Digital Higher Education in Texas: A Meta-Analysis of Data and Research

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DIGITEX

DIGITAL HIGHER EDUCATION CONSORTIUM OF TEXAS

Digital Higher Education in Texas:

A Meta-Analysis of Data and Research

Digital Higher Education Consortium of Texas
(DigiTex)

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Executive Summary

Texas public institutions of higher education—37 four-year and 59 two-year institutions—deliver fairly robust and extensive online courses and programs, and distance education enrollments are trending upward. In fall of 2019 at Texas community and technical colleges alone, statewide distance education enrollments totaled 800,223, compared to 1,138,105 face-to-face enrollments.[1] Furthermore, distance education enrollments increased nearly two percent from fall 2018 to fall 2019. Additionally, the COVID-19 pandemic has spurred a hurried and "unnaturally" forced, nearly 100% transition to remote learning across the state (and nationally). **The need to study and understand digital education in all its manifestations has never been more urgent.**

To this end, DigiTex has undertaken a meta-analysis of existing data and research on digital, including distance and online, higher education in Texas in order to assess the "holes" in that information and determine how we might impactfully contribute to the body of knowledge in this area. First, this paper provides a definition of key terms; then, it gives an overview of national and statewide data and research available on digital higher education, with an analysis of common categories of the existing research. Then, an examination of existing sources of data and research focused on Texas suggests which categories may be missing from the body of state data and research.

Finally, we suggest directions for future research in order to gain a more comprehensive picture of the state of digital higher education in Texas. This meta-analysis supports the need for a study of the state of digital education in Texas, building on data collected by the Texas Higher Education Coordinating Board and research conducted by its Learning Technology Advisory Council. Then, relevant topics for future study include:

Online Program Design
Equity
Impact and Outcomes

Through this research agenda we hope to contribute to a better understanding of digital education in Texas and beyond.

[1] Texas Higher Education Coordinating Board data.

Introduction

Texas public institutions of higher education—37 four-year and 59 two-year institutions—deliver fairly robust and extensive online courses and programs, and distance education enrollments are trending upward. In fall of 2019 at Texas community and technical colleges alone, statewide distance education enrollments totaled 800,223, compared to 1,138,105 face-to-face enrollments.[2] Furthermore, distance education enrollments increased nearly two percent from fall 2018 to fall 2019. Additionally, the COVID-19 pandemic has spurred a hurried and "unnaturally" forced, nearly 100% transition to remote learning across the state (and nationally). The need to study and understand digital education in all its manifestations has never been more urgent.

The Digital Higher Education Consortium of Texas (DigiTex) assists Texas public community colleges in providing learners an education without barriers through high quality digital educational opportunities, resources, and services (including research) that help students succeed. Founded in 1998 by the Texas Association of Community Colleges as the Virtual College of Texas (VCT), DigiTex is funded by an Exceptional Item allocation from the state legislature and is based at Austin Community College, which serves as the fiscal agent for the funding. Still, DigiTex serves all fifty public community college districts in the state. Historically the primary focus of the work of VCT was to facilitate inter-institutional course sharing in Texas. However, decreased participation over the past decade or so led to a strategic planning process in 2019 in order to evaluate VCT's services and initiatives for efficacy, impact, and return on investment.

Feedback from various stakeholders across the state during that process led to a revamping of course-sharing, including a partnership with a technology company, Acadeum, to more effectively share courses among community colleges. Work to increase efficiency and expand the Texas Quality Matters Consortium, which DigiTex leads, is underway. New initiatives to support member colleges and their students include research on, and support for, Open Educational Resource (OER) policy, practice, and development, and conducting research on digital higher education in Texas.

The COVID-19 pandemic, with its concomitant increase in digital delivery of education (whether termed "distance," "online," or the increasingly ubiquitous term "remote" to signal the rather unique conditions under which delivery of courses has shifted), brings into sharper relief the need to study such issues as cost to deliver, quality, outcomes, and impact, particularly if the current emergency measures move from short to long(er) term. For example, how will reporting on distance education data, such as enrollments, at the state and federal levels be affected? How will courses shifted midterm from face-to-face to remote be categorized for state reporting purposes? Are institutions harnessing the analytics that become available through digital education? These are just three questions that come to mind during these unprecedented times. **Research and data are needed to help better inform responses to COVID-19 disruptions—not to mention preparation for shifts in higher education that may be more permanent.**

[2] Texas Higher Education Coordinating Board data.

DigiTex already has conducted research on OER, with plans for future studies (see below). However, anecdotal reports from those consulted during the strategic planning process pointed toward a dearth of research on digital education in Texas. Before allocating resources (both human and financial) for this purpose, it seems imperative to conduct a more comprehensive, quasi-quantitative study of existing data and research on digital, including distance and online, higher education in Texas in order to assess the "holes" in that information and determine how DigiTex might impactfully contribute to the body of knowledge in this area.

This meta-analysis first will provide a definition of key terms; then, it will give an overview of national and statewide data and research available on digital higher education, with an analysis of common categories of the existing research. Then, an examination of existing sources of data and research focused on Texas will suggest which categories may be missing from the body of state data and research. **Finally, the paper will suggest directions for future research in order to move toward a more comprehensive picture of the state of digital higher education in Texas.**

Definitions and Need for Further Research

The shift in initiatives and services that resulted from DigiTex's strategic planning process necessitated a name change; "Virtual College of Texas" reflected its nearly exclusive focus on course sharing.[3] However, it was clear that our services and initiatives would continue to support work in which our member colleges engaged primarily in the "virtual" sphere. It was the opinion of stakeholders consulted, though, that virtual is perceived as either an outdated term or a term that now has specific connotations, e.g. "virtual reality." After much consideration, "digital" became an umbrella term for distance education, educational technology, online learning, and e-learning.

DigiTex, as had VCT, focuses primarily on higher education, also known as postsecondary education, generally defined as education beyond high school, especially at a college or university. Our legislative mandate ensures a focus on education at public community, or two-year, colleges. However, we recognize that the lines between secondary and postsecondary education are becoming increasingly blurred through programs like dual credit, early college high school, college preparation, and the like. Furthermore, issues related to transfer and articulation also blur the lines between two-year and four-year institutions of higher education. DigiTex's initiatives, including research, therefore somewhat cross these boundaries as well.

A first step in a research process often is conducting a literature review; a meta-analysis takes a lit review one step further. While the former provides an overview of the development of knowledge in a field, a meta-analysis, at least in its uses here, takes a more statistical approach to quantifying the themes revealed by the existing body of literature. As defined by the Department of Education, it is "a technique for combining the results of multiple experiments or quasi- experiments to obtain

[3] It also was problematic because it caused confusion: VCT was neither an accredited college nor offered courses itself.

a composite estimate of the size of the effect" (Means, et al., 2010, p. xiii). It is a more systematic method for combining results of previous research to arrive at conclusions about the body of research.

In the field of digital higher education, an early example is *Research in Distance Education: A status report*, which focused on comparative studies (Saba, 2000). The report examined the impact of a then-"new" system of research incorporating the core issue of instructional interaction and grounded in a theory of transactional distance, promising a more comprehensive understanding of distance learning than previously available and revealing some of the complexities of the field. In 2009, the authors of "Review of distance education research (2000 to 2008): Analysis of research areas, methods, and authorship patterns" reviewed 695 articles from five journals to identify both common areas of research and neglected topics during the focus period. They concluded that "distance education research is strongly dominated by issues related to instructional design and individual learning processes; whereas, other important areas (e.g., innovation and change management or intercultural aspects of distance learning) are dreadfully neglected. There is a significant trend towards collaborative research and more qualitative studies. Over 80% of all articles originate from only five countries" (Zawacki-Richter, et al., p. 21).

In 2010, the Department of Education, in conjunction with SRI International, published a seminal meta-analysis of research in this field, Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. The research was undertaken to address four questions:

1. How does the effectiveness of online learning compare with that of face-to-face instruction?
2. Does supplementing face-to-face instruction with online instruction enhance learning?
3. What practices are associated with more effective online learning?
4. What conditions influence the effectiveness of online learning? (Means, et al., p. xi)

The screening and analyses of studies, including of K-12 education, found that, among other conclusions,

> on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction. The difference between student outcomes for online and face-to-face classes—measured as the difference between treatment and control means, divided by the pooled standard deviation—was larger in those studies contrasting conditions that blended elements of online and face-to-face instruction with conditions taught entirely face-to-face. (p. ix)

More recently, in "Trends in Distance Education Research" (2015), the authors reviewed 861 research articles in seven peer-reviewed journals to analyze trends in the field during the period of 2009-2013. Findings included that

- "distance education" was the primary generic term defining the field.
- "learning" was the major topic in the field, with collaborative learning and teacher training also key.

- open education resources and mobile learning were newer topics in the field.
- educational technology, interaction and communication in learning communities, learner characteristics, and instructional design were the most studied areas and constituted 51% of all fifteen research areas identified in the articles. (Bozkurt, et al.)

A topical subset of this field includes open educational resources, which although not exclusively so, often are digital. *Research on Open: OER Research Hub Review and Futures for Research on OER* (Shear, et al., 2015) focuses on the accomplishments of, and challenges faced by, the Open Educational Resources Research Hub, based at the Open University in the UK and funded by the Hewlett Foundation. That same year, the Open Education Group initiated The Review Project, which provides a summary of all known empirical research on the impacts of OER adoption. And in 2019, *Educational Technology Research and Development* published an in-depth article focusing on empirical research relating to perceptions and efficacy of OER at the college level (Hilton).

What the majority of these examples point to is the need for more quantitative, empirical, and experimental research in digital education broadly conceived. According to the Babson Survey Research Group, in 2016 distance student enrollments increased for the fourteenth straight year, with over thirty percent of higher education students taking at least one distance education course that year. And according to the latest data from the National Center for Education Statistics, in fall 2018 there were 6,937,249 students enrolled in distance education courses at degree-granting postsecondary institutions.The increasing ubiquity of online and distance education, as well as digital learning resources and educational technologies utilized to support them, demands more in-depth, sophisticated methodologies for measuring outcomes and impact on student retention, progress, completion, and success. **At the same time, digital education produces large amounts of data about teaching and learning heretofore previously difficult to capture at any scale in face-to-face courses and programs, and these data need to be harnessed effectively to better understand digital education.**

National Data and Research

National Center for Education Statistics and Integrated Postsecondary Education Data System

As referenced above, the National Center for Education Statistics (NCES) tracks the number of students who take distance learning courses at the postsecondary level, which it disseminates through the Integrated Postsecondary Education Data System (IPEDS). NCES disaggregates these data by year, level of enrollment, and control and level of institution; then by the number and percent of students taking no distance education (DE) courses. For those who take any DE courses, data include, in addition to total students:

- At least one, but not all, of student's courses
- Exclusively distance education courses, by location of student: total, same state, different state, state not known, outside of the U.S., location not known

In 2017, the National Postsecondary Education Cooperative released a report with suggestions for improving IPEDS DE data collection. It concludes that "information about hybrid coursework and DE outcomes would be useful additions to the data collection, providing the additional survey questions do not impose a great deal of burden. Clarifying DE instructions and definitions and better representing DE student populations would also be beneficial to students and researchers using the data" (Miller, et al., p. 32).

The National Council for State Authorization Reciprocity Agreements

The National Council for State Authorization Reciprocity Agreements (NC-SARA) is a voluntary agreement among nearly 2,000 postsecondary institutions in 49 states and the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. Members agree to follow uniform processes for approving their eligible institutions' participation and to deal with other states' SARA institutions in a common way when those institutions carry out activities in SARA states other than their own. NC-SARA also collects DE enrollment and out-of-state learning placement data from participating institutions. In 2019 the total reported SARA out-of-state distance education enrollment (unduplicated) was 1,288,852, an increase of 5.2% from the 1,225,022 reported in 2018. This was the first year that institutions were required to report in-state distance education enrollment to NC-SARA. In 2019, a total of 1,517,530 in-state distance education enrollments were reported, for a total distance education enrollment of 2,806,382 (Straut & Boeke, 2020).

National Research Center for Distance Education and Technological Advancements

Established in 2014 with funding from the U.S. Department of Education Fund for the Improvement of Postsecondary Education, the National Research Center for Distance Education and Technological Advancements (DETA) at the University of Wisconsin – Milwaukee conducts cross-institutional research with two- and four-year postsecondary institutions. DETA partners with the University of Wisconsin System, the UW-Extension, Milwaukee Area Technical College (MATC), and EDUCAUSE (see below). Its objective is to

> promote student access and success through evidence-based online learning practices and learning technologies. Specifically, DETA identifies and evaluates instructional and institutional practices in blended and online learning, including competency-based education, with particular interest in underrepresented individuals (i.e., pell grant eligible, first generation, minorities, and students with disabilities) through rigorous research.

Ongoing areas of research include:

- Course and Instructional Characteristics and Student Outcomes
- Student Behaviors and Perceptions and Student Outcomes
- Learner Characteristics and Student Outcomes
- Program Behaviors and Student Outcomes

DETA has become a leader in the study of distance education student outcomes and model best practices in cross-institutional research. Additionally, they offer the indispensable DETA Research Toolkit, which serves to guide research conducted across institutions and disciplines, including both experimental and survey studies.

WICHE Cooperative for Educational Technologies

THE WICHE Cooperative for Educational Technologies (WCET) regularly conducts research that "aims to shed light on topics that support the operation, instruction and technology implementation of technology-enhanced higher education." For example, since 2009 WCET has conducted, with partner organizations, a series of short surveys on managing online education. Topics have included practices that promote quality in online education as well as costs of online courses. Key findings from Managing Online Education 2013: Practices in Ensuring Quality include, among others:

- More than 85 percent of responding institutions had adopted some form of standards or best practices in their online courses.
- Over half of institutions did not know either their online or on-campus course completion rates.
- More than half of institutions required new online faculty to participate in faculty development prior to teaching their first online courses.
- Only about one quarter of respondents required their online students to take an orientation prior to their first online course.

Legislators and other policy makers are particularly interested in the costs of digital education and how distance and online learning might support increased cost efficiencies and ROI for public funds. As Poulin and Straut (2017) state in WCET's Distance Education Price and Cost Report, "There is a long-held belief among legislators, governors, and other leaders that distance courses should cost less to produce and deliver. Therefore, the price paid by enrolled students should also be less" (p. 4). The report was an attempt to address that belief through a 2016 survey of, and interviews with, respondents on the front lines of distance education and leaders who have researched the issues.

Not surprisingly, the researchers found that, comparing face-to-face to distance prices, tuition is the same, but total price is more when accounting for fees that often are added to distance courses and programs. But they also note that 19 percent of distance students pay less than their on-campus counterparts because they do not have to pay fees associated with on-campus resources. Poulin and Straut also found that distance courses cost the same or more, but some respondents claimed that many of the technologies and practices driving those increased costs are becoming ubiquitous across campus and cost differences are lessening. The report concludes with a number of recommendations for legislators and governors as well as institutional personnel (p. 73).

Finally, Poulin and Straut also compiled the WCET Distance Education Enrollment Report 2016. Based on U.S. Department of Education data, the report "highlights differences by sector, graduate vs. undergraduate study, student location, and by the number of institutions educating students at a

distance" (p. 3). Finding that one in seven students learn exclusively at a distance, the researchers also suggest, based on those data:

- Distance Education is a key component of higher education in the U.S., with one in four students taking at least one distance ed course.
- Distance Education continues to grow while overall higher education enrollment declines.
- Policy-makers, members of the press, and higher education pundits may equate distance learning with for-profits, but the bulk of the activity is in other sectors.
- Identifying the location of distance students continues to be a problem.

Clearly WCET continues to be a key resource for research on digital education nationally.

Online Learning Consortium

The Online Learning Consortium (OLC) maintains a Research Center for Digital Learning & Leadership. Each year, the center collaborates with other organizations to track online education in the United States. The most recent iteration of this work, Grade Increase: Tracking Distance Education in the United States (2018), is the 14th annual report of the state of online learning in U.S. higher education and was conducted by the Babson Survey Research Group and co-sponsored by the Online Learning Consortium (OLC), Pearson, and Tyton Partners. Findings included that "[d]istance education enrollments increased for the fourteenth straight year, growing faster than they have for the past several years" (Seaman, et al., p. 3), and that the number of students not taking any distance courses declined from 2012 to 2016, down by 11.2% (1,737,955 students) by the end of the period (p. 4).

OLC's Research Center also includes a wide range of research studies, white papers, journal articles, and other resources including webinars and podcasts. The resources are categorized into six different categories: teaching & learning, instructional/learning design, leadership, digital learning, annual reports, and quality. One of their most recent studies is Digital Learning Innovation Trends, created in collaboration with the Every Learner Everywhere Network and DETA (see above). The report focuses on innovations that close the equity gap and improve student learning, course completion, persistence, and degree completion. It identifies ten primary and secondary innovations across postsecondary institutions that have been most successful:

Primary:

- Adaptive Learning
- Open Education Resources
- Gamification and Game-based Learning
- Massive Open Online Courses
- LMS and Interoperability
- Mobility and Mobile Devices
- Design

Secondary:

- Blended Learning
- Dashboards
- Virtual Reality and Artificial Intelligence

The report suggests that more research is needed on these trends in order to more accurately assess their effectiveness in supporting equity and student success (Joosten, et al., 2020).

OLC also publishes Online Learning, a journal dedicated to the development and dissemination of new knowledge at the intersection of pedagogy, emerging technology, policy, and practice in online environments.[4] Finally, through a collaboration with the American Education Research Association's Online Teaching and Learning Special Interest Group (AERA OTL SIG), OLC and the OTL SIG publish a quarterly newsletter to provide timely information to the AERA OTL and OLC research communities.

EDUCAUSE and the New Media Consortium

The EDUCAUSE Library is the world's largest collection of information about higher educational technology, aggregating over 21,000 resources. The EDUCAUSE Center for Analysis and Research (ECAR) is an extensive collection of briefs, papers, studies, and reports dating from 2003 to the present. For example, in 2013 ECAR published The State of E-Learning in Higher Education, a report on the challenges of e-learning, the concerns about e-learning that remain, the most important factors to consider in selecting e-learning technologies, how accreditors view and approach e-learning, and the specific steps institutions can take to make progress in their e-learning initiatives (Bichsel). A more recent example is Higher Education's 2020 Trend Watch & Top 10 Strategic Technologies (Brooks, et al.). The report, based on a survey that was conducted in the summer of 2019 and completed by 312 U.S. institutions, identifies top ten strategic technologies:

- Uses of Application Programming Interfaces (API)
- Institutional support for accessibility technologies
- Blended data center (on premises and cloud based)
- Incorporation of mobile devices in teaching and learning
- Open educational resources
- Technologies for improving analysis of student data
- Security analytics
- Integrated student success planning and advising systems
- Mobile apps for enterprise applications
- Predictive analytics for student success (institutional level)

However, this report, like many of EDUCAUSE's resources, is available only to members of the organization.

[4] Other journals focused on research on digital education include the American Journal of Distance Education and Distance Education.

In 2019, EDUCAUSE assumed ownership of the *Horizon Report*, formerly managed by the New Media Consortium (NMC). For 16 years, NMC published the reports, which analyzed emerging educational technologies and forecasted their impact in the short, medium, and long terms, before the dissolution of the non-profit in 2017. Recognizing the value of the reports to the higher education community, EDUCAUSE published the first revised edition this year. The 2020 EDUCAUSE Horizon Report™ Teaching and Learning Edition focuses on "the trends, technologies, and practices shaping the future of teaching and learning, based on a methodology that grounds the findings in the perspectives and expertise of a panel of leaders in higher education" (Brown, et al., p. 5). The consulted panelists selected the following trends as the most important:

Social

- Well-Being and Mental Health
- Demographic Changes
- Equity and Fair Practices

Technological

- Artificial Intelligence: Technology Implications
- Next-Generation Digital Learning Environment(NGDLE)
- Analytics and Privacy Questions

Economic

- Cost of Higher Education
- Future of Work and Skills
- Climate Change

They identified six emerging technologies and practices that will have the most significant impact on the future of postsecondary teaching and learning:

- Adaptive Learning Technologies
- AI/Machine Learning Education Applications
- Analytics for Student Success
- Elevation of Instructional Design, Learning Engineering,and UX Design in Pedagogy
- Open Educational Resources
- XR (AR/VR/MR/Haptic) Technologies (p. 5)

The association also publishes *EDUCAUSE Review*, an open-access digital publication for the higher education IT community. The publication takes a broad look at current developments and trends in information technology, how they may affect the college/university as an institution, and what these mean for higher education and society.

Quality Matters

Quality Matters (QM) maintains a curated archive of studies—both by QM and other researchers and entities—related to the impact and use of the QM standards model. For example, in 2017, QM partnered with Eduventures to produce The Changing Landscape of Online Education (CHLOE), a multi-year study that examines the structure and organization of postsecondary online education in the U.S through the perspective of Chief Online Officers. The 2020 edition, the fourth in the series, notes that the use of Online Program Managers (OPMs) had doubled from 2017 to 2019, and

although required preparation of faculty members to teach online was reported by 60% of those surveyed, the figures for required online student orientation—ranging from 10% (at flagships) to 49% (at regional privates)—was surprisingly low (Garrett, et al.).

Another example of effective, useful research QM has conducted is Class Size in Online Courses: What the Research Says (Burch, 2019). The author asks, "What is the ideal number of students in an online class to create purposeful instructor-student as well as student-content engagement?" Through an analysis of available research on the subject, she responds that it depends on a number of factors and variables. "While there is no easy, cookie-cutter answer to the online class size question, research supports the fact that it is an important consideration," affecting a student's course experience and outcomes, as well as in an instructor's experience teaching a course.

State-Specific and System-Wide Research Overview: Selected Examples

In addition to national efforts, some states conduct and disseminate research efforts related to digital education, which often mean coordinated system-wide efforts when (unlike Texas) higher education institutions there operate under only one or two statewide systems. Foundational empirical studies based on statewide community college data in Virginia and Washington found largely negative outcomes for students taking online courses (Jaggars & Xu, 2010; Xu & Jaggars, 2011, 2013). However, in this research, correlational, as opposed to causal, links may render the conclusions arguable.

In fact, more recent research finds more positive outcomes. For example, Making Digital Learning Work: Success Strategies from Six Leading Universities and Community Colleges (Bailey, et al., 2018) includes case studies on the impact of distance learning on enrollment, outcome, and ROI at campuses across six institutions: Arizona State University, University of Central Florida, Georgia State University, Houston Community College, Kentucky Community and Technical College System, and Rio Salado Community College. The report authors selected these institutions because of their "strong track record of positive academic outcomes and other successes in using digital learning to serve large, socioeconomically diverse student populations" (p. 17). The study focused primarily on enrollment and outcomes data at the institutions to measure return on investment, as well as to identify lessons and promising practices for the field.

At the Kentucky Community and Technical College System, for example, which consists of sixteen independently accredited colleges, nearly three-quarters of the over 100,000 students take at least one class online in any given semester. Graduation rates are 25 percentage points higher for students who take 21% to 40% of their courses online than for those who take all of their classes face-to-face (37% versus 12%) (p. 44). The data collected across the system provide an opportunity to understand what it takes to effectively implement digital learning on a large scale within a public state system.

The authors of the report conclude that "[c]olleges and universities that want to increase enrollment, expand access to high-quality education, and improve student performance—all at lower cost—should strongly consider investing in the improvement and scaled enterprise implementation of high-quality digital learning." (p. 7)

California, Florida, and New York often are considered "peer" states to Texas due to population data. Therefore, it is useful to look at efforts to collect data and information on digital education in these states.

California

Successful Online Courses in California's Community Colleges (Johnson, et al., 2015) outlines practices that make an online course successful. The authors identify three aspects of successful courses: at least 70 percent of its students earning a passing grade, student performance is at least as good as in traditional versions of the same course, and whether students in an online course continue to do well in subsequent courses (either online or traditional) in the same subject. By these standards, only about 11 percent of online courses at community colleges in California in the 2013–14 academic year were highly successful (p. 3).

Best practices to support successful courses based on the authors' research include:

- a systems model in which teams develop courses, including an instructional designer as team lead, a faculty member as subject expert, a media developer, and a programmer.
- faculty members receive appropriate training and ongoing professional development.
- setting expectations and preparing students to make the best possible use of online learning technology by, for example, readiness assessments and orientations.
- ensuring regular and effective interaction between students and faculty, among students themselves, and between students and the online course material.

The report suggests that, as demand for online learning rapidly grows, a more data-driven, integrated, and systematic approach is needed to ensure its effectiveness and success.

Similar to the mission of DigiTex, The California Virtual Campus – Online Education Initiative (CVC-OEI) is "a collaborative effort among California Community Colleges (CCCs) to ensure that significantly more students are able to complete their educational goals by increasing both access to and success in high-quality online courses." CVC-OEI publishes Benchmarks for High Quality, Inclusive Online Learning and maintains a data metrics dashboard. This dashboard includes data on numbers of users of the system-wide LMS (canvas) and other platforms that support online learning at the colleges, among other metrics. The CVC-OEI also houses the California Community Colleges Online Education Landscape Report (Berumen & Nguyen, 2019). The report provides a comparative overview of online education at California Community Colleges between 2008-2009 and 2017-2018 "to better understand and describe changes in enrollment and outcomes for students enrolled in online courses over the past 10 years." The analysis of the landscape includes "a snapshot of the

fully-online program offerings in the state, course enrollment trends, course outcome trends, and the potential impact of the [California] Online Education Initiative on online course outcomes" (p. 3). The report concludes by identifying five opportunity areas on which the Online Education Initiative could focus (pp. 38-39).

Florida

The Florida Virtual Campus (FLVC) provides a variety of services to support online learning across the state. It produces an annual report that includes highlights of activities and programs throughout the prior year. The reports provide data on numbers of courses offered online each year, statewide online enrollments, participation in Quality Matters, cost savings for shared services and through the use of open educational resources, and economic impacts of the FLVC. For example, the 2019 report states that FLVC's shared services saved state higher education institutions over $318.6 million in operating costs in 2018 (Florida Virtual Campus, p. 10). Comprehensive data collection and dissemination like the FLVC annual reports are an effective model for understanding digital education statewide.

New York

In 2019, Shea and Bidjerano conducted a statewide study of online learning at the thirty community colleges of the State University of New York (SUNY) to understand course-load effects on degree completion, transfer, and dropout. The researchers found that "on average, community college students who successfully complete online courses nearly double their chances . . . of earning a degree or transferring to a 4-year college" (p. 6). However, they also concluded that racial minority students had reduced outcomes. Specifically, minority students who were academically stronger were significantly more likely than nonminority students to drop out when the majority of their courses were fully online (p. 20). Shea and Bidjerano point out the crucial need for further research in this particular area to support equity.

Oregon

The Oregon State University Ecampus Research Unit conducts online higher education research not only on Oregon State courses and programs, but on the needs and challenges of the field of online teaching and learning, and their mission is "to make online teaching and learning research actionable." Focus areas include:

- Exploring the efficacy of modalities, technologies and pedagogical methods
- Promoting research literacy and evidence-based decision-making
- Building communities to support and encourage research networks

An example of national research they have conducted is *Student Uses and Perceptions of Closed Captions and Transcripts: Results from a National Study* (Linder, 2016). It studies college students' experience with, and perceptions of, closed captions through two national online surveys, one with college students and a second with higher education administrators at institutions implementing closed captioning. Other resources available through their site range widely, from podcasts,

white papers, and book-length studies, to a checklist to help readers assess the quality of research reports along six key areas: (1) content, (2) methodology, (3) sample, (4) reporting results, (5) transparency, and (6) reader experience.

Themes Across National and State Research

Although the overview above of national and state/system research and data is not exhaustive, such information is becoming increasingly ubiquitous, and it does reveal a number of themes and categories that suggest priorities for digital education:

- Quality/Efficacy
- Impact/Outcomes
- Equity
- Cost & Funding
- Enrollment
- Instructional Design & Development
- Delivery of Instruction
- Regulation and Policy
- Perceptions of/Attitudes toward Digital Education
- Management of Digital Education
- Student Support
- Faculty Support and Professional Development

Generally, qualitative research methods are used more widely than quantitative, unsurprising given the complicated nature of the latter when conducting higher education research, particularly when attempting such methodologies as blind studies. **Additionally, very little of the data collected is disaggregated by minorities, underserved populations, etc., to focus on equity issues.**

Texas Research and Data

As early as 1999, researchers focused on aspects of distance education in Texas. One master's thesis assessed student support services in "virtual environments" at community and technical colleges in the state (Luedtke, 1999). The author, in analyzing the level of student support services provided for students enrolled in distance learning courses or programs, found that few services were available at that time. Fortunately, this has changed (see the surveys conducted by the THECB's Learning Technology Advisory Committee below).

The Texas Higher Education Coordinating Board

In 2005, the Texas Higher Education Coordinating Board released Critical Issues Facing Distance Education in Texas. Five teams examined critical issues then facing distance education in Texas in order to make data-based recommendations, including on cost/benefits and sources of funding, to

the Coordinating Board. Issues/topics included:

- Cooperative Software Purchasing and Licensing Agreements
- Distance Education Collaborative Content/Program Efforts
- Regulatory and Accrediting Issues
- Distance Education Course and Program Quality Assurance and Assessment
- Hardware Issues

An extensive project over seven months, "Critical Issues" made numerous recommendations based on surveys and other statewide research and data in order to:

- improve coordination and efficiency of distance education efforts of Texas public higher education institutions;
- increase the visibility of distance education efforts of Texas public higher education institutions;
- make the distance education efforts of Texas public higher education institutions appear and function more as a single system from the perspective of students and the general public;
- advise the Texas Higher Education Coordinating Board on state-level actions that would facilitate distance education;
- tie Critical Issues topics to the Coordinating Board's Closing the Gaps efforts; and
- address future funding of higher education's telecommunication resources for distance education (DE). (p. 1)

As mentioned in the introduction to this meta-analysis, currently Texas public institutions of higher education (IHEs)—37 four-year and 59 two-year institutions—deliver fairly robust and extensive online courses and programs. In fall of 2019 at Texas community and technical colleges alone, statewide distance education enrollments totaled 800,223, compared to 1,138,105 face-to-face enrollments.[5] Furthermore, distance education enrollments increased nearly two percent from fall 2018. **However, although "raw" data on enrollments are available through the state's higher education agency (see below), few reports or studies exist that analyze and/or interpret the data for a broader audience.**

The THECB tracks enrollment and semester credit hours (SCHs) attempted in distance and non-distance education courses at public IHEs (excluding health-related institutions) by instruction mode and location. Distance education is classified for reporting purposes as anything that is not on-campus, face-to-face (for universities) or in-district, face-to-face (for community, state, and technical colleges). The THECB also has a tool to conduct a Distance Education Program Search.

As on the national level, costs and funding of distance education, particularly compared to non-distance education, are key issues for many Texas stakeholders, including legislators and other policymakers. Therefore in 2013, the THECB conducted a legislatively-mandated study, Report on the Cost of Distance Education. The study consisted of a survey of all Texas public institutions of higher

[5] Texas Higher Education Coordinating Board data.

education on the projected costs of placing each institution's four most popular degree programs online. However, the ability to collect uniform data and cost models was complicated by a number of factors: a national (and state) lack of a uniform distance education cost methodology; diverse accounting practices at IHEs across the state; difficulties in assigning costs of resources, like an LMS, that might be used to support face-to-face courses as well; lack of personnel, especially at small colleges, to track and analyze cost data; lack of uniformity among self-reported data; and other factors.

After an analysis of the data, the Coordinating Board made a number of recommendations:

- development of a cost methodology and tool that can be used for uniform data collection.
- creation of purchasing consortia for large-scale systems, like LMSs, that support online learning.
- development of a consortium that would allow students at participating institutions to enroll in online courses without the need for multiple admissions or other fees. [6]

The final recommendations relate to quality control and assurance, including the development of a definition of effective online education and a uniform standard by which it can be assessed. Using that standard,

> institutions which are not able to effectively offer face-to-face degree programs on their home campuses, as determined by student outcomes, should not be allowed to deliver those programs via online learning. Additionally, institutions wishing to add future online programs must show that any online programs already being offered have met minimum success and effectiveness as determined by the Coordinating Board staff with input from the Learning Technology Advisory Committee. (p. 2)

Finally, the report recommended a review process to ensure that all new online programs were in "high need fields" (p. 2). However, as of this writing, neither the THECB nor the legislature seem to have acted on these recommendations.

Learning Technology Advisory Committee

The Learning Technology Advisory Committee (LTAC) is a standing committee of the THECB that engages in policy research and discussion regarding the role that learning technology plays in Texas higher education. The LTAC also informs the Coordinating Board of how distance education and computer-assisted instruction can help the state reach the goals of *60x30TX*. In 2015, the LTAC conducted the first Survey of Distance Education and Learning Technologies, "designed to gain a better understanding of online education and the use of learning technologies in higher education in Texas and to promote opportunities for broader collaboration across Texas institutions and systems" (Pluscht, 2016, p. 3).

[6] Interestingly, the report references the Virtual College of Texas (VCT, now DigiTex) as merely a "starting place for examining how such an arrangement might look," even though VCT had been leading just such a consortium among community colleges in the state since 1998 (p. 25).

Participants in the survey represented 57 colleges and universities. Questions focused on learning management systems and other ed tech platform usage, solutions for academic integrity and accessibility, professional development and incentives for faculty teaching online, preparation for students taking courses online, development of OER, security, state authorization, and other issues. **The report concludes that key topics for future study are "ensuring the accessibility of online courses, examining administrative structures to more quickly respond to market demand and flexible delivery models, and developing funding models and collaborative partnerships that will sustain the technical and personnel structure needed to deliver high-quality courses in an increasingly complex regulatory environment" (p. 5).**

In 2018, the LTAC again conducted a survey of distance education and learning technologies. However, as of this writing, that report is unavailable on the THECB website. Instead, a comparison of the 2016 and 2018 survey results is available. It consists of graphs with responses to questions from both surveys but no higher level analysis or description of the trends represented by the two surveys. However, some of the most striking trends indicated by the graphs include increases, sometimes significant, from 2016-2018 in the use of:

- The Canvas LMS and ePortfolio
- Secure testing/proctoring services (including an increase in institutions paying for the service)
- Zoom web conferencing[7]
- Institutionally coordinated OER use
- Services for online students
- Web- and home-based labs for science courses

Hopefully, the LTAC will soon make the report of the 2018 survey results available. According to the recording of the last LTAC meeting from Nov. 1, 2019, the Coordinating Board website is being overhauled and a link to the report will be available on the new site. The chair of the Learning Technology Survey Workgroup also apparently is developing a database to share the survey.

Legislative Reports

In 2018, the Legislative Budget Board (LBB) released Improve Reporting for Costs Related to Online Higher Education. In surveying IHEs, the LBB found that 91.1 percent of respondents do not track expenditures for online and on-campus courses separately. The report references the 2013 THECB Report on the Cost of Distance Education (see above) and acknowledges the difficulty of collecting uniform cost information. The LBB final recommendation based on the survey is to "[a]mend statute to require the Texas Higher Education Coordinating Board to develop an accounting method that could be used by general academic institutions and public community and technical colleges to standardize and separate the reporting of expenditures and revenue related to delivering education online and on-campus" (p. 1), with a deadline of Sept. 1, 2020, to complete this work.

[7] Note that this was two years before the current seemingly ubiquitous surge in the use of Zoom to support remote instruction and work during the COVID-19 crisis.

While comparative analyses of online vs. on-ground course and program costs are needed, such analyses are much easier said than done.

Texas Distance Learning Association

The Texas Distance Learning Association is a professional association that serves individuals working in a variety of sectors, including non-profit, corporate, and education. It holds an annual statewide conference as well as programs, workshops, and webinars year-round and sponsors a number of communities of practice organized around subjects related to distance learning. It publishes the *TxDLA Journal of Distance Learning*, "a blind peer-reviewed, open access and continuous publication for original manuscripts with emphasis on the body of knowledge in the areas of educational practice in distance learning in educational institutions and community settings." However, according to the journal's website, it only has published one issue a year for three years, with one to two articles per issue, for a total of four articles and one book review.

System- and District-Wide Data & Reports

Assuming that Texas' public university and community college systems and districts collect data on their distance education courses and programs beyond what is required for state reporting purposes, additional data, and analysis and interpretation of that data, does not seem to be widely, publicly available. However, some system-wide efforts related to digital education are worth noting.

For twelve years, online education through the University of Texas System was coordinated by the UT TeleCampus until its closing in 2010. This was followed two years later by the Institute for Transformational Learning (ITL). Created to develop an online brand for UT, including competency-based courses and programs, the ITL closed in 2018. However, it is unclear to what extent these centralized offices had missions that included the collection and dissemination of research and data on their initiatives.

In April 2019, the UT System Office of Academic Affairs released Strategic Directions for Online Education, a report from an Online Education Task Force charged with "exploring opportunities for collaboration and ways that UT System can support institutions as they scale up high-quality online offerings." The paper discusses "the value of online education as it relates to the unique missions of UT academic institutions" (p. 2) and states that

> the UT System Office of Academic Affairs is going to enhance its data collection and analysis of programs and courses offered in hybrid/blended, fully- online and 100% formats, as well as enrollments in those courses. Doing so will better position the System to communicate the unique value delivered by blended and online courses and to make informed recommendations related to state and national policies and initiatives. Further, these data are necessary to evaluate institutions' progress toward enrollment targets. (p. 4)

Hopefully these data will be more accessible to the public in order to inform larger statewide discussions regarding digital education in Texas.

The Texas A&M University System maintains the Council on Academic Technology and Innovative Education, but it is unclear from its statement of purpose if it collects and/or analyzes data and research on digital education across the system. Other than this, information regarding system-wide efforts/data related to digital education were not readily apparent. The Texas State University System (TSUS), with the highest percentage among public Texas university systems of fully online students in relation to the systems' student populations as a whole, provides to the public a fairly robust tool for viewing system-wide enrollment (and other) data. However, it does not seem possible to disaggregate the data by delivery mode. But since 2017, TSUS has produced an annual report on online education across the system. The most recent, the TSUS Online Education Annual Report 2019, provides a variety of data on online education across the system, as well as goals for 2020 (Holder).

Open Educational Resources (OER) in Texas Higher Education, 2019

Although not exclusively digital, OER designed and disseminated in digital formats enhance the benefits of open knowledge, including accessibility and affordability. Therefore, digital OER have become increasingly ubiquitous and represent a subcategory of digital education. However, before allocating resources to support the development and/or adaptation of OER, we recognized the need to better understand OER use across the state. In 2019 DigiTex, in collaboration with the Institute for the Study of Knowledge Management in Education and the THECB, conducted a survey to examine the landscape of OER programs, policies, and practices at higher education institutions in Texas (Jimes, et. al). The survey was administered to all 158 two- and four-year public and private, nonprofit institutions across the state. Responses from 100 institutions painted a picture of growing commitment to OER, with 38 percent of institutions having formal programs and initiatives in place to support OER, and with 51 percent either in the process of or interested in implementing OER programs or policies in the future. The survey findings further revealed insights, including the following:

- Affordability and access are key drivers of OER, though teaching and learning benefits also play a role;
- The development of faculty OER training and incentive programs are key priorities for institutions;
- OER-based courses are prevalent across Texas and likely to scale, and the development of full, OER-based programs are also underway, primarily at the state's two-year institutions;
- OER initiatives are funded primarily through internal budgets;
- Institutions are centralizing their OER work through dedicated roles, offices, and committees;
- OER success is a collaborative effort, with libraries, students, and cross-institutional partnerships playing important roles;
- OER discourse is limited and non-standardized within and across institutions, and the majority of institutions do not have a written definition of OER;
- Institutions view lack of faculty awareness and conflicts with existing priorities as principal barriers to OER adoption.

Although the authors acknowledged the existence of early, promising data collection on the pedagogical and financial impacts of OER in Texas, they called for much more extensive collection of data on OER use and impact. DigiTex plans to use this survey as a baseline for future research on OER policy and practice across Texas, including biannual surveys.

Conclusion and Recommendations for Future Research

Current data suggest that Texas IHEs engage in robust practices related to digital education to support student access and success and the goals of *60x30TX*. However, the state is considerably lagging in data on, and study of, those practices. Although the THECB collects data on distance education enrollment, and its Learning Technology Advisory Council conducts periodic statewide surveys on DE and educational technologies, much more research is needed to gain a better understanding of current practices in order to inform future policy and strategies. **And with the disruptions from COVID-19, the stakes were never higher to find innovative, evidence-based, and data-driven ways to deliver effective courses and programs—with likely even more limited resources.**

Following on our landscape analysis of OER, DigiTex first should continue the research agenda begun with this meta-analysis by undergoing a similar study of the state of digital education in Texas. An effective example of this type of study, referenced above, is the California Community Colleges Online Education Landscape Report (Berumen & Nguyen, 2019). An analysis of the broader digital landscape could build on the survey work of the Learning Technology Advisory Council and the THECB's distance education data collection to create a more complete narrative on distance education, online learning, and educational technology practices at IHEs in Texas. From there, more complex and actionable research, including quantitative, could be conducted. To this end, we are considering the creation of a DigiTex Research Fellowship to augment current staff, bring additional data collection and analysis expertise to this work, and contribute to the development of researchers with expertise on digital education in Texas.

Further study of cost and funding policies and practices is crucial, particularly for public institutions relying, in part, on state funding. But as the analysis above makes clear, these are extremely complicated issues involving a number of difficult to control variables. It is our hope that both the legislature and the THECB are able to take up these issues again in the near future, particularly during and after the COVID-19 crisis. Should they do so, they might consult the methodologies, cited above, used in Poulin and Straut's Distance Education Price and Cost Report (2017).

Cost and funding aside, this meta-analysis suggests three primary areas in which DigiTex could contribute to the broadening of data and research on digital education in Texas.

Online Program Design

The analysis above indicates a need for research into characteristics of effective online program design to serve Texas students, which could coincide well with DigiTex's work leading the Texas Quality Matters Consortium, building on its research into effective online course design. Research conducted at California community colleges (see above) provides another model for this work.

Equity

As Shea and Bidjerano conclude from their study of New York community colleges, there exists a crucial need for further research on equity issues in online learning. Given our mission of "ensuring

equity through collaboration," research in this area contributes to that work. Both the national and state research outlined above reveal a significant hole in studies on efficacy and impact of online education, the use of educational technologies, and other issues when examined through the lens of diverse and underserved student populations such as adult, disabled, first-generation, rural, and minority learners, among others. This research could build on the Digital Learning Innovation Trends report from Every Learner Everywhere, OLC, and DETA (Joosten, et. al, 2020).

Impact and Outcomes

Little research seems to exist on impact and outcomes, including student retention, progress, completion, and success, related to digital education in Texas. Comparative studies, when possible, of online and face-to-face courses and programs, complicated as they can be to control for variables and differentiate causal from correlative factors, are needed. DETA's studies of online student outcomes (referenced above) provide one model for this research.

This research becomes even more relevant in a pandemic and post-pandemic world. Tech-assisted education, whether fully online, hybrid, hyflex, or some modality as yet undiscovered, likely is going to increase, even after the COVID-19 crisis. It holds great—and, perhaps for many underserved and nontraditional students, the best—potential to reskill a disrupted labor force. A survey by the nonprofit Strada Education Network revealed that because of the pandemic, most Americans are worried about their jobs; one-third of American workers believe that if they do lose their jobs, they will need additional education to find comparable ones; and for 43 percent of those, the top choice for further education or training is online programs (2020, p. 1).

Through this research agenda, and by collaborating with IHEs across the state to fulfill it, we hope to contribute to a better understanding of digital education in Texas and beyond, thus supporting our mission to assist Texas community colleges in providing learners an education without barriers through high quality digital educational opportunities, resources, and services that help students succeed, ensuring equity through collaboration.

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About the Digital Higher Education Consortium of Texas

Ensuring Equity through Collaboration

Mission

The Digital Higher Education Consortium of Texas assists Texas community colleges in providing learners an education without barriers through high quality digital educational opportunities, resources, and services that help students succeed. DigiTex does this by functioning as a consortium that:

- Provides members with access to research and emerging best practices in technology-enhanced education.
- Helps members identify and implement innovative solutions that will make higher education more affordable and accessible for all Texans.
- Facilitates collaboration among Texas community colleges.
- Leverages the collective power of Texas community colleges to improve institutional efficiency.
- Provides stakeholders with relevant and timely information on Texas community college online education.

Values

Quality Learner success Community & Collaboration Service

Organizational & Institutional Efficiency Innovation

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