedagogy when possible.

Faculty and instructors

There are numerous instructional and pedagogical strategies that faculty and instructors can implement to support equitable learning experiences for students.

When using technology in a course, students need to have the skills and resources to access and use the technology effectively to ensure it doesn't become a barrier to their learning or academic achievement. Faculty and instructors should assess students' access to technology, broadband, and an effective learning environment, providing information on institutional resources when needed. Also, faculty and instructors should ensure that students' online learning readiness is assessed prior to the start of course, and students should be provided information as to where they can locate online learning readiness resources. For instance, questions for faculty to consider include: Do students have previous experience in an online course? Are students proficient in using technology, such as work productivity apps (e.g., Word, PowerPoint) and communication tools (e.g., email, threaded discussions, synchronous chat)? Faculty should be encouraged to avoid assuming that students' skills in using social technologies translate to success in learning technologies.

STEM courses and programs are an area that has been a particular challenge for Black students and has received attention. Faculty and instructors who teach STEM courses should consider providing *online* summer academic preparation courses to prepare students for STEM courses rather than remedial courses. Moreover, adaptive learning or other personalized learning approaches should be considered in the instructional design process.

Generally, faculty and instructors should consider their courses and their learning outcomes with special consideration to the delivery mode. Faculty and instructors should consider using a hybrid or blended mode with greater structure for the entry-level courses. Faculty and instructors should consider a fully-online format for the major or upper-level degree program courses.

All courses should be designed strategically despite the course level or degree requirement. Faculty and instructors teaching technology-enhanced, blended, and online courses should appropriately design and organize their courses, which include alignment of learning objectives, assessments, and activities. Additionally, faculty and instructors teaching technology-enhanced, blended, and online courses should remove barriers to learning for students, navigate and provide access to information with ease, and state clearly what is expected of students (e.g., interactions, performance). Faculty and instructors teaching blended and online courses should ensure they are designed to be supportive and collaborative, including group activities where students can connect with each other. Also, faculty and instructors teaching blended and online courses should use smaller size groups in collaborative learning projects and should ensure that they provide frequent communication, including timely feedback to questions and discussions.

Faculty and instructors should consider using a hybrid or blended mode with greater structure for the entry-level courses. Faculty and instructors should consider a fully-online format for the major or upper-level degree program courses.



Recommendations

Lastly, faculty should consider a more culturally inclusive curriculum when possible. Faculty should encourage collaboration that provides students the opportunity and space to learn about various cultures. Faculty should ensure that the design of their course does not privilege one culture over another, including investigating learning cultural norms and avoiding awarding a dominant learning cultural norm over another.

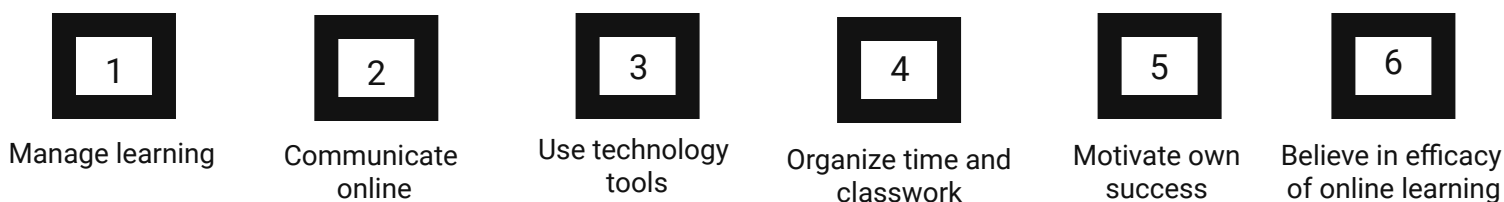
Students

The research findings were central to understanding what behaviors, interventions, and practices positively influenced student access and success. Although the burden to create systems to ensure success for students from traditionally underrepresented racial and ethnic groups rests with the institutions, there are several recommendations that should indicate student-level outcomes of any institutional or instructional efforts.

The existence of the digital divide has become even more evident in the response to COVID-19. It is particularly evident when students are removed from institutional student housing. Students should have access to technology, broadband, and an effective learning environment. Also, students should have previous experience with technology prior to taking an online course and/or demonstrate proficiency in using technology, such as work productivity apps (e.g., Word, PowerPoint) and communication tools (e.g., email, threaded discussions, synchronous chat). Students should take advantage of any opportunities to learn how to learn, or how to prepare for online classes, including how to gain behaviors, attitudes, and beliefs to prepare for success with online learning. Specifically, students should gather information on how to 1.) manage their learning, 2.) communicate effectively online, 3.) use different technologies effectively for communicating, collaborating, and working, 4.) organize time and classwork, 5.) motivate their success and 6.) develop the belief that online learning is just as good as face-to-face. If offered, students should enroll in online summer academic preparatory courses.

Although online courses may be the only option or seem like an easier option, students should avoid taking too many courses in one semester, especially online courses. Also, students should avoid believing the myth that online courses are easier than face-to-face courses. Belief in this myth can potentially lead students to fail their online courses, drop out of these courses, or drop out of college. However, when possible, students should take hybrid or blended courses for their general education or entry-level courses. Students should not hesitate to take online courses when they are offered as part of their major. On the other hand, students also should speak to an advisor or course instructor before enrolling in entry-level online classes.

When students are not meeting frequently face-to-face with instructors and classmates, they may experience a higher degree of uncertainty and equivocality. Therefore, students should take the initiative to reduce ambiguity. To help them do so, students should not hesitate to communicate by contacting their instructor for clarification and questions via email or forums and build a network with their classmates to create a support system.



Conclusion

Additional funding and research are needed to identify and understand the factors that influence the success of students who identify as Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander. Specifically, there needs to be a substantial investment from federal and state governments, foundations, and private sector industry in supporting systematic change in institutions of higher education that will guarantee that 1.) all students have free and/or affordable access to broadband, laptops, and apps for learning that include readiness training as a means of preparing them for courses regardless of modality and for prospective careers, 2.) all students have free access to course materials, texts, videos, and other content that is rich, relevant, and current, 3.) institutions have the knowledge to effectively implement and adopt practices and associated technologies that will improve the student experience inside and outside of the classroom, and 4.) institutions have the knowledge as to how courses and programs, including curriculum, are structured to enhance student engagement, learning, and success - efficiently and affordably.

There needs to be national and state cooperatives that are built and sufficiently funded to conduct research about potential factors that will support success for these students

Research is needed to create greater knowledge of how these four goals can be accomplished. National dissemination strategies should also be devised for the storage and sharing of this knowledge across institutions of higher education. Since there is a lack of recent research in the area regarding how educational technologies can support the success of Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander students in higher education, there needs to be national and state cooperatives that are built and sufficiently funded to conduct research about potential factors that will support success for these students. Importantly, the solutions and innovations need to be identified, developed, tested, replicated, and scaled with careful implementation while engaging a heterogeneous team of stakeholders.

What this report has made apparent is the existing research gap about student success, access, and satisfaction in online learning as well as instructional and learning effectiveness. Researchers continually call for more cross-institutional research (Wladis, Conway, & Hachey, 2017). Hundreds of peer-reviewed research articles were systematically reviewed and only a handful of studies were identified that could illustrate a relationship between an intervention and practice and show evidence of impact on student outcomes for Black students enrolled in an IHE in the US. To ensure access and equity through inclusive instructional and institutional practices, resources need to be allocated to ensure rigorous empirical research efforts are underway to produce findings that will guide decision making at IHEs. IHEs must make the commitment to search and advocate for resources that prioritize this type of research as well as engage in valid and reliable research about this important topic.

This research must include mixed methodological approaches and be inclusive of interpretive and critical methodologies along with traditional quantitative methods. Because of the seeming novelty of the phenomenon and the misdirected attention by economists investigating online learning, there are many webs of significance that are far from understood. There is still a lot to be learned about the experience of these students in mediated courses and the use of technology for learning. This area of inquiry calls forth the need for interpretive methods, such as ethnographic studies through observation and interviews and focus groups of students. Interpretive methods will lead to discoveries about the unique and common characteristics that can be built into quantitative models for instrument development and testing. Moreover, interpretive methods are more inclusive of racial and ethnic characteristics.

Conclusion

Although critical paradigms are less likely to identify factors that will improve learning or variables that can be replicated and scaled, these paradigms do identify structures that are oppressive and can provide opportunities to change those structures through micro-level actions. With the long history of racism in institutions of higher education, it is critical that a multi-paradigmatic approach be taken to create knowledge that will help change the macro-level structures that impact the day-to-day experiences of Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander students. Furthermore, critical paradigms help capture student voices through data collection, which is crucial to identifying recommendations for structural improvement in IHEs. In so doing, students are perceived not as research participants but as co-researchers who assist in gathering necessary evidence used to inform decision-making and create new innovative inclusive practices.

The research is clear as to the continued problems with technology access and the potential for open education resources (OER) to provide more equitable access. Notably, decades after identifying and documenting the movement of the digital divide, the pandemic has revealed that institutions are not keeping pace with the needs of students in general access to technology. Rather than spending time on preparing faculty to design courses and teach remotely, many of the pandemic-related institutional resources were allocated toward efforts to ensure that instructors and students had base-level technologies in order to complete work at a distance. What has been revealed in retrospect is that institutions, which is largely influenced by what local and national communities are doing to address the problem of affordable broadband service across the United States, have been unable to meet students' basic technology needs which is an unacceptable injustice characterizing 21st century higher education. The inability for institutions to meet students' basic technological needs served as a magnifying glass for additional educational inequities.

Even prior to the pandemic, access to technology has been consistently identified through research as an issue in institutions of higher education (IHE). There is siloed knowledge as to how students can access technology and the Internet, as well as skills training using technologies to ready them for online and remote instruction. Yet, there is little effort to engage university and industry leaders in this strategic investment across the country. While the government ensures standards for how instructors should teach online on a federal level, it would be wise to first invest in funding help to ensure that every student in our country has the resources he or she needs to be able to equitably access online offerings. All national stakeholders should be involved immediately in solving this issue and building technological capacity for future generations of learners.

The pandemic and move to remote instruction highlighted another digital divide - the challenges of the antiquated textbook model as the primary delivery mechanism of higher education content. In the digital age, IHEs are still using materials that are unreasonably costly, quickly outdated, and difficult to access, especially at a distance. Although there have been initiatives that have provided evidence of the benefits of OER, the overwhelming majority of courses in higher education still require a phenomenal investment in course materials, such as textbooks and other reading materials. Free or affordable digital OER with print options should be standard in higher education. OER can be free or affordable, rich, current, and relevant. Information is no longer scarce. With the proper investment in faculty and instructors to design, curate, and/or develop OER for active learning along with solutions for student technology access, this divide can be feasibly narrowed while also acknowledging the potential to increase learning and instructional effectiveness. Government agencies and industries could make an investment to create capacity for the use and creation of OER while the government and accrediting bodies could create standards ensuring free and affordable access to course texts and materials that are relevant to students' learning, including their digital and technology literacy of which they will need for their future profession and enactment as active citizens.



Conclusion

While our nation struggles to provide basic access to technology and course materials in 2020, select educators and researchers have been working to understand how to design courses and structure learning experiences for students when implementing an educational technology (e.g., adaptive learning technologies) or mediating part or all of the learning experience using online technologies (i.e., blended or online learning). They are mapping instructional practices and processes within the black box - the college course. Yet, the majority of resources are still being spent on determining the efficacy of online learning which fails to meet the requirements for an efficacy study as the mode is not an intervention in of itself. Mode comparison studies have been conducted for over 50 years, yet misdirected federal funding is still being invested in these types of studies rather than unraveling the complexity of pedagogy and instruction beyond content delivery when technology mediates the experience.

There is promise in course structure and design that incorporates active learning pedagogy and other pedagogical techniques that rely on an array of learning technologies and communication tools. For this promise to be actualized, research in this area requires further investment, especially for additional cross-institutional studies. Additionally, these studies must have the resources and capacity to

- a.) gain institutional prioritization of research and data sharing across institutions,
- b.) identify key factors that influence student success,
- c.) replicate and scale factors across institutions, and
- d.) disseminate the research-based course and instructional design factors.

These factors should focus on enhancing the student interaction not only with content, but with each other and their instructors in ways that create an approachable, understanding, and engaging experience with authentic and varied assessments that mirror their expected cognitive, behavioral, and affective growth at the postsecondary level rather than a cognitive race of memorization and disengaged didactic Olympics. As these course and instructional structures, processes, and interactions are identified, it is crucial that we document their relationship to student access and success. Furthermore, an investment is needed to increase the capacity for state and national resources for faculty and instructor professional development to gain the skills in these areas. This should be accompanied by incentives to implement these practices in all college courses. If this infrastructure would have been in place prior to the pandemic, the negative effects suffered by educators and students would have been less.

One example of the kind of change that we need to see in the systemic structures of our institutions is the capacity for faculty to implement proven pedagogical techniques while taking advantage of technologies that help them better meet the learning needs of students. As a result, the institutions bear the burden of responsibility rather than placing it on students. While recent distance education policy emphasizes a specific technique, it would be more beneficial if federal efforts advocated for the use of research-based pedagogical and instructional techniques and faculty and professional development to disseminate these effective practices that are appropriate for the student population, discipline, course level, and program rather than assuming one pedagogical technique is appropriate for all mediated learning and all students.

Another needed change is related to program and curriculum design and requirements. While some program requirements have consistently led to the dropout of students, little change has been made to the curriculum or program requirements to reevaluate these requirements.

The pandemic and move to remote instruction highlighted another digital divide - the challenges of the antiquated textbook model as the primary delivery mechanism of higher education content.



Conclusion

Instead, the burden is again placed on students where they are required to utilize additional student support services or enroll and complete development courses. Yet, there is little research-based evidence that these are efficacious solutions. The relationship between program requirements and department funding further complicates the problem. However, there are practices that show promise in the use of digital interventions and the changing of program requirements to remove structural barriers to student success. While further research is needed, replication and scaling of these findings across numerous institutions are most pertinent and should be completed with a sense of immediate urgency and in a manner of rapid succession.

Institutions need to be held accountable for these courses within programs that present barriers to success. Likewise, students support services alone is not acceptable evidence that efforts are being made to help students. Help students by examining the structural deficit or the racist systems that live within the institutions that lack data, research, or evidence to support the continuation of these program barriers, such as these problematic courses or instruction. Doing so requires that institutions include as part of their strategic plan - and central to their mission - the priority of continuously interrogating potential racist underpinnings at the institution. To do this well also requires that institutions lean into the hard work of having institutional-wide difficult conversations with the goal being to explore and criticize parts of the institutional system that may be perceived as deeply entrenched into the organizational mission. Being willing to rethink and let go of parts of the system that are valued but actually part of the problem is an important step that institutions will need to take if they are truly committed to creating an equitable institution of education for all students. While there is a small foundational body of research to be replicated and scaled to guide course and instructional design while examining the relationship to student outcomes, there is a gap in how institutions and programs can be designed and structured for equity as demonstrated that may be impacting the success rates of students. There has been a consistent need to stop the leaking of the students from institutional enrollments, where patches have been made; It is time to change the pipes.

Effort is needed to effectively implement and utilize the affordances of education technologies in a way that creates and works within innovative systems committed to helping students achieve their personal and professional goals in postsecondary education. Moreover, assurances are needed that the knowledge gained through research related to student success in higher education is specific to each racial and ethnic population of interest. Importantly, focus must be placed on what changes can be made to the institutional, programmatic, and instructional levels that create inclusive systems for students. Institutions should develop the infrastructure and capacity to support innovation and inclusiveness. Technology is central to all of these institutional functions.

The institutions should be designed around the students of 2020, not the students of 1920. Although one can change the symbols and behaviors of an institution and its actors, such as language use, change is needed at the core of the culture of institutions. Changes need to be made to the underlying assumptions, norms, and values of the institution and of our postsecondary education system as a nation to embrace and value our Black, African American, Hispanic, Latinx, Latino or Latina, Native or Indigenous American, including American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander students.

Being willing to rethink and let go of parts of the system that are valued but actually part of the problem is an important step that institutions will need to take if they are truly committed to creating an equitable institution of education for all students



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