TECHNOLOGY CONSIDERATIONS AND OPPORTUNITIES IN HIGHER EDUCATION

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Acknowledgments

Abstract

The intent of this paper is to provide professionals in Higher Education with a compilation of evidence-based findings on the use of promising practices in technology and what is involved in creating a learning environment that will meet the educational needs of students. The paper will mainly examine the importance of technology use in developmental and transitional education courses, but discussion is included on technology use in Higher Education courses. In addition, with the advent of a worldwide COVID-19 pandemic, information on the transition from traditional seated courses to fully online delivery is discussed as well as the use of social media in the classroom and the inclusion of cell phone technology in learning.

Technology Considerations and Opportunities in Higher Education

Issac Asimov once proclaimed, "I do not fear computers. I fear the lack of them" (as quoted in "Age of miracle chips," 1978). Years later, Manuel Castells (1985, 1989, 2000a, 2000b, 2003, 2010) posited that we are now living in a distinct information age. In our current age, computers are perceived as being ubiquitous, even in regards to education, but it was in the 1960's when Lawrence Lipsitz predicted this phenomenon in his publication of "Educational Technology" (Kinshuk, Demetrios, & Nian-Shung, 2013). The term "educational technology" has gained merit since then. From online courses, cell phones, computers, Learning Management Systems (LMS) such as Moodle, and Blackboard, and social media avenues such as Facebook and Twitter, this article will offer a comprehensive examination of the value of the various educational technologies and the implications that accompany them. In higher education today, no matter the course level, technology can be viewed as a great equalizer, as evidenced in its accessibility. For example, in terms of educational technology, students and staff can communicate across cities, states, and continents. Technology applications currently in education are nearly infinite. The recent/current COVID 19 crisis has required all in higher education to use it, including many luddites (Gardner, 2020).

Hadadian, Jones, and Yssel (2014) asserted that technology is quickly becoming a global phenomenon, increasingly seen in higher education classrooms. For instance, prospective international students can participate in virtual tours of many campuses in the United States from the comfort of their homes. This is just one example of how technology has connected people across oceans and continents.

Without a doubt, technology has profoundly altered the education experience. It has greatly expanded access to education as vast amounts of information (books, audio, images, videos, and podcasts) are available at one's fingertips through the world wide web. According to the U.S. Department of Education's Office of Educational Technology (2017), formal learning opportunities can be easily accessed with platforms such as Khan Academy, Massive Open Online Courses (MOOCS), podcasts, traditional online degree programs, and other learning resources. It is because of technology that exposure to learning opportunities and digital connection is unprecedented in its scope and it is up to educators to adapt if they have not already.

Attributes to Higher Education Enrollment

Friedman (2018) contended that enrollment in online courses rose at a faster pace between Fall 2015 and 2016 when compared to the previous three years. Based on Federal data from more than 4,700 colleges and universities, more than 6.3 million students in the U.S. - most of whom were undergraduates- took at least one online course in Fall 2016, a 5.6% increase from just a year before (Friedman, 2018). According to Gannon (2019) one societal benefit of online learning is increased access to higher education. Online education increases access to learning for anyone interested in attending college, particularly those students who have full-time work and/or family obligations who might not have otherwise entertained the notion of attaining a degree.

Statnicke, Savanevičienė, and Šakys, (2019) asserted that different generations are affected by different factors. Gen Z students

have grown up with technology in all aspects of their lives. Persada, Miraja, and Nadlifatin (2019) contended that Generation Z students are considered the generation that was born between 1995 and 2012. Many from this group are enrolled in high school and college education; this generation is dominated by Internet inclusion. Thus, the addition of technology in education is expected as a part of these students becoming well-rounded and preparing them for the workforce after graduation. In the midst of the global pandemic, elementary, middle, and high schools are providing instructions online in order to keep their students on task. These students, even though at home, get to see their friends and communicate with them like normal while working on classwork at the same time. On the other hand, instructors are able to track the progress of their students by joining breakout groups via zoom or google docs.

There are certain factors that help Generation Z students succeed in a fully online learning environment for communication skills. Out of a diverse group of learners, the student's institutions significantly impacted their preference for instructional delivery modality. The factors which lead to student success and retention in online courses are dependent on the characteristics of the student (Eunjyu, 2020). A majority of students work to pay some, if not all, of their tuition and living expenses which is a reality and would prefer an online learning environment over traditional. In addition, these students become more responsible and efficient as they are able to get a lot done in a small period of time with technology.

Meeting Students Where They Are

In developmental education, math, integrated reading, and English courses, technology is a tool which can help bridge the gap among students who enter college immediately after high school and those who enroll after entering the workforce. Technological support for student learning in developmental math can improve student Lexile reading levels, grammar, and writing skills in integrated reading and/or English courses (standalone, transition, or integrated). According to Kim (2019) while only 14 % of undergraduate students study exclusively online, 30.7 % of graduate students.

Considering the ways in which different students learn new information, instructional design teams create curricular versions which appeal to many learning styles. These teams can also set students who enter college, especially in developmental and/or transition-level courses, up for success by acknowledging student deficits across disciplines. If the skill level of the student is not considered, then instructional design teams are creating a potential barrier to these under-prepared students.

Regarding modifications and accommodations, one important tool is the laptop. Students, for example, may require use of a laptop instead of another mobile device due to their learning needs. Because of the legal and ethical issues surrounding these students, it remains important to provide various technological resources to students. Thereby, it is essential to recognize the ways that technology supports students of different learning styles. Hess (2019) presented studies that showed the powerful computers we keep in our pockets (our phones) offer distraction to the most disciplined adults and student learners. Visual learners are supported through embedded YouTube videos in the campus LMS while auditory learners can listen to lectures which are recorded in programs such as Jing. Other programs, like Camtasia, provide instructors opportunities to extend options to both visual and auditory learners.

According to Kapp (2007), students with different learning styles have different ideas about connectivity, reporting hierarchies, learning, and communication ideas forged while playing video games, manipulating gadgets, and Web surfing. They also vary from Baby Boomers, the generation born between 1946 and 1964 in terms of the capabilities and preferred learning styles. Gamers and kinesthetic learners must also be considered when using supplemental technologies, as well as ADA compliance (see Figure 1, page 13). Programs which offer rewards for subject mastery or badges designated sections can be appealing. Regarding ADA compliance, closed captioning of video recordings is vital, but the instructor must ensure the words appearing in the captions are in sync with what the presenter(s) are communicating. The United States Department of Education's Office of Educational Technology (2017) asserted that one of the biggest issues is making sure that all learners can access the technology.

Learning Management Systems

Learning Management Systems (LMS) can be utilized in various ways across higher education courses. They can be used as simple "shells" that hold the basic course information, such as rosters and syllabi or they can also be used as repositories for course materials and be a resource for students who miss class or have mislaid important information. The LMS can help further enhance the face-to-face classroom with online activities or assignments or the LMS could create blended or hybrid courses that are a mixture of face-to-face and online. The ways each institution and each faculty member handles trends tend to vary; however, as Rhode, Richter, Gowen, Miller, and Willis (2017) observed in their study, there tends to be usage patterns that can emerge. Still, to create a fully online course a LMS is a must have for a university or college.

There are many LMS available; Blackboard, Canvas, D2L, and Moodle are currently among the biggest names. While there are many determining factors as to what LMS is ideal for courses/universities to use (cost, support, ease of use, and more), it really all depends on the purpose and outcomes desired from using it in courses. Washington (2019) argued that while online courses are key to LMS selection, the needs of face-to-face courses should also be taken into consideration.

According to Washington (2019) a LMS is a critical technology platform for teaching and learning for nearly all institutions of higher education. Although a LMS is a driving force in online courses, it is not always used in traditional face-to-face environments. Adding information in the LMS offers students course access which is available 24-hours a day. In the early days of online coursework, classes were not as interactive as they are now and it was difficult to ensure student accountability. However, using newer software applications like Zoom allows students to interact with each other in breakout groups or as a whole class, as well as sharing and editing group assignments. Further, students who have families and/or work full time are more apt to apply to colleges that are flexible to their needs and preferences as they may want to multitask which is why it is very important for Higher Education Institutions (HEIs) to wholly embrace virtual instruction.

Washington (2019) contended that the problem is an underutilization of a LMS in face-to-face higher education courses. Instructors, both adjunct and full-time, must be trained and encouraged to use the LMS as a part of all classes, both online and traditional (see Figure 1, page 13). Washington's (2019) study results identified the features and tools in the LMS used most frequently and how they were used in the LMS. Based

on this study, it is possible to better understand the educational potential of the LMS to enhance traditional face-to-face courses.

Still, educational administrators and instructors recognize that there are benefits to working with LMS where student learning is concerned. According to Hernandez-Garcia and Conde-Gonzales (2016), learning management systems can both aid in integrating assessment measures as well as fostering self-directed learning. These two benefits alone can be of value to institutions, but these attributes can certainly appeal to diverse learners and instructors who prefer more digital communication. Additionally, LMS helps make educational resources available to learners, and built in LMS functions can aid in obtaining social learning analytic data. Palahicky's (2015) research with LMS supported this idea. In regard to differentiated learning, LMS can support various methods of instruction when it comes to meeting learner needs (Palahicky, 2015). In this way, LMS can further aid in meeting students where they are.

However, an online course must be built by faculty members and staff. The more diversified the teaching and learning approaches, the more potential there is for teacher-student objectives to be met via course delivery. Instructional designers using best practices can work alongside faculty members to create successful student experiences (Sugar & Luterbach, 2018). Best practices are many and varied, and all should be explored fully. One, for instance, is discussed by Mtebe (2015) who found that coupling LMS with social media can prove beneficial in higher education courses as social media is a familiar platform that students utilize for communication and connection.

Cell Phones

Another relevant piece of technology is the smartphone. Ortiz and Greene (2019) contended that the use of mobile technology, such as smartphones and tablets and other handheld devices, is deeply embedded in everyday college life by Generation Z (students born between 1995 and 2010). This can be viewed in the frequency of devices used by this group. According to Ortiz and Greene (2019) frequency counts were employed to determine numbers of logins over 24 hours, logins over days of the weeks, and preferred operating systems. The study reported that there were 14, 234 unique visitors, that Monday had the most logins of the days of the week, and that the most frequent time of day for logins was 10 A.M. Interestingly, there were a robust number of logins between midnight and 6 A.M. This group uses technology in all aspects of their daily lives. From the data, we can argue that the lives of the majority of the current population depend on mobile devices and will be difficult to take away from them. With the help of software applications like Microsoft Word, Adobe reader, iScanner, and DocuSign, students who cannot afford to purchase laptops tend to do their assignments, as well as complete and sign documents on the phone without any difficulty. The importance of mobile devices cannot be overlooked in this era and HEIs should consider this when making decisions concerning their students.

Barnwell (2016) posited that cell phones offer students from diverse backgrounds the same technological chance to be successful. Ray (2015) stated that the cell phone has changed and developed so rapidly during the past decade that it makes having one invaluable for various purposes. Cell phones today are much like minicomputers as some of them are the size of computer tablets. According to Jones (2020), the convergence of all technology gadgets into one mobile device, like the cell phone, will continue to advance. McVay and Dyck (2015)

communicated that Smartphones represent the evolution of the mobile telephone into a minicomputer that can be carried anywhere; this was different from merely incorporating technology into course curricula. More faculty should embrace their technology use as learning tools. Rimer (2019) recommended instructors take the technology lane by permitting students to access cell phones as teaching aids. Apps offered on cell phones can aid in student learning, such as Top Hat (Rimer, 2019).

Of course, there are concerns with cell phone use. Richmond and Troisi (2018) reported that when students have free reign to use their cells in class, they do not perform as well as they could have if they did not use their phones. Cell phones, therefore, could serve as a distraction. While this may be the case, it would behoove instructors to determine the intention behind cell phones. For instance, would it be for a certain assignment or purpose? It is indeed a challenge for educators to capitalize on the pervasive use of cell phones by younger students.

Social Media

Many instructors have begun to embrace social media as part of their courses. According to The Derek Bok Center at Harvard University (2020) since students are already using social media it could be beneficial for instructors to incorporate it into lectures and other course content. Blankenship (2010) contended that social media is implemented in the classroom in several ways. The Babson survey noted that 30 % of online educators used social networks to communicate with their students (trading posts on blogs, for instance) while more than 52 % used online videos, podcasts, blogs, and wikis during actual class meetings. There are many options for integrating social media in formal learning environments.

Examples ranged from using closed course groups on Facebook, adding YouTube videos in a lecture, to using Google slides.

There are facets of social media to consider before implementing it in course learning, such as literacy. Blankenship (2010) stated that five interconnected literacies exist in using social media in college courses. The first was attention as it is vital to know where and when to direct one's attention with social media inclusion. The second literacy entailed defining what it means for someone to be a good participant. Thirdly, online communities are built for collaboration. A fourth point is that one must be aware of the privacy settings and the perils of using social media as part of a course. Lastly, critical consumption, determining what is real as well as important and vice versa, describes the fifth literacy.

Social media sites can be used in many ways to support higher education. These trends must be considered cautiously in using this technology as part of a college-level course. Islim and Sevim-Cirvak (2019) asserted that the most commonly used Social Networking Site (SNS) was Facebook. Many young adults used social networking sites (SNSs), especially Facebook, to stay in touch with their friends as well as for entertainment.

Faculty members and students are conscious about friend requests, as both groups are able to send and/or accept friend requests to/from each other without hesitation. This can be viewed as both a positive and a negative aspect of using a SNS. When faculty allow friend requests from students, this enabled them to be included in closed groups used strictly for class only access. Conversely, this allowed students a view into the personal postings of professors and vice-versa.

According to Islim and Sevim-Cirvak (2019) faculty members preferred that students did not communicate with them via SNSs. Only one-third of the faculty members created groups on SNSs in order to communicate and share with their students. Institutional SNS accounts and groups were seen as a requirement by both students and faculty members for announcements and sharing on an institutional level.

Other SNS use involved course postings on Twitter in closed class groups for particular courses. LinkedIn and Instagram are also used by some professors to support student learning. The use of closed courses on SNS sites is important as it embraces student technology interests while also allowing another outlet for students and instructors during the Covid-19 pandemic. There are other benefits of using a SNS as a part of college courses. This can help with the issue of regular contact and communication between the instructor and student. Greene (2020) contended that the distinction between synchronous/asynchronous learning is more complicated than it looks.

Implications to Online Learning

Darby (2020) expresses that online classes are here to stay. Therefore, determining how to run an online course is vital for instructors. Indisputably, online learning provides increased access to tertiary education (Gannon, 2019). While administrators are willing to offer online courses to varying degrees, conversely, formidable educators are not necessarily equipped or inclined to deal with all the technology available to them to further develop their discipline. Kumar (2010) stated that only about 33% of prospective online students said they perceived the quality of online education to be equivalent to face-to-face instruction. Furthermore, 36% of prospective students surveyed, cited a concern regarding employer acceptance of online education.

In terms of students, online learning courses can result in decrements across learner populations. One research study (Xu & Jaggars, 2016) reported that males, younger students, Black students, and students with low grade point averages struggled more. Mendenhall (2011) stated that most online courses are still taught in a "virtual classroom" format in which the instructor has a defined schedule for covering curricula and classes are conducted over a set number of weeks. This format may not reach all students as it may be difficult to attain a sense of connection and community among learners (Mendenhall, 2011).

Educator reluctance, lack of skill, time constraints, lack of tech support, and low pay may all be variables as to why educators may not produce more creative class formats. However, it is critical to consider different ways to reach students, so they are successful as online learners. Perhaps, students can help facilitate the process through peer education, co-teaching, and assigning creative implementation online course strategies. Richmond and Troisi (2018) advocated that, when possible, instructors should approach learning in a multimodal and multifaceted way.

The inclusion of technology in college courses can cause frustration for the learner and the instructor when it comes to connectivity at student residences, where they may not have internet access for various reasons. This can be an issue especially for students who live in rural areas (Koricich & Boylan, 2019). Students living in mountainous, rural, and non-mountainous areas can all be impacted by this problem. Not only does connectivity at home present a

problem, but software cost and access can be a concern also.

In terms of software use, cost can be a prohibitive measure. If students have to pay for expensive software programs, then this can cause, or add to, financial burden. According to Boylan, Levine-Brown, and Anthony (2017) 81% of African-American students graduating with Associate degrees are in debt (14% more than white students) and 66% of African-Americans and Latino borrowers drop out of for-profit colleges with debt loads. On the instructor's part, distinguishing what type of software to include required careful thought regarding the student's financial situation, accessibility, and skill level, among other contributing factors. Instructors must also gauge student readiness to use and access a particular software program.

Creating Parallels Among School and the Workforce

Student technology use can run the gamut. Before entering college, students are expected to know how to write and edit essays using various forms of technology. They also must be prepared to create course presentations. After enrolling in college, students are expected to adapt to instructor communication preferences-written, verbal and digital. They should be able to navigate the internet and find credible resources to support their ideas. Technology can certainly enhance the classroom experience (Richmond & Troisi, 2018) by way of building relationships and communicating ideas. Students can use Smartboards, PowerPoints, Google docs, Pecha Kucha, MOOCs, databases, software programs, video lessons, self-testing, and discussion forums to identify ways they can be successful learners (Richmond & Troisi, 2018). It is vital that students learn the myriad ways of communication approaches used in formal learning

settings so they can apply this learning more readily in the workforce. This can make the transition from college life to work life more seamless.

Digital Natives and Shifting the Paradigm

Millennials have been referred to as "digital natives" (Prensky, 2007) as they are born into a technology-centric world and it is inherently natural for them to connect digitally for various purposes. Au-Yong-Oliveira, Goncalves, Martins, and Branco (2018) conducted a study of 111 millennial students where research participants were asked to complete surveys on the leader attitude and higher education approaches they desired. The study results indicated a high value placed on technology in classes, particularly in Padlet.com, Moodle, Online News Forums, as well as students being tasked with producing their own videos focused on course learning (p. 954). Shifts in technology, student diversity, and ever-changing educational practices can all inform how technology is used for learning in higher education. Being intentional with how technology is implemented in higher education learning can pave the way for a paradigm shift.

Marc Prensky (2017) posited that "ed tech" supports a nearly obsolete educational paradigm as he acknowledged the digital connection and interactivity youth crave. He believed that purchasing dedicated educational software is not necessary, and urged educators and students to locate creative ways to use tools such as augmented reality, robotics, virtual reality, analysis tools, and other communication tools so that learners will be more empowered to make meaningful contributions to the world by exploring ways to improve it.

Possibly one avenue for online instructors to consider is to pursue simulation education (SE). In terms of benefits and

value, authors Campos, Nogal, Caliz, and Juan (2020) make correlations between SE and student intrinsic motivation, and between SE and Science Technology Engineering and Math (STEM) programs of study like engineering and marine ecology. The team addressed the importance of "serious" game play (p.3) in which gamers can improve decision making skills as they navigate realistic experiences playing games. Another platform that may be worthy of exploring in higher education is Artificial Intelligence (AI). Zawacki-Richter, Marín, Bond, and Gouverneur (2019) reviewed how AI has been implemented in higher education and arrived at limited results, indicating that AI has mostly been used in computer science and STEM fields. However, these authors report AI is an emerging field and may enhance student learning outcomes.

Continuing further into options, and considering cultural factors that exist among students, is the notion of redeveloping a global MOOC to be more relevant locally. Chen and Oakley (2020) conducted a 3-year study that examined an English-Chinese MOOC "Learning How to Learn" (LHTL). They determined that MOOCS could assist in sustainable course redevelopment in their research outcomes. They suggested setting up comparable MOOCS, that are research embedded, can engage local partners, and allowed for MOOC instructor collaboration. This can produce a sustainable online model. Furthermore, Chen and Oakley (2020) indicate that, "Our work is a proof-of-concept, showing that creating a learning environment that enables domain-specific MOOC research is practicable (last paragraph)."

Online Education and Creating Community

As evidenced in this article, there are several options for educators to explore in creating a quality online class. In times of crisis, like the COVID 19 pandemic, technology can not only save jobs but be instrumental in meeting student learning outcomes. An article in Forbes magazine (2020) by Marlene Gavant Star titled, "Online education becomes teacher's pet in COVID-19 Crisis" is just one source that points to the significant value technology presents in educational systems. While higher education instructors work diligently to determine the right online technology for their courses, it would behoove them to consider platforms and strategies that foster community among learners, as community is vital in times of crisis.

People's lives have been uprooted, problems need to be solved, and people need support and care. Perhaps this crisis is an opportunity for higher education systems to not only build their resilience but is also a chance for them to integrate (perhaps more intentionally) community/relationship building into online courses. For instructors who are not familiar with online teaching the current crisis could be very stressful for them as they will need to spend hours figuring out how to make their virtual class "less boring". O'Malley (2017) suggested that being mentally present is very important. This includes actively engaging with students, posting bios and encouraging students to do the same and so on.

Studies and articles have addressed social justice and its place in educational systems. While social justice is a valid consideration given developmental classes, diverse learners, and varied teaching preferences of professors, systems can grapple with how to implement social justice tenets. Guthrie and McCracken (2010) shared an idea about constructing intentionally designed courses that interconnected service learning, technology, and social justice in their research. Although this was published

ten years ago, much of what was discussed remains relevant to current issues and complexities in terms of educational instruction. Another notion might be to organically involve students in the complexities of solving such real-life problems by experimenting with various technology platforms to determine what may or may not work sustainably for higher education culture. By involving students, professors and learners have an opportunity to create meaningful relationships and thus, meaningful learning outcomes.

A Call to Action

Although COVID 19 has created considerable upheaval globally, it also has created a chance for higher education systems to connect with learners in ways that may otherwise be left unexplored. Technology has provided a tool, or bridge, to help develop relationships and community among students and faculty across higher education environments. In these times, it is evident that communities across the globe need to find as many ways as possible to connect in meaningful ways. Students desire social connection, digital connection, and a sense of community and belonging. Numerous higher education systems have accepted this call to action by encouraging educators to do things differently, with greater intention and purposeful inclusion, in the construction of their virtual classrooms.

The President of Hampshire College, in Massachusetts, Edward Wingenbach, contends that designing online instruction is a discipline backed by decades of learning science, and is a time-consuming process that, if done properly, can take months or even years to do (Gardner, 2020). While many institutions have offered certain courses online over the past decade, others have been taught strictly in a traditional classroom setting. Instructors, both adjunct and full-time, need as much support as possible in working

through this forced transition. Campus trainings and webinars can be paramount to student success and retention in this new environment.

Gardner (2020) asserted that many colleges are proceeding with online instruction using their existing learning-management systems and common conferencing software, like Zoom, for lectures and discussions. It is important to transition to this format with flexibility. Creating materials, such as Pacing Guides and Course Modules, are helpful in this transition.

With all instruction moving online at most colleges and universities following this year's extended spring break, an important point to keep in mind is that faculty should be allowed to use the technology that they are comfortable with during the transition (Gardner, 2020). A majority of college faculty are trained in basic use of the campus LMS. This is a step in the right direction.

Helping Under-Prepared Students Succeed with Technology

There are certainly positive and negative aspects to using technology in developmental education courses. According to Boylan, Calderwood, and Bonham (2016), there are three phases to increasing college completion. The first is to improve the quality of teaching and learning in community college classrooms; the second is to fully integrate courses and student support services, and the third is to expand the connections between community colleges, public schools, and community services.

Professional development is at the center of meeting phase one of Boylan's et al. (2016) plan. This phase required a substantial faculty development effort. Faculty cannot adequately assist underprepared students in the use of technology if they are not efficiently prepared. Faculty development

should include both full-time and adjunct instructors.

Creating a common campus culture with open communication lines is necessary for meeting phase two (Boylan et al., 2016) asserted that, at present, the academic and the student affairs divisions of community colleges usually operate randomly and independently of each other. Technology programs can help bridge this gap. Through technology such as Form Stack and similar software programs, online forms can replace papers ones. This also allows multiple departments immediate access to this documentation. The DMI Daily Digest maintains that by using predictive analytics, that examines patterns in data to determine if those patterns will likely occur again, institutions can provide students with support services before they encounter problems. The University of Nevada is already using analytics to pinpoint students who need earlier intervention. Using the insights yielded through predictive analytics, instructors' step in to provide timely interventions (DMI Digest, 2020).

In order to expand connections in phase three, Boylan et al. (2016) suggested that high schools and colleges collaborate more closely to ensure that the exit standards of secondary education are more consistent with the entry standards of postsecondary education. In addition, community colleges needed to establish better relationships with services available in the local community to address the varying nonacademic needs of the least advantaged students. By embracing technology, these communication gaps can be met. For example, by using data gathered from their LMS, Georgia Southern was able to predict, measure and guide student performance for better graduation rates (DMI Digest, 2020). Through analyzing 53,000 data points the school gathered from 3,155 students, their

system predicted a passing final grade with 82% accuracy at the course midpoint. Student progress was tracked to determine success or failure. Students continued to move through a course, the system's accuracy improves, with an 87% accuracy by the 16th week of a course. By leveraging this system, Georgia Southern aims to produce 250,000 more graduates in upcoming years. Through this extra attention to detail, universities are able to retain students and see them through to graduation (DMI Daily Digest, 2020).

Additionally, technology can serve as an integral part in meeting the current deficit of college graduates in the United States, as well as aiding students in completing college with less debt. According to Boylan et al. (2017) three factors - a shortage of college educated workers, the increased costs of a college education and the increase in student debt—have captured the attention of policy makers in the past decade. These factors can be mitigated using educational technology to move more classes, at all college levels, online.

Each of these phases can be accomplished through the use of educational technology. An article published in DMI Daily Digest states that as the cost of Higher Education has continued to rise for the past three decades, by an average of 3% each year, the need for finding additional ways to fund higher education has become a priority. As such, the phases outlined by Boylan et al. (2016) should be taken into consideration when implementing technology in developmental education classrooms. Technology, especially in this chaotic time for higher education, can help to alleviate each of these trends.

Developmental educators have been caught up in the completion agenda and subsequent reform movement, frequently having to completely change what they do, often without having any input into the change (Boylan et al., 2017). Primary and secondary stakeholders on campus have not had a lot of input with curricular mandates from the state community college systems or legislature in many states but buy-in from these stakeholders is pivotal to successful implementation of innovations, such as increased technology use. DMI Daily Digest (2020) has also asserted that by 2020, the LMS will play a more significant role in many ways, such as connecting students with advisors, making tuition bill-pay easier, offering a convenient way to make appointments with counselors, checking and submitting for financial aid, offering more robust job boards, and connecting current students with alumni.

Start Small	**Be Reasonable**
Change in departmental curriculum should be piloted on a small scale. Start small and then expand to the larger course offerings	Avoid burdening students with too much work in accelerated learning courses. Too much work can result in students dropping courses, as well as hindering student engagement, and decreasing motivation levels.
Be Flexible	**Don't Forget Training**
Initial plans for implementing innovations, especially technological ones, often have to be tweaked. Try different versions of assignment lists, pacing guides, and other supplemental materials	Be sure to provide adequate training to faculty when using new technology. Training should be offered for both full-time and adjunct faculty
Find Common Ground	**Create Ease of Use**
Use technology that all students can understand and benefit from. Amend assignment lists based on student performance on initial placement tests.	Be sure online material is easy to find and clearly listed on the main tool bar of the LMS. Order these appropriately as well.
Get Student Input	**Get Approval**
Review how students feel about the inclusion of different forms of technology at the beginning, middle, and end of each course to help discern student engagement and whether the technology is beneficial to bolstering their skills.	Do not use supplemental software programs that are not approved by your campus IT department. Doing so can cause issues with campus IT security protocols.
Find Other Avenues to Success	**Know Your Limits**
Be open to creating micro-credentials and other offerings which can be gained strictly online. Some students might be interested in investing in a new degree or a new credential during the time they are quarantined at home.	Do not go beyond the state, civic, or campus mandated requirements for implementing an innovation with technology at the current time. Stay within your campus' plan for making advances work.

Figure 1. **This chart outlines some helpful tips for technology application in developmental education.**

Conclusion

Technology is a good way to help students bolster the necessary skill set to be successful in higher-level college courses while also preparing them for an ever-changing workforce that has incorporated numerous technological expansions. Embracing new ways to help under-prepared and under-served students bridge the skill gap in entering college for the first time or those returning after an extended absence in the workforce is vital, especially considering the world-wide ramifications of the Covid-19 pandemic. Creating clear, concise documents and embedding them in the campus LMS online, sectioning the course into manageable units, and using properly leveled technology, will help both students and instructors make a more seamless transition while maintaining a meaningful online presence. In order to create a successful transition, this process requires faculty and students alike to show flexibility and a willingness to learn. Remaining flexible is essential as society moves through this transition. Accommodating students by extending deadlines and providing instructions and rubrics for their online assignments can help faculty build relationships with their students. This is especially important for students who are taking online courses for the first time. The advent of the COVID-19 pandemic has made it clear that colleges must have a thorough, long-term digital strategy in place for course delivery and campus-wide operations. Only 42 % of institutions have an information-technology business-continuity plan to facilitate remote operations in the event of a disruption like a pandemic, according to Grajek and Brooks (2020). This means that 58% of these institutions are reacting and scurrying. This expedited course creation process brings up new questions regarding the efficacy of this process.

This pandemic event, which affects all parts of society, will have long-lasting effects on higher education and the way students are taught. Even if the experience does not drive more faculty members to teach online, many who have run their classrooms the same way for years may be exposed to more modern teaching methods and concepts as a result of this pandemic (Gardner, 2020). While the pandemic has been accompanied by much hardship for people, it has also come with opportunity - the opportunity for institutions of higher education to rise to the occasion by showing grace, creativity, and resilience in their embracing of technology and maximizing its capabilities.

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