

Message from the Publisher

Densil A. Williams

The onset of COVID-19 has accelerated the pace at which educational institutions and especially, higher educational institutions are using Information and Communication Technologies (ICT) to facilitate service delivery. This issue of Trends in Higher Education provides critical insights as to how Technology is supporting the transformation within the education sector. It focuses on data privacy policy, a critical element in the move to online teaching and learning and also, support for administrative operation. Educational institutions have large amounts of data on students, staff, intellectual property among other areas. So, security breaches can have tremendous impact on the confidence which stakeholders have in the organization. Similarly, other issues such as: online examination tools, teaching tools and meeting arrangement, in light of the need for social distancing are addressed in the volume. Insights drawn from best practices across other universities are shared so that readers can draw lessons and strategies to suit their own environment.

I hope you enjoy reading this volume and can adapt some of the strategies identified, within your own portfolio of work.

Technology Trends in Higher Education

The rapid spread of the deadly COVID-19 pandemic in early 2020 has forced many countries to introduce stringent measures to curb the spread of the virus. These included restrictions to public and social gatherings to limit personal contact among individuals and large groups. For places that had mass gatherings such as academic institutions, the result was that they had to suspend most face-to-face interactions and instead, turn to Information and Communications Technology (ICT) platforms, to support their operations. Academic institutions in the main, suspended face-to-face classes and adopted and deployed online learning modalities which provided immediate access to continued participation. The pandemic accelerated the implementation pace and use and reliance on technology.

Top technology trends will continue to promote greater innovation and efficiency in the enterprise as well as make services more efficient. Gartner's top strategic technology trends for this year fall under three major themes: people centricity, location independence, and resilient delivery¹ and is likely to remain relevant for the next five-to-ten years (Panetta 2020). Moreover, trends such as internet of behaviours, privacy-enhancing computing, distributed cloud, artificial intelligence engineering, cybersecurity mesh and composable business drive as identified by Gartner will transform not only institutions but the wider society. For Higher Education Institutions (HEIs) to compete successfully in this 'new normal' it will require the development of a technology ecosystem that is reliable, cloud-based, data-integrated and learning-focused (DeLapi 2020).

The rapid development and deployment of technology combined with push factors such as travel restrictions, expansion of global online credentials, , improvements in learning management systems,

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Editorial Team

Dr. Indrani Bachan-Persad
Dr. Halima-Sa'adia Kassim
Mr. Leighton Duncan
Mr. Anand Dass

Contact Us:

St. Augustine, Trinidad and Tobago
Phone/Fax: (868) 645-5795
E-Mail: uopd@sta.uwi.edu

Mona, Jamaica
Phone: (876) 977-0055;
970-2986; 977-0771
Email: vcprojoffc@uwimona.edu.jm
Website: <http://uwi.edu/uop/>

rise in more sophisticated video-conferencing platforms, and the emergence of augmented and virtual reality for simulations and games suggest that the business models, programme design and delivery of learning will be subject to review. In the post-pandemic environment, short-term technology priorities will be focused on keeping education affordable and accessible through strengthening online and hybrid education, keeping data private and secure while in the longer-term focus will be on improved technology and cost management through “digital transformation” (SCUP 2021). This edition of *Trends in Higher Education* focuses on some of the critical issues that must be borne in mind as higher education institutions increase their use of technology. These issues include but are not limited to data privacy, online teaching and exam tools, emergency communications and algorithm biases.

A rethink of AI adoption

Although Artificial Intelligence (AI) has changed business practices, student services, and other aspects of institutional operations, there are still hurdles with technology related to reasoning or social intelligence. Adoption of AI will require an understanding of its limitations and what tasks are better suited for humans versus machines. Within higher education, AI platforms review the tasks of students for plagiarism and the lectures of faculty are transcribed live. There are also Chatbots that address financial assistance, registration, and campus life questions. Students are reminded of office hours, test logistics, and essay file formats by virtual teaching assistants. Chakraborty (2021) notes that virtual assistants are using AI to nudge students taking a break from education to re-enrol in classes.

However, the adoption of AI is not without drawbacks. AI raises ethical concerns about algorithms (or computational formulas), which may replicate or amplify human biases. Computer-based algorithm models that make inferences from data about people, including their identities, their demographic attributes, their preferences, and their likely future

behaviours can influence decisions, specifying outputs that has consequences for a person’s lives and livelihoods. For example, Mount St. Mary’s University (Maryland) fired several university leaders in 2016 after the university’s president used a survey tool to predict which first-year students would not be successful in college and kicked them out to improve retention rates (Foresman 2020). Incidents such as that Mount St. Mary’s University requires institutions to carefully consider who will be harmed by this algorithm and what would that harm look like.”

Lee, Resnick, and Barton (2019) suggest that an increase in algorithm literacy and the use of “algorithmic hygiene” (processes that identify root causes of biases in computational formulas and identify ways to address such shortcomings) will alleviate the biases. Based on that, it bodes well for HEIs to consider what technologies and processes use algorithms and identify potential bias in the algorithms used and mitigate the bias in hiring and improve student success.

Analysing data privacy

HEIs hold an enormous amount of sensitive data (staff, student, financial, intellectual property, etc.,) that a security breach can have severe consequences. EdTech (2020) notes that higher education leaders expect to devote just 20% of their IT budgets to risk mitigation over the next two years. They also selected privacy as the second most important issue behind information security highlighting that the growth of data privacy as a top priority over the past few years (Burns 2020). It will require institutions to develop and comply with data privacy policies and programmes and be more proactive in protecting student and employee data.

Burns (2020) reports that students are not well informed about how institutions use their data and require institutions to bridge the gap between administrative policies and student knowledge. Citing the findings from the *EDUCAUSE 2020 Student Technology Report*, Burns (2020) notes that in a survey of 16,162

students across 71 US institutions, only 22% agreed or strongly agreed that they understood how their institution uses their personal data, and only 25% agreed or strongly agreed that they benefit from their institution's data collection. A promising practice at Ohio State University is that first-year students can take a class to help them understand data privacy.

HEIs such as University of Michigan have introduced privacy-enhancing technologies (PETs) to maximize data usage without posing privacy and security risks. The software offers data encryption, and digital rights management as well as features that support privacy governance. The university utilises the online portal, [ViziBLUE](#), which shows students how their data is being used.

Additionally, institutions should conduct privacy and security risk assessments to inform decisions on partnerships and data exchanges with other institutions or organisations, vendors, and governments.

Responsibility for data privacy is often dispersed across multiple university offices. Privacy officers and chief information security officers or other information security administrators are among the most commonly reported managers of privacy, with general counsel being the least common (Burns 2020). The areas of work include responsibility for incident-response events in which institutions need to identify whether personally identifiable information was compromised and how policies or procedures have failed, incident drafting and proliferation of policy and data governance.

SCUP (2021) highlighted a promising practice where faculty, administrators, and students are appointed to a privacy and data protection board/councils (e.g., Ohio State University) that sets the strategic direction and guide operational policy development and management decision-making for institutional data privacy.

Emergency Communication

During an emergency, the efficacy of campus emergency communications systems and protocols is tested. SCUP (2021) notes that institutions should adopt a multimodal system that delivers alerts through multiple channels, including SMS alerts, emails, push notifications, RSS feeds, computer screen takeovers, loudspeaker announcements, digital sign messaging, and social media posts. Consideration should also be given on how to communicate emergency messages to campus visitors and ensure that messaging is accessible to those with vision and hearing challenges. Emergency communication systems also offer feedback boards. This is seen as particularly useful as it allows community members to indicate to campus officials or first responders that “I am safe” and receive live location and status updates.

Going forward, it is important for institutions to establish a communications incident management team which can develop, or review emergency notification plans and policies, procedures, and equipment. Beyond that, SCUP proposes that regular “stress” tests of our institution’s emergency communications capacity be scheduled.

Faculty views of online teaching

COVID-19 led to the transitioning from face-to-face to online modalities. Johnson, Seaman and Veletsianos (2021) highlight that over 19.6 million total students in U.S. higher education, 1.5 million faculty members, and 2 million other staff members were impacted by transitions to remote forms of teaching and learning. Moreover, the authors note that at the start of the transition:

- Almost all institutions (97%) moving classes online had to call on faculty with no previous online teaching experience.
- One-half (50%) of the institutions could rely on at least some faculty with online teaching experience.

- A majority of faculty (56%) who moved courses online were using teaching methods that they had never used before.
- Faculty had to make many adjustments to their courses to complete them online. While only a few faculty (17%) made changes to required readings, roughly half (48%) reduced the amount of work they expected. About one-third (32%) lowered their expectations for the quality of student work.
- Faculty's most pressing concern was for their students; 57% identified additional support for their newly online students as their top concern — rating it more important than support for themselves.

By the end of Semester 1, AY2020/2021, attitudes and perspective among faculty had shifted. Johnson, Seaman and Veletsianos (2021) noted that:

- Most faculty reported changes to their teaching practices compared to teaching prior to the pandemic, and nearly all expect to incorporate these changes to some extent after the pandemic.
- Faculty reported being mainly satisfied with student learning during the fall term and that they were either extremely or somewhat satisfied with how efficiently they could communicate with their students.
- Over two-thirds of Faculty reported that they were either extremely or somewhat satisfied with how well their students learned.
- Faculty indicated that they felt more optimistic about using digital materials (57%) and online learning (51%).

The fear that grades would plummet did not hold at California State University at Fullerton (McMurtrie 2021). Average GPAs rose slightly for undergrads compared with grades for the fall of 2019. In a deeper dive into what worked, McMurtrie (2021) surveyed thousands of students and professors who took or taught math classes at Fullerton. After reviewing responses from 81 faculty members and about 2,800 students, the researchers found that:

- instructors put enormous effort into professional development that focused on both tools and teaching strategies (more than 60% of them took part in training over the summer to prepare for a fall online and 80% reported spending more time on their courses this fall than in previous years).
- faculty members reported that break-out rooms, synchronous chats, and polling, in particular, worked well for them and their students (80% of instructors said they will continue using approaches adopted this year).

They also reported wanting to maintain recorded video lessons that students can watch on their own time; virtual office hours; and smaller, more frequent assessments, and mastery-based grading.

The findings indicated that students liked certain aspects of virtual learning, such as being able to connect with professors online. They were also communicating regularly with one another on discussion boards, which helped create more-active learning.

Improving student experience via voice technology

Rapid developments in technology have led to voice assistants (e.g., Alexa and Google Home), smartphone chatbots, and touchless contact applications that opens doors or select elevator floors. Voice technology will impact education and more broadly, influence how students learn. Pothan (2020) notes that in a survey of college students in Boston, 70% use a voice assistant at least once per month with 66% expressing an interest in using voice to help with studying as well as academic tasks such as keeping track of assignments, retrieving lectures, campus events and calendar information.

AI-powered voice-activated applications can enable greater student engagement. For example, Grand Valley State University has launched myBlueLaker, a new virtual voice-activated assistant app design to help students navigate campus and answer their questions or

provide information on registration and classes, finances and academic status, transportation, health, housing, student life, building hours, etc. The app provides the opportunity to integrate data and create customised mobile and web platforms to drive student engagement. Some colleges have also provided voice-enabled devices in dorm rooms (e.g., St. Louis University) as way of improving student experience or Northeastern University, which has deployed Echo Dots around campus (Pothen 2020).

Voice-enabled technology is being integrated into curriculum. At Emerson College (Boston), faculty are experimenting with voicelets, which students can access on personal smart speakers or their phones. The voicelets (study aids in various formats) benefits students with reading comprehension challenges, those who are visually impaired, English language learners, or anyone who learns best when interacting with the material. Pothen (2020) reports that the voicelets were well received and used by the students to study especially, auditory learners.

Despite the benefits of voice-enabled technology for student engagement, there are concerns regarding the presence of personalisation tools on campuses and the protection of data. It will require campuses to conduct an audit of all the devices on their campus that use voice technology, and to directly manage their student data and apply strong authentication levels to ensure that student data is not breached.

New Meeting Practices

Academic conferences are critical spaces for researchers to share ideas and network. The presence of the COVID-19 pandemic made face-to-face meetings problematic leading to the organisation of virtual conferences. There is a growing perspective that an online component will be a permanent fixture of future conferences. Some conferences are experimenting with virtual-reality versions. For example, at the 2020 Women in Graphene Conference² researchers who attended the

event were encouraged to interact with each other through their own chosen 3D avatars, while attending three different lecture halls and networking lounges. Switching to virtual conferences does have some benefits - lower institutional costs, reduce carbon impacts, greater participant participation (e.g., persons with disabilities), and remove obstacles associated with visas.

Online exam tools

The COVID-19 pandemic heightened concerns about academic dishonesty. According to Basken (2020), there are increased reports of spikes in student cheating during the coronavirus-driven shift to online tuition. For example:

- University of Waterloo counted 1,340 incidents of cheating in the year ending this August, up 146% on the previous 12 months
- Queensland University of Technology noted that test-related cheating had quadrupled
- University of Houston reported that rates doubled.

There were also increases in students outsourcing their learning with the homework help site, Chegg. A study by researchers at Imperial College London, found that requests for help with exam-style questions on Chegg increased by 196% comparing April to August 2020 with the same period in 2019 (McKie March 2021). However, the site corporates with academic institutions in their investigations into academic integrity. For instance, the University at Buffalo, said that before March 2020 they had only made 10 to 15 requests, but have made about 100 since. Although students use bogus email addresses making it difficult to trace who submitted a question, the site has introduced Honor Shield, which allows teachers to pre-submit exam questions, preventing them from being answered on the platform for a specified time period. As well as raising awareness on what constitutes cheating, more innovative assessment methods are required to reduce the levels of dishonesty. At Kansas State University, focus is on more regular quizzes and

assignments and the University of Calgary includes oral assessments on Zoom.

The pandemic created challenges for assessments including plagiarism and remote examinations. Online proctoring services raises serious privacy concerns and does not offer strategies for preventing remote academic dishonesty. Now, a European Union-backed tool (Tesla Community Edition), which is designed to stamp-out cheating in online assessment with facial and keystroke recognition, will be available soon *gratis* (McKie April 2021). The tool was designed to support continuous assessment and will be able to compare learners' work to check for potential plagiarism. All data and communications will be encrypted.

Return of MOOCs

As a result of COVID-19 and the introduction of public health protocols that limited access and mobility, Massive Open Online Courses (MOOCs) is once again gaining traction. TeachONline.CA notes that the expansion of global credentials offered via MOOC platforms such as FutureLearn, edX and Coursera attracted about 16 million new users during the pandemic.

Universities are seeing that there is an opportunity to scale-up online education either through deployment of internal systems or in partnership with private companies and/or online platform providers. While institutions tend to be wary of outsourcing courses because of quality concerns, the pandemic made MOOCs attractive as universities and colleges look for new ways to recruit students.

The private providers partner with colleges to offer students standalone online courses, often counting toward general education requirements. For example, StraighterLine partnered with the University of Louisiana System to create a virtual academy allowing prospective students to take paid college classes before they enrol at one of its institutions. Outlier.org partnered with the University of Pittsburgh through a revenue-share

model to offer credit for introductory courses in calculus and psychology. Coursera recently launched Coursera for Campus, which allows any university to use Coursera's courses to deliver online learning. EdX, a non-profit MOOC platform created by Harvard University and the Massachusetts Institute of Technology, also launched its Online Campus, which gives partner institutions free access to its courses, and a limited version of this service to other accredited colleges.

Will online learning become the new normal?

The pandemic accelerated the trend towards remote teaching and learning. Nevertheless, there exists some scepticism about the value of online learning. A mid-2020 survey on COVID19, work and education by *Inside Higher Ed* found that Americans' perceptions of the quality and value of in-person, online or hybrid education vary widely. There was recognition that online education offered the best value for money, but the least effective approach for learning, and the least likely to prepare students for success in their job and career. See *Figure 1*.

Researchers and futurists believe that online and fully blended learning will become a more substantial component of our post-secondary learning ecosystem. A QuickPoll by EDUCAUSE in April 2021 shows that most respondents anticipate that their institution will increase or continue their offering of hybrid/online courses in a post-pandemic future and that faculty will continue to express an interest in those forms of education as well. See *Figure 2*.

To prepare for this long-term change it will require broader adoption of open educational resources, more use of chatbots to support learning or tutorial support, innovative or reimaged assessments, and the systematic use of analytics and data to improve programmes and courses. Other components include investing in faculty development and infrastructure, making more extensive use of support from instructional designers, subject matter experts, and technology advisors for

Figure 1: Americans perceptions of the quality and value of in-person and online education are diverse

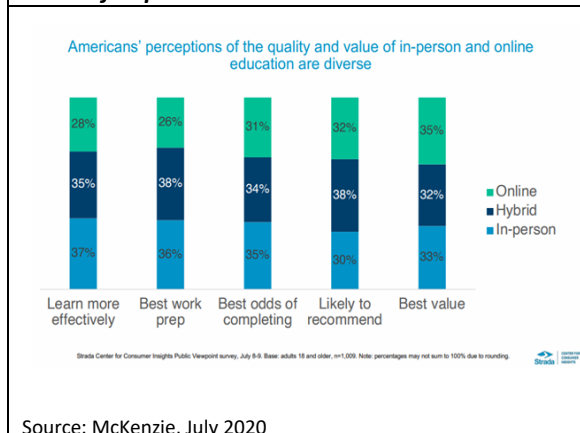
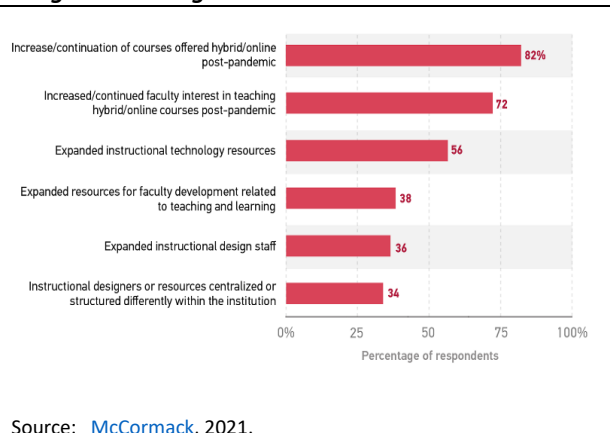


Figure 2: Percentage of Respondents Anticipating Long-Term Changes



developing and delivering effective online/hybrid programmes and courses. Additionally, it will necessitate making online learning “a financial imperative in terms of sustaining programs and markets” (SCUP Spring 2021).

Conclusion

The pandemic accelerated the pace of adoption of online technologies for teaching and remote work. While a hybrid of online and face to face learning will become the way of the future, it will require resources to support programme development and delivery and more collaboration between IT and subject matter experts. Similarly, the growing concern with data privacy will require HEIs to be more proactive in protecting their multiple sources of data. These developments will impact on business practices and other aspects of institutional operations.

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¹ **People centricity:** Although the pandemic changed how many people work and interact with organizations, people are still at the center of all business, and they need digitalized processes to function in today’s environment. Elements include internet of behaviours, total experience strategy and privacy enhancing computing. **Location independence:** COVID-19 has shifted where employees, customers, suppliers and organizational ecosystems physically exist. Location independence requires a technology shift to support this new version of business. This includes distribution cloud presence, anywhere operations, and cybersecurity mesh. **Resilient delivery:** Whether a pandemic or a recession, volatility exists in the world. Organizations that are prepared to pivot and adapt will weather all types of disruptions. Elements include intelligent composable business, AI engineering, and hyperautomation. See Penetta 20220.

² Women in Graphene Conference launched in 2015 give female researchers the opportunity to discuss their research, while also inspiring more women to become involved in science – particularly in fields relating to graphene and layered materials.

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