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# How One University Harnessed Internal Knowledge and Expertise to Effectively Combat the COVID-19 Pandemic<sup>1</sup>

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**Abstract:** This case history provides a snapshot of the leadership and organizational context that supported a bold and collaborative decision-making process at Rutgers, The State University of New Jersey, highlighting the importance of a disciplined approach to information and communication that takes full advantage of internal resources and expertise. Rutgers was the first university in the United States to make and announce a decision to require COVID-19 vaccination of all students for fall 2021. The decision to protect the university community with a mandated vaccination effort was the cumulative result of more than a year's effort to sustain a campus environment that maintained some of the lowest COVID-19 positivity rates in the country. From the outset, the announcement triggered extensive media coverage, an outpouring of reactions, and considerable debate that placed the university in the national spotlight. The university relied on its core values, internal subject-matter experts, information and communication resources, and collaborative leadership to guide, implement, and disseminate decisions. The successful health and safety outcomes that have resulted are no small feat when considering New Jersey and New York were the epicenter for the first east coast surge of the American COVID-19 Pandemic of 2020.

**Keywords:** COVID-19, Pandemic, Vaccination Requirement, Higher Education, Knowledge and Information Management, Collaborative Leadership, Crisis Management, Rapid Institutional Change, Population Health,

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## 1. Introduction

The challenges associated with knowledge and information management can be significant in organizations of all kinds and in all sectors during a crisis. Obstacles to these processes are particularly notable within higher education (Rowley, 2000), where loosely-coupled systems, distributed leadership, decentralized decision-making, traditions of faculty autonomy, work-flow inefficiencies, and diverse role-based cultures magnify the usual organizational challenges (Birnbaum, 1988; Bueller, 2015; Cranfield and Taylor, 2008; Hendrickson, et al, 2013; Nuninger and Chatelet, 2016; Ruben, De Lisi and Gigliotti, 2021; Ruben, in press; Weick, 1976).

Although universities are understood to be in the knowledge business (Goddard, 1998) and should be well positioned to lead other sectors in the organization and use of knowledge for administrative purposes, this is not necessarily an area of distinction within many colleges and universities (Bhusry, Ranjan and Nagar, 2012).

Impediments to excellence in knowledge management arise from the absence of a culture of sharing, a lack of awareness of potential benefits, and a failure to integrate effective practices into work routines (Bhusry, Ranjan and Nagar, 2012). In such a context, the effective aggregation, curation, and communication of pertinent information—from both internal and external sources—present challenges at any point in time. These challenges are especially problematic during periods of disruption and crisis such as has occurred within higher education in response to the COVID-19 pandemic. (Ruben, 2020a, 2020b). However, when the power of such a community of academic, administrative, and professional experts is effectively harnessed and focused on addressing a problem, such as the pandemic, the knowledge available with the institution becomes apparent.

The result is a case history of how colleges and universities may address additional challenges confronting society if they are able to organize and leverage their resident knowledge.

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Clearly, the impact of the pandemic has been pervasive and largely unprecedented for individuals and organizations worldwide. Like other organizations, higher-education institutions, and their faculty, staff, and students in the U.S. and internationally, have been confronted by life-threatening health and safety concerns.

Wide-ranging disruptions have often been quite extreme, even existential. These circumstances instigated critical moments calling for thoughtful and expeditious decision-making in a context in which leaders, students, and others in the institutions were compelled to pivot rapidly to remote technology to support all interactions.

This case history provides a snapshot of the leadership and organizational context that supported a bold and collaborative process at Rutgers, The State University of New Jersey (Rutgers) that harnessed internal expertise to overcome many of the usual impediments to effective, efficient, action-oriented, and informed decision-making. These efforts culminated in the decision to require vaccination of all students for fall 2021. Rutgers was the first university in the United States to make and announce this decision—a decision which was subsequently embraced by approximately 1,000 other colleges and universities and later by various public and private organizations (Thomason and O’Leary, September, 2020). The background, setting, and processes through which this occurred are profiled in this article, along with a discussion of insights that emerged and implications for effectively utilizing internal knowledge resources and collaborative leadership in other crisis settings within higher education and perhaps in a broader range of contexts.

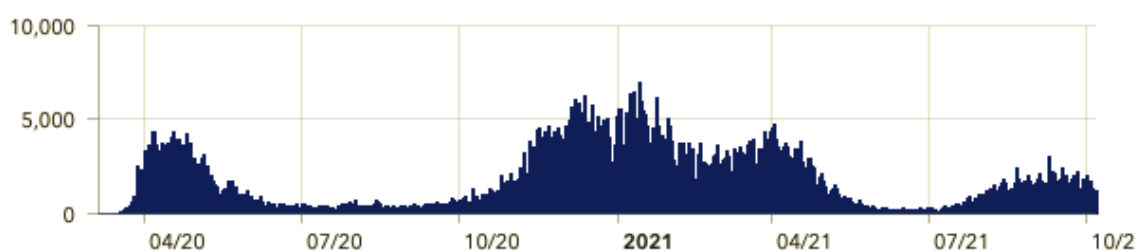
## **2. Research Methodology**

This article utilizes a narrative approach, drawing on qualitative and quantitative data to provide a case history of events associated with the efforts of one large U.S. research university to address a life-threatening crisis confronting the community. The project analyzes public documents, media accounts, and interviews with selected university leaders and key decision makers to describe the manner in which internal sources of expertise and knowledge were identified and integrated to facilitate rapid, coordinated, value-based decision-making and execution. The study considers ways in which what Davenport, DeLong and Beers (1998) and Rowley (2000, p. 327) describe as “explicit, documented knowledge, and tacit, subjective knowledge” were shared and collaboratively utilized to become vital organizational assets at a critical moment for the institution.

## **3. The National and State Context**

In late January 2020, many in the U.S. became aware of the novel coronavirus first detected in China when news arrived that a case had been confirmed in Washington state (New York Times, Jan 21, 2020). Within 10 days Wuhan, China and the surrounding communities were on lockdown, and the World Health Organization (WHO) declared a public health emergency. As the virus spread, organizational leaders across the country took note of guidance as it flowed from the Centers of Disease Control and Infection (CDC) to state departments of health and then to local health departments.

As one of the initial sites for extensive spread of the virus, New Jersey (NJ) along with New York were among the first to battle the pandemic. New Jersey is the most densely populated state in the U.S. with one of the most diverse and global populations. These demographics coupled with the state’s locale and centrality relative to significant travel corridors (New York, Philadelphia, District of Colombia, and Boston) and around major international airports contributed to its susceptibility to an airborne transmissible disease arriving from overseas.



**Figure 1:** NJ COVID-19 Dashboard Confirmed COVID-19 Cases Over Time

(Source: [https://www.nj.gov/health/cd/topics/covid2019\\_dashboard.shtml](https://www.nj.gov/health/cd/topics/covid2019_dashboard.shtml))

New Jersey Governor Phil Murphy issued executive order 104 on March 16, 2020 limiting gatherings to 50 individuals, closing non-essential businesses and schools, and ending in-person instruction at higher-education institutions within the state beginning March 18. Although positivity rates within the community were unknown throughout much of that spring due to limited availability of testing, the virus's prevalence was evident within NJ's overwhelmed hospitals and mounting mortality.

#### 4. The University Context

The COVID-19 pandemic created extraordinary crisis conditions for organizations in various sectors, including higher education (Chronicle of Higher Education, 2020b). In a matter of days, colleges and universities had to confront organizational challenges related to instructional delivery, campus openings and closings (temporary and permanent), long-term financial stability (Chronicle of Higher Education, 2020a; Associated Press, 2020), employment (Chronicle of Higher Education, 2020b), campus governance, faculty engagement in decision-making, confidence in administrators (Flaherty, 2020; Murphy, 2020; Paquette, 2020), and many other issues (Fernandes, 2020; Furstenberg, 2020; Nadworny, 2020; Ruben, 2020b; Vedder, 2020; Zahneis, 2020; Zwickel, 2020).

The crisis for higher education is defined by four conditions that have been extremely difficult to resolve:

1. Social distancing in an industry where social interaction and physical presence are central to the work done, whether in the classroom, dormitories, and fraternities or sororities, or in the laboratories, libraries, clinics, and field sites where students and faculty conduct their research.
2. Fiscal emergencies in a sector that has confronted financial challenges for some time, especially- but not exclusively- at schools that receive state funding, and at small private institutions that were struggling financially. The unpredictability of demand/tuition revenue as well as the impact from auxiliary services; such as housing, athletics, facility rentals, campus stores, and restaurants, etc., coupled with increased financial need among students, also contributed to the strain on the university. Loss of international students, most of whom pay full tuition, could exacerbate financial challenges.
3. Increasing demand for health care services delivered in hazardous conditions for those schools with medical schools, other health professional schools, or hospitals, while simultaneously losing revenue from delayed elective surgeries contributed mounting strain on already pressured leadership to produce more, with less (Lawrence, 2020).
4. The lack of a human or technological infrastructure to pivot to an all-remote environment.

Rutgers is a large and complex teaching-research institution with campuses and satellite facilities located throughout the state of NJ. Collective senior-level governance of the institution is provided by a Board of Governors, the university president, the president's cabinet which is composed of academic and administrative leaders, and four chancellors that oversee the institution's three regional and one united health sciences campuses. The State, and the university specifically, are highly unionized.

The university is home to more than 28,000 faculty and staff and 66,000+ students. Its largest campus, both in size and population, is Rutgers-New Brunswick. Rutgers-Newark and Rutgers-Camden also host sizeable academic and research programs, and Rutgers Biomedical and Health Sciences (RBHS) – which includes health care providers, instructors, researchers, and medical residents and fellows in addition to undergraduate students, graduate students, and academic faculty – has a major presence on each of the campuses and at numerous locations throughout the state.

While the functions described above are common to many if not most large universities and systems, the combination of Rutgers' size, organizational complexity, geographic dispersion, and urban campus settings were important considerations for leaders in planning and implementing COVID-19 policy. Administrators at all levels were involved in the process. Along with the university president, members of the university cabinet played important leadership roles in this regard, representing these critical functions: academic affairs, general counsel, human resources, IT, and communications. Each had a vital role to play in their respective area of expertise. The Office of Information Technology focused their efforts on preparing technology and providing technological support for faculty. Human Resources efforts centered on workforce policy, support, and labor relationships. Communications coordinated information dissemination from and to administrators and the community. Chancellors, their provosts, members of their leadership teams, and other unit's functional leaders provided

important input and supported communication efforts with their communities throughout the pandemic. Ongoing clear communication across the university was necessary to maintain coordination and overcome fears as the pandemic intensified and anxiety became an enemy of providing effective, timely, equitable, and safe education and patient care. All of these efforts depended on the deployment and integration of all Rutgers statewide enterprises through one central coordinated approach, reacting to the pandemic's rapidly changing landscape across the most densely populated state in America.

#### **4.1 A Leader in Health**

A key asset to the university during this period was the expertise and leadership present within its own academic medical centers. Dedicated to advancing medical research, education, outreach, and clinical practice, RBHS employs renowned experts throughout the varied fields of health and wellness and is led by physician and epidemiologist Brian L. Strom, a long-term member of the National Academy of Medicine, with special expertise in the effects of drugs and vaccines. More than 1,300 health care professionals including dentists, nurses, psychologists, pharmacists, and other allied health providers comprise RBHS's clinical care division, Rutgers Health. Each year Rutgers Health delivers 2.8 million patient visits and performs 470 clinical trials. Additionally, Rutgers University and RWJBarnabas Health, NJ's largest and most comprehensive health care delivery system, recently partnered to create one of the largest academic health systems in the U.S., and the largest in the state of NJ. The collaboration between the two entities supports the training of more than 1,500 medical residents and interns and includes substantial investments in research.

RBHS's Chancellor and Senior Vice Chancellor of Clinical Affairs also guide universitywide health services as Executive Vice President of Health Affairs and Vice President of Health Affairs, respectively. Along with a former NJ Health Commissioner as the Executive Director of Health Systems and Population Health Integration and the Assistant Vice President of Student Health, Rutgers Health Affairs organized the institution's historically siloed, campus-specific student and occupational health offices into a coordinated and agile team that could quickly advise university leadership and guide the Rutgers community as a whole.

This valuable expertise also supported the university's clinical partners, as Rutgers served a key role in coordinating practices among its multiple health system partners and the university provided subject matter experts to the state government, lending critical expertise during a period when best practices were not yet known or confirmed.

### **5. Decision-making Complexity and Challenges**

Throughout the pandemic, health care, academic, and administrative leaders were confronted by an unending array of decisions to be made, each requiring analysis, mapping to and weighing against potential consequences, implementation, and follow up. Beyond fundamental issues related to the initial health and safety of the university community, further decisions concerning renewal, repopulating, and reenergizing campuses needed to be addressed often while preparing for sometimes unpredictable health and safety concerns that emerged as the pandemic evolved. Transcending these decisions were efforts to maintain core values, promote resilience, and bolster a sense of community while direct interpersonal and organizational contact was restricted.

#### **5.1 Coordinating the Rutgers Response**

The Office of Emergency Management, led by the university's Emergency Management Coordinator, was central to coordinating the university's response and the formation of the governance structure by which the university would make and execute all decisions.

On February 10, 2020 an initial Emergency Operations Team meeting was organized to establish regular briefings and on February 28 the university activated its Emergency Operations Center (EOC) to deal with the emerging threat and call all-hands-on-deck. The EOC assembled 14 Teams with more than 200 members. Team leads were senior-level individuals at the university, and members were subject-matter experts. Tasks were identified for each team, a governance structure was put in place, and a cadence of meetings was established.

The Executive Team (ET) was led by the president and included the four chancellors and the Executive Vice President and Chief Operating Officer who was the chair of both the EOC and the ET.

The activation of the EOC further elevated planning across the university and expanded resources dedicated to gathering and sharing pertinent information within the decision-making teams and developing and disseminating a unified response to the community. Under the guidance of the EOC, multiple teams and committees were conceived, launched, evolved, and dismantled as necessity ebbed and flowed. During this time Rutgers Health Affairs leaders continued to offer critical guidance to the university through the EOC, as well as leading several EOC sub-committees focused on addressing the health concerns of the university, and more largely for the state, as it navigated the height of the crisis. During the early stages of the pandemic the EOC and the ET met daily to review countless questions and make decisions necessary to keep university functions operating. RBHS clinical deans and institute directors met nightly to respond to the crises and shortages of the day, and RBHS coordinated very closely with its hospital partners and the New Jersey Department of Health. EOC Team Leads met regularly to address all outstanding issues.

Collectively this group was charged with maintaining clear alignment of clinical and operational guidance across all campuses. Often data or governmental guidance was not available or delayed, and decisions had to be weighed and distributed to offer the best chance at maintaining a cohesive defense against the growing number of sick and dying patients. The EOC monitored CDC and world data to make informed predictions in order to withstand the pandemic and deliver against all of Rutgers' missions in as safe an environment as possible.

In the early stages of what would eventually become the pandemic, a small Health Affairs Response Team (HART) consisting of representatives from clinical affairs, student health, occupational health, population health, and communications monitored developments and guided early university response. Initial guidance was primarily focused on the university's global academic programs and advising the internal population to adhere to traditional virus-prevention tactics. HART grew alongside the pandemic, integrating and empowering representatives from operations, student affairs, state information systems, and others as needed. As detection of the novel coronavirus, and its subsequent "community spread" was announced in the United States and devastating illness and loss of life erupted in Italy, preparations and contingencies were developed within the university to provide resources and stability while external guidance and support faltered.

Within just 15 days the assembled teams worked together to cancel all study abroad programs and all university travel and depopulate the campuses by encouraging international students and visiting faculty to return home immediately, moving all students who were able from their residence halls to their homes, and introducing telecommuting and COVID-19 leave policies for employees. On March 14 the university was first alerted to a positive case of COVID-19 on campus, and on March 17 the university cancelled in-person commencement ceremonies, having readied itself for the storm to come. Just a few weeks later, Rutgers expedited virtual graduations of several cohorts of clinical students to help provide lifesaving clinical care in the state's overwhelmed hospitals.

In late spring 2020, the university continued mitigation strategies, cancelled Summer Session, and continued contingency planning for fall 2020. The EOC continued to meet on a weekly basis, with a larger working group of about 35 members joining on a bi-weekly cadence. During this time, the team focused on aligning with New Jersey Governor Murphy's Executive Orders and the State Office of the Secretary of Higher Education (OSHE) requirements and articulating the guidance in a comprehensive "Return to Rutgers" document that would inform operations for every university location and program.

In the middle of the year a university leadership transition took place with Dr. Jonathan S. Holloway, a U.S. historian and former provost of Northwestern, succeeding Dr. Robert L. Barchi, a neuroscientist who had served in the position since 2012. The announcement of the appointment of President Holloway in January 2020 contributed to a smooth transition by enabling briefings and consultation throughout the spring semester.

On the sixth day of his tenure, President Holloway announced that Rutgers would plan for a primarily remote Fall 2020 with a limited number of in-person classes. This decision was a departure from the direction that was taken by many peer institutions, but one that university leadership felt necessary due to Rutgers size, complexity, and location within urban and population-dense environments.

Mitigation through testing and tracing expanded and continued through the fall and was extended into the spring 2021 semester with a slightly increased on-campus student population.

As the weeks and months of the crisis advanced, it became increasingly apparent that, rather than simply returning to “business as usual,” a “new normal” would need to be defined, along with new ways to guide the review and adjustments, and in some cases more fundamental reprioritization of mission-critical functions, programs, services, work roles, and many other operational concerns (Ruben, 2020a). Indeed, as the pandemic progressed into a new endemic stage, it was clear that all of these issues would need to be addressed—and that that need would likely continue for some time into the future.

Adding immeasurably to the intensity and significance of leadership decision-making has been the pervasive, continuing, and evolving threat to campus safety and the health and safety of students, faculty, and staff. Before the pandemic was recognized as a national emergency, many universities with health care enterprises already felt the challenge of guaranteeing a safe environment for patients, students, employees, and the university community at large. At Rutgers, reorganization of core central health care clinical command was judged to be critical to produce fluid and rapid decision making and guidance for care coordination across sites.

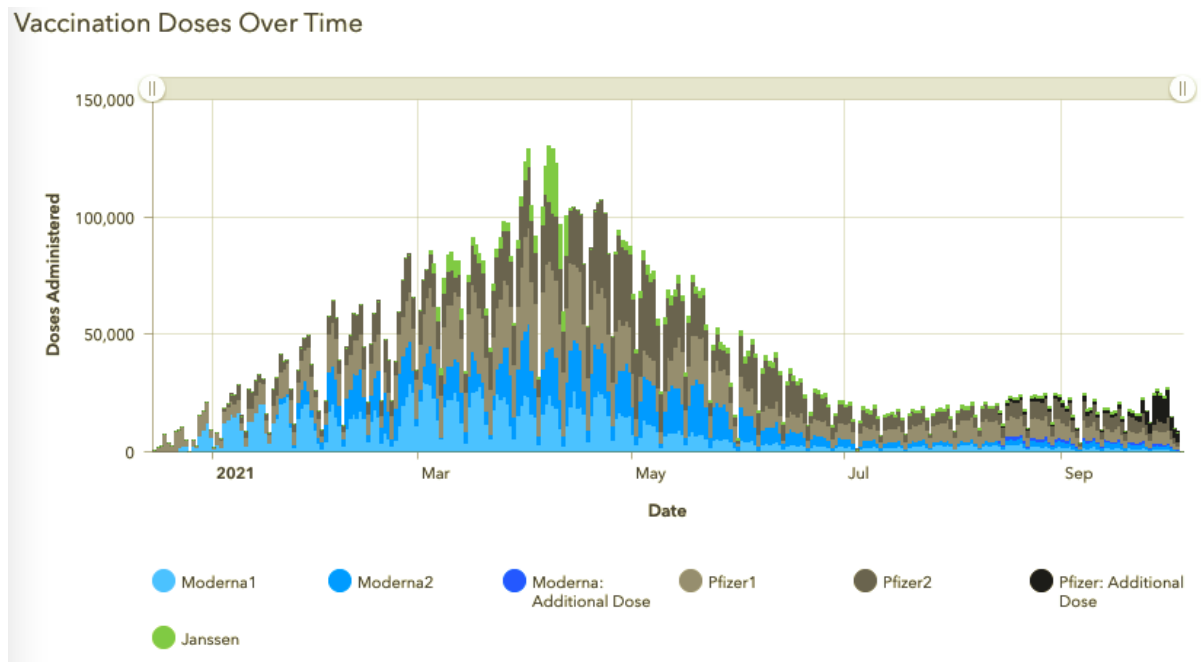
To facilitate communication, often overlapping committees and subcommittees comprised of deans, directors, and other senior leadership from student health, behavioral health, and ambulatory practices among others, met frequently (at times semi-weekly) and also included central administrative representatives from environmental health and safety, systems engineering, communications, general counsel, and human resources as needed. Leads for each sub-committee advised appropriate action, centralized resource requests, and provided timely reports as the pandemic evolved. The Vice President for Health Affairs served as the chair of the clinical EOC, and coordinated all activities and information regarding global pandemic observation, local and national trends, clinical operations and intercampus readiness, and coordination with the NJ Department of Health, driving all information into the EOC central command.

This collaborative structure and supporting communication processes were established to collect, manage, and disseminate information, and to allow for organizing and channeling questions and queries on each major and minor decision and milestone to decision-makers. This approach was intended to promote clarity, enhance the sense of ownership, and encourage adherence to defined operating procedures across the university.

## **6. Vaccine Availability**

Hope of relief from the crisis began to build in late summer and early fall of 2020 as three vaccine candidates entered phase three clinical trials. In mid-December the two mRNA vaccines received FDA EUA approval. Due to limited supply, vaccination eligibility was announced in stages to prioritize availability for those most at risk. The first vaccination in NJ was administered to Maritza Beniquez, a nurse at University Hospital in Newark on December 16, 2020.

Expanded eligibility for all adults in NJ was granted on April 19, 2021. Initial and then confirmatory subsequent data indicated that the vaccines are extremely effective at preventing serious illness from COVID-19, and cases throughout the state dropped significantly as vaccination increased.



**Figure 2:** NJ COVID-19 Dashboard COVID-19 Vaccine Doses Administered Over Time.

Source: (NJ COVID Dashboard, October 5, 2021)

## 7. Vaccination-related Decision Making

As vaccination was initiated across the country, Rutgers leadership began evaluating the role vaccines could play in a safe return to campus. As time passed, and more data became available, skepticism related to the efficacy and safety of the vaccines shifted to tempered optimism. The remaining hurdles were availability and public perception.

In January 2021 the university cancelled Summer Session 2021 and started to have critical conversations about what all Fall 2021 would look like. Over the next eight weeks university leaders consulted with health agencies as well as their own health experts and internal departments to determine the best course forward for the wellbeing of the 28,000+ employees and the 66,000+ students at the university.

Despite emerging variants, data suggested that the vaccines remained effective at preventing serious illness from COVID-19, and an internal survey distributed to all university community members indicated a strong willingness for vaccination.

University leaders weighed the value of various levels of vaccination within the community. Within the university's own testing program positivity rates among the student population (1.29%) were double that of employees (0.63%). Though risk of serious illness seemed less common within the student age group, the university needed to weigh the safety of all of its constituencies – including the members of the communities in which each of the university's campuses reside: New Brunswick/Piscataway, Newark, and Camden (Rutgers Testing Program Dashboard, Sept 11, 2021).

University leaders scanned the higher-education landscape, focusing particularly on peer institutions and also on the broader national community for a model to help guide them, and found that none had yet emerged.

With decision day for accepted students fast approaching and Fall 2021 course registration set to open in the end of March, the university was looking to make a determination about the fall semester. At the beginning of March, President Biden announced that vaccine supply would be available for everyone aged 16 and up by July.

The university's senior leadership team reconvened and reviewed all relevant information. The vaccines were effective and safe, vaccines would be available to all university community members who wanted them, and community spread of COVID-19 remained a threat to all who were unvaccinated.

## **8. The Announcement**

During the first two weeks in March, university administrators finalized plans for the vaccination requirement. The announcement of the mandate needed to be clear and communicated early enough to ensure that students were informed with ample time to weigh their options.

On March 25 2021, when Rutgers announced the decision to require students to be vaccinated in order to enroll in the Fall semester (Rutgers Office of the President, Mar 25, 2021), it became the first institution to do so (Durkee, Mar. 25, 2021). That morning the university had alerted the governor's office and OSHE of the forthcoming announcement. The mandate was announced initially in a message to the university community from President Holloway, Executive Vice President for Academic Affairs Prabhas V. Moghe, and Executive Vice President and Chief Operating Officer Antonio M. Calcado. The announcement stated that the policy would apply to all students except in cases where medical or religious reasons would be permitted. Vaccinations would not be required for students enrolled in purely online degree programs and individuals participating in online-only continuing education programs.

Rutgers President Jonathan Holloway prefaced the announcement of the policy in this way: "We are committed to the health and safety for all members of our community and adding COVID-19 vaccination to our student immunization requirements will help provide a safer and more robust college experience for our students" (Rutgers Today, Mar 25, 2021).

Commenting further, Antonio Calcado, executive vice president and chief operating officer explained that "Since the start of the pandemic, we have said that the safety of the Rutgers community is a shared responsibility. An effective vaccination program is a continuation of Rutgers' commitment to health and safety for all members of our community of more than 71,000 students, the cities we are in and the communities we serve throughout New Jersey."

The official press statement also included a statement from Brian Strom, chancellor of Rutgers Biomedical and Health Sciences and executive vice president for health affairs at the university. "The COVID-19 vaccines have proven to be safe and effective in preventing serious illness, hospitalization and death. Vaccination is key to stopping the current pandemic and to the return of campus instruction and activities closer to what we were accustomed to before the pandemic drastically changed life at Rutgers" (Rutgers Today, Mar 25, 2021). The announcement also noted that faculty and staff were strongly urged to receive the vaccine.

### **8.1 A Bold Action**

As explained by President Holloway, there had been no intention to be the first institution to make such an announcement. There was, however, a conscious effort to arrive at and communicate a decision as early as possible so that students or parents who felt they could not comfortably comply with this guidance would have time to pursue other options for the fall (Holloway, Sept 3, 2021).

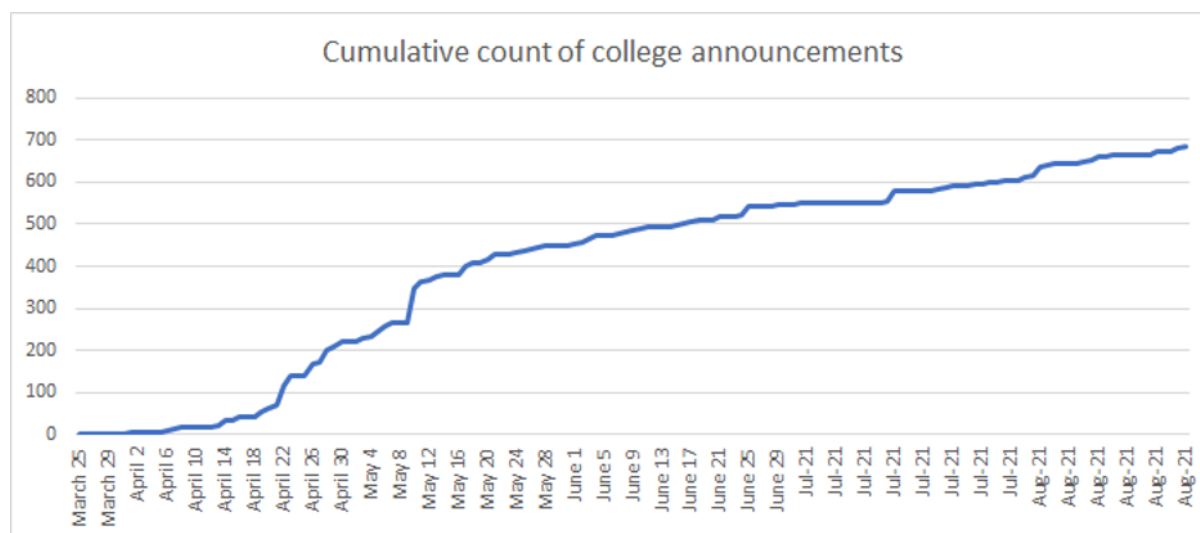
The announcement triggered a pattern that would eventually lead to adoption of the same course of action by approximately 1,000 institutions in subsequent days and weeks, representing an impressive leadership moment for Rutgers, and for higher education in general (Redden, Sept 21, 2021). The graph presented in Figure 3 shows the rate at which universities/colleges have made their announcements of required vaccines.

In an uncharacteristic endorsement, and what turned out to be a very accurate prediction of future events, Anthony S. Fauci, director of the National Institute of Allergy and Infectious Diseases and President Biden's chief medical adviser offered the following observations as a forecast of future developments within the higher education community and beyond.

*You would wish that people would see why it's so important to get vaccinated... I know that people must like to have their individual freedom and not be told to do something, but I think we're in such a serious situation now that I think in certain circumstances, mandates should be done. When that occurs, which I hope will be really quite soon, I think you're going to see that local institutions, local enterprises are going to feel empowered — and ... they're going to be saying that if you want to go to this university or you want to go to this college, you've got to be vaccinated. (Bellows, Aug 10, 2021)*

In the days that followed, media engagements were selectively accepted for university, local, statewide, and national outlets. Supporting messages cascaded from leadership across the campuses, and content was developed and disseminated across university media properties to help students understand the requirements and the directions for uploading their documentation.

“(Students) deserve to have the experience that they have been looking forward to, and we think this is a small price to pay to do it,” said Antonio Calcado in an interview with CNN. “We already require and mandate a number of different vaccines so we have a policy in place.” (Golodryga, Apr 23, 2021)



**Figure 3:** University Vaccine Mandate Announcements Over Time

(Source: Thomason and O’Leary, Aug 21, 2021, *The Chronicle of Higher Education*)

## 8.2 Follow-up

When the decision of the student vaccination mandate became known, Rutgers administrators quickly began working on implementing the policy. Frameworks already existed for both student and employee inoculation policies – but only for limited segments of those populations. Together, employees from Health Affairs, Occupational Health, Student Health, Student Affairs, General Counsel, Human Resources, Institutional Planning and Operations, Information Technology, and Communications worked expeditiously to update the existing policies, build systems, create processes, and define compliance expectations necessary in order to enact the requirement.

Traditionally, immunization requirements for all incoming undergraduate students include Measles, Mumps, Rubella, Meningitis, Tuberculosis, and Hepatitis b. Students who participate in clinical activities are also required to have received additional inoculations for Varicella, Tetanus-diphtheria-pertussis, and annually Influenza. University employees who are identified as “covered individuals” (typically those who provide clinical care or are physically located within spaces that do so) are required to attest to inoculation against Annual Influenza. The updates to the two relevant policies expanded their application to include returning undergraduate students and all graduate students.

An immediate need was a comprehensive centralized information system that harnessed data from student record systems as well as the Rutgers COVID-19 testing and COVID-19 vaccination systems and cross communicated between them. The parameters of the system were established by subject matter experts from health affairs, student health, occupational health, clinical affairs, information technology, communications, human resources, admissions, general counsel, and more. Built progressively by a highly skilled internal programmer as the pandemic evolved, first with testing and then with vaccine administration – the “Return to Rutgers” system was further expanded to integrate vaccine documentation upload and review. The resulting system enabled users to schedule vaccination and/or testing appointments, upload their relevant documentation, and view status updates. Most importantly it allowed university administrators to monitor

activity, report on compliance, and communicate with targeted segments of the population based on level of compliance.

Verification committees consisting of trained health professionals within the university were quickly assembled and expanded to address the increased volume of student records to be reviewed and approved. Committee leaders also were challenged to define expectations for the term “fully vaccinated” for a population that included international students and personnel with differing and at times limited, access to vaccines.

Each of the COVID-19 vaccine mandate policies allowed exemptions to be requested by students for medical or religious reasons. Though these same exemption opportunities were available within the existing policies, they were rarely requested. Additional internal committees were convened to address the need to process an anticipated significant increase in exemption requests. The exemption committees were charged with reviewing and expanding upon the existing criteria for exemptions as necessary. It was critical that both the verification and exemption committee groups ensured consistent application of their criteria throughout the university and that they worked quickly. The process for both groups was often slowed by necessary correspondence between the reviewers (which may or may not be the same individual) and the submitter as technical problems, user error, or additional information requests were addressed. As the summer passed, and the deadline for record upload loomed, both groups of committees also faced the burden of processing escalating submissions.

Clear, consistent information and communication were required to convey the intention of the vaccine requirements, gain support from the community, provide necessary details for all university groups covered by the policies, and identify and clarify misunderstandings and concerns. A representative from university communications was embedded within the health affairs leadership group to provide proactive guidance and streamline the development of key messages and their delivery methods. Messages were strategically targeted to address evolving concerns including campus health and safety, vaccine safety and effectiveness, vaccine availability, vaccine hesitancy, vaccine documentation requirements, and more. Primary audiences included: incoming students, returning students, international students, and university employees. Multiple communication channels were employed as appropriate to each message and the target audience.

As attention shifted from deliberation to implementation, a primary concern became informing key audiences of the parameters of the policies and encouraging them to take action. This required clear definitions of compliance (what documentation was required, of whom, by when, and how it should be submitted) and what the consequences of non-compliance would be. Information related to requirements was conveyed using university media including websites, learning management tools, social media accounts, campus digital signage, and others. Tailored messages were delivered regularly to students segmented by their role (returning student, incoming student, international student, etc.) and status (non-compliant, semi-compliant, pending review, fully compliant).

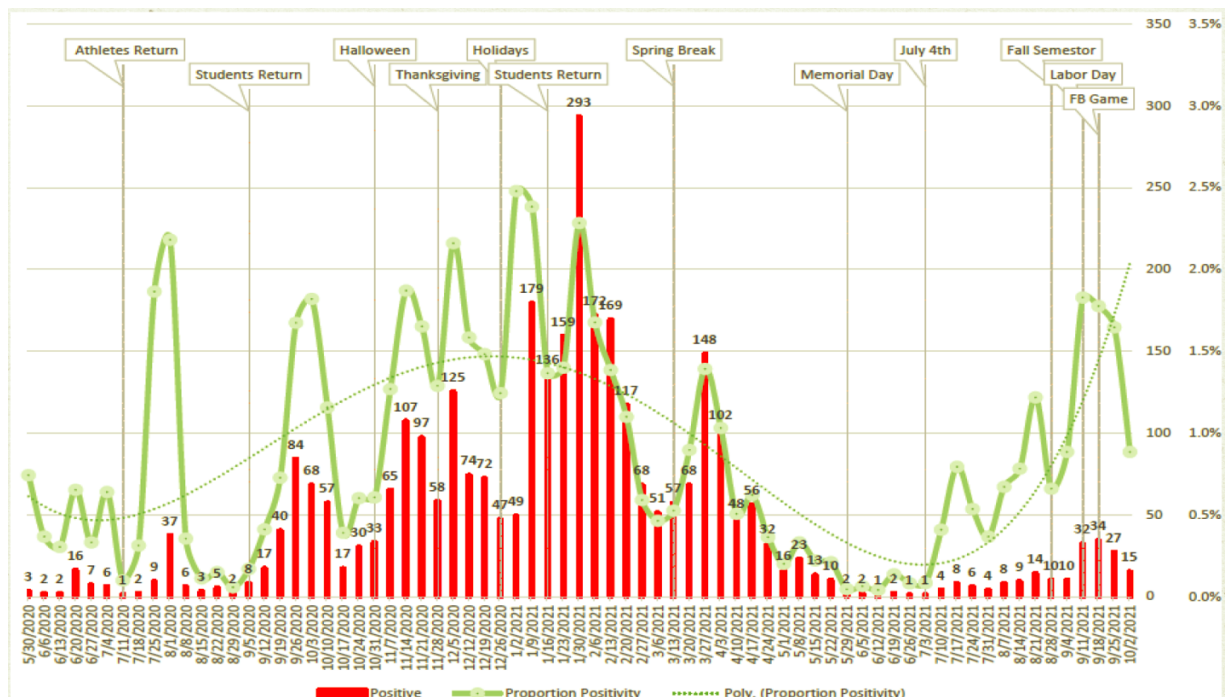
Communication related to vaccine hesitancy was also a priority. The Rutgers Vaccination Portal was designed ahead of the vaccine mandates in early spring 2021 as a repository for the records of the health care professional and other employees who were among the first in the nation to become vaccinated. Though eager to receive the vaccinations, some of the employees were reluctant to share their health records with the university due to privacy and security concerns. These issues were addressed by providing general information regarding the security of the information systems that held the data as well as the governance that dictated who would have access to detailed information and how that information would be aggregated into reports. The more challenging issue to address was the reluctance to become vaccinated.

Messages were created relative to key vaccine hesitancy issues, including: 1) the efficacy of the available vaccines; 2) the safety of the available vaccines; 3) the validity of the emergency use authorization (EUA) process; and 4) the toll of COVID-19 on individuals and within the community. These messages were primarily delivered by the university’s medical experts and trusted student and university leaders through traditional channels and new platforms that were developed such as virtual townhalls, live web-based health briefings, and podcasts. Campus news platforms and other media were also used to disseminate these messages to external audiences.

### 8.3 A Bold Decision with Impressive Results

From the outset the announcement triggered extensive media coverage, an outpouring of reactions, and considerable debate that placed the university in the national spotlight. Rarely has there been a circumstance where a higher education leadership decision has garnered as much national attention, touched on as many concerns, been as widely scrutinized, or acted on with such rapidity and consistency across the higher education community.

The outcomes from this process have been impressive. For the fall 2021 semester, the university deregistered only 60 students out of a total of 64,636, enabling Rutgers' campuses to return to full capacity, with every able employee and student returning to work and learning at pre-pandemic levels under the guidance of carefully detailed operating instructions (Update to the Guide, Aug 27, 2021). Rutgers rates of disease have been consistently far below that of the surrounding region [see Figure 4], which has been better than much of the rest of the country after passing through its initial surge.



**Figure 4:** Rutgers University Testing Program Case Positivity Rate Over Time

Unquestionably, the decision to require vaccination among returning students—and to assume a leadership role among higher education institutions in doing so—was a bold action. It is not customary for colleges and universities to lead the way in decisions that have such broad implications, nor to arrive at such a decision in what may have seemed to be a short amount of time. It was quite clear from earlier experiences globally, however, that hesitation would result in misinformation, confusion, fear, and degraded community cohesion, and ultimately serious illness and the loss of life.

From the beginning, Rutgers was on the front lines, using the full power of its science, innovation, and determination with the aim of creating an oasis of health within a very threatening environment. The university responded to the global emergency in ways big and small, including among other things: by sharing their expertise and factual and steady analysis to an anxious and uneasy world; by creating a better way to test for COVID-19 and sharing this discovery with the world; by working with hospital and health system partners to care for the sick and then researching how the disease impacted those providing care; by graduating medical, pharmacy, and nursing students early so that they could join the front lines sooner; by partnering with the State of NJ (Edelstein, June 10, 2020) to mitigate spread of the disease; and by conducting studies of vaccines (Hosseini, Sept 1, 2020).

Throughout the pandemic, university leaders were required to use incomplete information to make the best decision possible in a time of unprecedented uncertainty. The university's data gathering, deliberations, action

planning, and implementation efforts moved with remarkable speed to support decision-making that was data informed, collaborative, and carefully reviewed. The process required consideration of an extraordinarily broad array of perspectives including medical, legal, ethical, political, campus safety, facilities, economic, risk management, political, students and parents, faculty and staff, unions, and other stakeholder groups.

Each decision was guided by the university's mission to its support students, employees, patients, and surrounding communities, and to cultivate an environment of exploration, healing, innovation, and discovery. Successful adherence to these values was made possible by the tireless work of the fourteen teams: Human Resources, Information Technology, Academic Affairs, Facilities, Finance, Communications, Health Affairs and Clinical Affairs, Research, Student Affairs, Student Health, Emergency Management, President's Office, Secretary's Office, and Office of General Counsel.

It is too soon to tell what the legacy of the pandemic and its effect on the university community will be. Outside of the required rapid reevaluation of how learning and work is performed, it is hoped that society's renewed appreciation for science, wellness, and the health professions will usher in a renaissance of life-changing discoveries, ground-breaking and integrated treatments, and a commitment to ensuring that everyone receives the care they deserve.

#### **8.4 Future Uncertainties as the Pandemic and Planning Enters a New Phase: A Work in Progress**

At this point this disease is more likely to evolve to being endemic, than for the pandemic to end. It is also worth noting in this connection that the authors have struggled with determining where this case history should begin and end. We are now entering the third academic year of disruption, and each day new developments further blur this issue. An early thought was to focus the case on the decision, announcement, and follow-up communication related to the vaccine requirement. However, as we worked forward, it became apparent that the broader environmental and organization context—what went before—was a necessary part of the story required to understand the success of the organizational decision-making, its widespread acceptance, and the broader influence of the vaccination decision within a unified university community and beyond.

In spite of these complications, we believe it is important to chronicle the case as we have to this point in time. First, we believe there can be considerable value in analyzing the leadership effort—even though it is a “work in progress”—to better understand the encouraging outcomes that have resulted thus far. Second, we believe there are a number of interesting and important insights and generalizations that can be identified that may be helpful for leaders at other institutions in dealing with COVID-19-related challenges and other complex institutional challenges going forward. Third, as noted, it is not possible to determine now when or if the situation being described will reach a natural end point, or at least a plateau; when and if that happens, we are concerned that so much time is likely to have passed that the key events described herein will be far more challenging to extract, capture, and convey than they are now, and many possibly valuable lessons will not have been shared with others who could use them now.

### **9. “Lessons Learned”**

In this section, the article offers several observations related to leadership, management, and organizational principles and practices based on the outcomes to this point in time after two successful academic years during the COVID-19 pandemic. While a narrative such as this suggests a number of useful practices and procedures addressing a pandemic-scale crisis within a large campus community, a number of other more general insights can be drawn through reflection on this case. These generic observations have potential applicability across contexts and circumstances where challenges related to leadership, information, and organizational processes are involved. The following sections identify and briefly address a number of these.

#### **9.1 Values-Guided, Collaborative Leadership**

A first critical insight gained from the case analysis relates to the critical role of core values and the way they have been used by leaders to create and guide the COVID-19 strategy from beginning to end. As articulated by President Holloway and his colleagues on the leadership team, these values guided all phases of university strategy planning and execution: 1) the health and safety of students, faculty, and staff; 2) acting in accordance with the guidance provided by science and the medical community; and 3) timely and flexible decision-making in order to provide as much opportunity for students, faculty, and staff to plan and prepare (Holloway, Sept 3, 2021).

While many other considerations and concerns were at play, having a clear and shared set of guiding principles in terms of which to evaluate suggestions, weigh alternative courses of action, and formulate and enact plans in a consistent manner was a defining element of the leadership approach, one that served the team and the community at large very well.

## 9.2 Leveraging Internal Experts and Expertise

From the outset, an important aspect of the planning and implementation effort was the use of internal subject-matter experts and expertise. Many colleges and universities have an amazing wealth of in-house knowledge that may be applied to virtually any situation that might arise in the life of the institution. Ironically, however, academic and professional expertise is not always effectively leveraged to address organizational issues. That was not the case in this instance, and leadership for all phases of the university response was informed by the knowledge base of thought leaders throughout the institution. The recognition and use of in-house knowledge reinforced confidence in leadership and contributed to a sense of pride within the community.

## 9.3 Communication and Information

Widely, consistently, and frequently communicating core values, relevant medical and health information, and campus updates related to policy decisions and plans represented another key element of the university's approach and cannot be stressed enough. Multiple communication channels were utilized at the institutional level including email, a regularly updated university website, virtual townhalls, webinars, and postings. The communication division of the university worked with senior leaders to craft clear messages consciously targeted to the information needs and concerns of students and their parents, faculty, staff, and other members of the community. These channels and messages were reinforced through audience-specific messages from campus chancellors/provosts, school deans, and other offices. Bolstered by frequent value-consistent messages, continuing updates, and a commitment to transparency, and various opportunities for two-way engagement—FAQ sections, live webinars, query options on websites, and through other means—trust in the guidance provided by institutional leaders was established and continually reinforced. Systematic processes were also used to monitor, capture, and share pertinent information from external sources—science and health agencies, governmental agencies, peer institutions, faculty and staff, and community stakeholders. The communication and information activities described in this case focused on immediate needs. Over the longer term, reviews and reflections such as this one have considerable potential to contribute to discussions of the value information and knowledge can have within higher education institutions in crisis situations and more generally (Galagan; 1997; Gigliotti, 2020; Ruben, in press).

## 9.4 Leadership and Management

A third area where valuable lessons emerged relates to commonly referenced distinctions between leadership and management. Traditionally, leadership is seen as consisting of establishing a vision and enacting behaviors that mobilize colleagues to join in embracing a shared set of priorities, goals, and plans. Management generally is the term used to refer to actions associated with maintaining order and consistency through the enactment of systematic procedures and routines necessary to complete particular tasks (Kotter, 2012; Zaleznik, 2004). Management is often described as “keeping the trains running on time,” while leadership is often characterized as “deciding where the trains should go.”

This distinction, while a familiar one, has been criticized for failing to capture the fluid, interdependent, and permeable nature of these two functions as they operate in the ideal circumstance (Ruben, De Lisi and Gigliotti, 2021). We believe the case history described herein is an excellent example of the limitations of a leader-manager dichotomy. In fact, it can be argued that the fluidity and intersectionality of these two functions is a significant lesson that can be derived from the case. Each member of the leadership team and many of their colleagues have functioned as both leaders and managers in ways that have blended these two roles (Ruben, De Lisi and Gigliotti, 2021). Indeed, one take-away from the description of this complex crisis situation, and perhaps others, is that leadership-management is better characterized as defining end points on a continuum rather than a dichotomy. In this view, individuals on a leadership team—and managers— can be seen as working together to define and execute actions along the continuum as dictated by circumstance and need and guided by a shared and jointly created understanding of values, purposes, and priorities.

### **9.5 Broad-Based Collaboration and Problem Solving**

Quite clearly, the encouraging progress and outcomes to date in this case have benefitted immeasurably from the expertise of academic, professional, and administrative collaboration and guidance. By engaging individuals who are recognized administrative, academic, health/medical, and crisis-management leaders, the perspectives, expertise, and credibility of each domain were blended in a manner that enhanced the resulting plans, and their acceptance and adoption by members of the community who see their points of view reflected in the leadership guidance being provided.

### **9.6 Leveraging Complexity and Multi-disciplinarity**

A somewhat related and quite vital insight to emerge from the case relates to the challenges presented by organizational complexity and multi-disciplinarity within a large university. While these features can certainly be a challenge in day-to-day decision making and operations, a case such as this demonstrates the substantial benefit that is present within a university community and its many divisions, disciplines, and departments. When these multiple talents are focused on a particular problem by academic, administrative, and professional experts, the power of this community of experts and the knowledge available with the institution becomes apparent.

### **9.7 Leadership Integration of Institutional Knowledge and Expertise**

A last key insight to be mentioned follows from the previous one. It should also be noted that the most visible aspects of this case history represent only the tip of the iceberg, as is so often the case in such situations when they go well. The vaccination decision was but one piece of an ongoing, carefully planned and executed process beginning in January 2020 with early efforts to inform and protect the campus community and continuing today and into the future in efforts to anticipate and address challenges of the pandemic as they emerge.

Nonetheless, even this case history—incomplete in many respects—demonstrates not only the easily overlooked power, but also the potentially useful source of pertinent knowledge and subject matter expertise available within the university community. But to be useful, that expertise must be harnessed, leveraged, and coordinated. Academic conferences and writings on the value of interdisciplinarity, inter-professionality, and diversity were translated into action and influence—within the university, nationally, and across sectors in this instance. This case, then, becomes a reminder of what is possible within colleges and universities when knowledge resources, expertise, and technological support are harnessed not only with regard to a pandemic, but potentially across a wide range of subjects and topics of broad societal import. The case demonstrates the exceptional value knowledge resources of the academy can have if they are appropriately utilized. Perhaps the most significant take-away and a topic worthy of further thought and discussion is how higher education can more effectively and consistently leverage the extensive knowledge and information base that exists within each of our institutions in order to expand our leadership in a far broader range of community and societal challenges.

## **10. Conclusion**

In the typical circumstance, a case history such as this is written when the events described have concluded. This case does not lend itself to this kind of conclusion because the COVID-19 pandemic is ongoing and evolving, as is the leadership efforts at Rutgers to maintain the health and safety of the community. Nonetheless, even given these circumstances, the narrative describing the Rutgers' efforts to exercise local and national leadership in combatting the COVID-19 pandemic provides an interesting example of how knowledge and expertise resident within the academic and professional staff community within a university can be identified, coordinated, and leveraged with impressive consequences. This case also provides a model of what might well be possible within colleges and universities in addressing various other institutional and public challenges confronting society with thoughtful attention to identifying and marshalling internal knowledge and expertise.

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# Poor Economics – Knowledge Economy and The Existing Knowledge Gaps (Higher and Academic Education) In Healthcare; How To Overcome?

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**Abstract:** The 2018 United Nations Development Program (UNDP) presents clearly that the lower the human development indices (HDI), the more significant the decrement in secondary and tertiary education enrolment (higher and academic). For example, tertiary education in the very high-HDI countries shows 72% enrolment, where enrolment in the medium and low HDI parts of the world is only 24% and 8% respectively. The data illustrate the impressive paucity in education, hence knowledge production. This paucity in education is predicted to result in a weak knowledge economy of available and accessible knowledge. This root cause analysis discloses a significant area of attention to narrow and bridge the existing knowledge gap. Education in these countries has been focused almost exclusively on vocational education of technical skills with limited theoretical attention (knowledge) and rudimentary attention to topics such as governance, human capacity investment, and appropriate application. Education needs the proper environment and climate at primary, secondary and tertiary education levels, resulting in an effective knowledge economy and contributing to advancing progress and improvement of quality. The healthcare system for example needs to be available and accessible to all. This environment can only be created and developed when countries establish national structures, institutional environment, and a competent leadership and management cadre. This depends on the existence of a well-educated and motivated cadre of 'intelligentsia', competent and responsible policymakers and governors, and creating an inviting and inspiring education climate, irrespective of the level of knowledge to be acquired. The paper provides a global situation analysis of qualified and quantified key elements of the knowledge economy, and analysis of the impact of differentials between knowledge economies of the various human development groups on national healthcare structures and patient safety as a final outcome. Additionally, it alludes to methods on how to improve on the identified gaps.

**Keywords:** poor economics, knowledge gap, higher education, academic education, healthcare, patient safety

## 1. Introduction

National development should be measured not only by income per capita, but also by health and education achievements. Imbalances in people's opportunities and choices stem from inequity in income, education, health, access to technology, among others. At a global scale, inequities in income contribute the most to overall inequities, followed by education and life expectancies. For example adults in very high human development countries average 7.5 years more schooling than those in low human development countries. The United Nations Development Plan (UNDP) 2018 statistical update report '*Human Development Indices and Indicators*' presents clearly that the lower the human development indices (HDI), the more significant the decrement in secondary and tertiary (higher education, university) education enrolment (UNDP, 2018). For example, tertiary education in the very high-HDI countries shows 72% enrolment, whereas enrolment in the medium and low HDI parts of the world, is only 24% and 8% respectively (Table 1).

**Table 1:** UNDP 2018 Education enrolment ratio for primary, secondary and tertiary education in the four Human Development Index groups.

| Human Development Groups | EDUCATION ENROLMENT RATIO         |                                     |                                    |
|--------------------------|-----------------------------------|-------------------------------------|------------------------------------|
|                          | Primary school-age population (%) | Secondary school-age population (%) | Tertiary school-age population (%) |
|                          |                                   |                                     |                                    |

| Human Development Groups | EDUCATION ENROLMENT RATIO |     |    |
|--------------------------|---------------------------|-----|----|
| Low HDI                  | 98                        | 43  | 8  |
| Medium HDI               | 110                       | 73  | 24 |
| High HDI                 | 103                       | 96  | 50 |
| Very-High HDI            | 102                       | 106 | 72 |

HDI=human development index

Most vocational schools and universities (higher and tertiary education) in many developing countries are relatively young and date back to the last part of the colonial era, the second half of the 19<sup>th</sup> and the first half of the 20<sup>th</sup> Centuries. The data illustrate the impressive paucity in education, hence knowledge production, predicting to result in a weak knowledge economy of available and accessible knowledge. This analysis discloses a significant area of attention to narrow and bridge the existing knowledge gap. Education in these countries has been focused almost exclusively on vocational teaching and training of technical skills with limited theoretical attention (knowledge), and rudimentary attention to topics such as governance, human capacity investment, and appropriate application.

Education needs the appropriate environment and climate at primary, secondary, and tertiary levels, to achieve an effective knowledge economy, advance progress and improve quality for instance in a healthcare system that is available and accessible to all (WHO, 2021b). This environment can only be created and developed when countries establish national structures, institutional environment, competent leadership and management cadre. This depends on the existence of a well-educated and motivated cadre of ‘intelligentsia’, competent and responsible policymakers and governors, and creating an inviting and inspiring education climate, irrespective of the level of knowledge to be acquired (Smit Sibinga, et al., 2021) and the economy of using and exchanging the knowledge

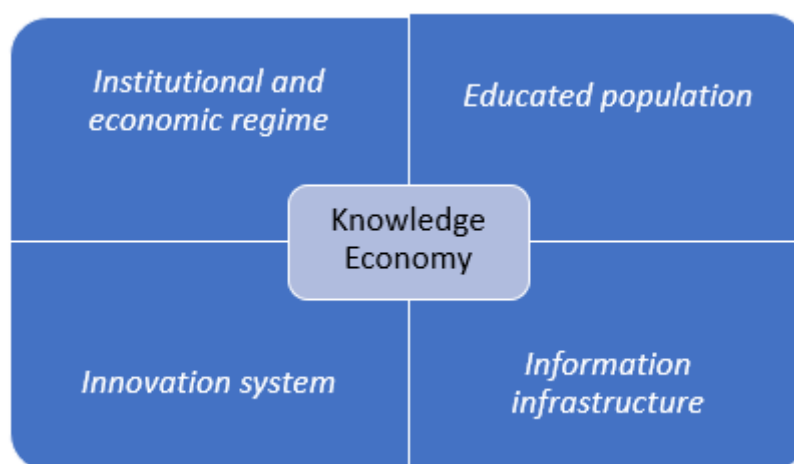
Against this background the paper will provide information on key elements and characteristics of knowledge economy, the impact of knowledge economy and the World Bank knowledge economy pillars on the development of the healthcare system, and a section on knowledge economy and the current WHO Patient Safety Action Plan 2021-2030, ending with conclusive remarks and policy recommendations.

## **2. Key elements and characteristics of knowledge economy**

Knowledge economy is a system of consumption and production that is based on intellectual capital. It is an economy where knowledge is acquired, created, spread, and used effectively to enhance economic development, whether for profit or not for profit, private or public (Dang and Umemoto, 2009). It is also defined as production of services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence (Powell and Snellman, 2004).

Successful knowledge economy typically involves modernizing the information infrastructure, long-term investments in education, developing innovation capability, and having an economic environment conducive to market transactions (Chen and Dahlman, 2006). These elements have been advocated as the pillars of the Knowledge Economy. There are four pillars that together constitute the Knowledge Economy framework (Figure 1):

1. An *institutional and economic incentive regime* that provides good economic policies and education institutions that permit efficient mobilization and allocation of resources, and stimulate creativity and incentives for the efficient creation, dissemination, and use of existing knowledge.
2. *Educated (knowledge) and skilled people* at any level of education who can continuously upgrade and adapt their skills to create and use knowledge efficiently.
3. An *effective innovation system* of educational institutions, research centres, universities, consultants, and other organizations that can keep up with the knowledge revolution, and connect to the growing library of global knowledge, assimilate and adapt it to local needs e.g., healthcare.
4. A *modern and adequate information infrastructure* that can facilitate the effective communication, dissemination, and processing of information and knowledge e.g., the development of operational artificial intelligence [AI – artificial neural networks (ANN), deep learning (DL) and machine learning (ML)].



**Figure 1:** Framework of knowledge economy

Such framework asserts that investment in the four knowledge economy pillars is necessary for sustained creation, adoption, adaptation, and use of knowledge in domestic economic processes, resulting in higher value-added outcomes, goods, and services as exemplary in the healthcare.

## 2.1 Human Capital

Knowledge economy is focused on the importance of human capital in the economy of the 21<sup>st</sup> Century through assets, relations and capability views (Dang and Umamoto, 2009). The rapid expansion of knowledge and the increasing reliance on computerization, big data analytics, robotics and automation is changing the economy of the advanced world to one that is even more dependent on intellectual capital and managerial skills, and less dependent on the technical production processes. This unfortunately, results in increasing the existing knowledge gaps in different parts of the world, due to its emphasis on specific knowledge and skills, data analysis and measurable performance, and strategic management by objectives.

Knowledge economy is characterized by the presence of a higher percentage of highly skilled employees whose jobs require advanced and special knowledge and skills. In the past knowledge economy depended heavily on low- and unskilled labour jobs in industry and agriculture and consisted primarily of producing physical goods, the modern economy is comprised more of services and jobs that require intellectual capacities and analysis of data produced by robotics and computerized processes and procedures (machine learning). This results in an increased demand for highly skilled and educated labour relative to the demand for low-skilled labour, suggesting that technological change contributes more to the productivity of highly educated workers (Powell and Snellman, 2004).

The modern economy - also known as the post-industrial economy or the information economy – is a reference to the importance of information and communication technology (ICT) and AI in the economies of the world, and an important platform for applied research and science to build on evidence (Chen and Dahlman, 2006). Knowledge economy supports, and is fuelled by innovation, research, and rapid technological advancements such as AI and mega-capacity quantum computers.

## 2.2 Intangible Assets

In the 'new' knowledge economy, the most valuable assets owned by an organization or institution are often intangible assets, such as service, experience, commitment and awareness, or tangible such as proprietary software or processes. This contrasts with previous economic epochs of the 19<sup>th</sup> and 20<sup>th</sup> Centuries – for instance the agrarian economy, where the primary asset usually was land, and the industrial economy, where mechanical manufacturing plants and equipment were crucial assets for most industries. The majority of the younger generation working in the current knowledge economy settings is incredibly computer literate and skilled at handling and manipulating data as well as creating data monitoring and evaluation models. Noticeable is an increasing emphasis on quality data collection and analysis, and the development of algorithms and deep learning (multiple hidden layers of artificial neural networks), and machine learning principles.

The knowledge economy is considered the primary driver of the massive expansion of what is known as ‘science, technology, engineering, and mathematics’ (STEM) jobs (Giffi et al, 2015). Careers within the STEM fields – which includes occupational paths such as computer science, engineering, chemistry, biology, and medicine – belong to the greatest opportunities for career advancement, higher compensation, and top-level executive positions (STEM Learning). These STEM fields show a rapid expansion in operational size, allowing a high degree of standardization, quality management, and economic efficacy. However, the bottom line is that knowledge provides the foundation for the necessary technical expertise, data collection and analysis skills, and innovative management practices that enable non-profit organizations and institutions such as education and healthcare institutions to compete in the modern global economy. In addition specialized knowledge and skills may serve as either productive assets to deploy, or as products to offer and market on a cost-recovery principle, e.g., in the healthcare.

Another characteristic element of knowledge economy is consolidation of essential processes. An example would be the Blood Supply where mandatory safety testing and processing of collected human blood of smaller non-viable blood banks into larger economies of scale, centred in a strategic geographic area and affiliated to a university or one or more sizable tertiary healthcare institutions, clustering available knowledge and skills, offering better effectiveness and balanced knowledge economy (WHO, 2021a).

Today knowledge economy has become the primary economy among advanced countries, is an economy dependent on human capital and intangible assets, such as service and trust, or proprietary technology. Knowledge economy has placed the ICT and AI sciences and industries at the forefront of overall economic growth through larger and faster computing capacities. Skills sets that include data analysis, creating and working with big data and cost-recovery financial models, and the ability to innovate, based on well-structured higher and academic vocational and professional education systems, are a priority in the modern economy. A change in knowledge and skills requirements and a shift in assets through a different approach in customer orientation and appreciation, both with the community as well as for instance with the healthcare organizations and institutes add on the one side another valuable dimension to quality culture. However, the downside is a widening of the existing knowledge gaps in the less advanced world.

### **3. Impact of knowledge economy on the development of the Healthcare system**

Knowledge is gained and acquired through education, learning and experience. Knowledge is offered from the micro and macro environment as information to be received, stored, perceived, interpreted, and converted into signals for action – recognition, behaviour, expression, understanding, thinking, etc. This chain of events starts with birth and builds up during life. To standardize a basic amount of knowledge, teaching and learning systems, processes and curricula have been created and are continuously further developed; contextually, operationally, and technically through e-learning concepts (Kaplan, 2021). Depending on an individual’s intelligence and IQ level, education could be adapted and adjusted to what maximally can be perceived and understood or interpreted. The more exposure and repetition, the better the perception, interpretation, understanding, and storage achieved. For each of the three successive layers of structured education, primary, secondary, and tertiary, there is a continuous education and stimulation system to improve and expand on existing knowledge, optimizing the economy of knowledge.

As explained in the introduction, education, and the school-population progression rates from primary into secondary, and secondary into tertiary education are utilized as human development index indicators used by the UNDP (UNDP, 2018). These illustrate the growing quantitative knowledge economy gaps between education levels in the HDI groups. However, more importantly is the quality and depth of knowledge offered and perceived. Education is neither limited nor restricted to what structurally is offered. Mankind is continuously exposed to environmental information in its different forms, visual and pictorial (objects, light and darkness, colours, movement, postures, reading), audible (sound and music, soft and loud, harmonious and dissonant, attracting and warning), touchable (size, shape, surface, smooth and sharp), smell and taste (sweet, bitter, salt, rotten and challenging), senses like temperatures and pain, balance and speed; most come in combinations and environmental dimensions. The personal perception, interpretation, storage, and triggers to action are part of the individual knowledge economy with its levels of alertness and awareness, comfort and discomfort, risks, and safety perceptions (Thomas and Thomas, 1928). The intensity of the experience is part of a common life knowledge economy.

### 3.1 Added Value

The 2018 UNDP statistical data reveal remarkable differences in acquiring a structured knowledge economy and consequently the value added to education in different parts of the world (UNDP, 2018). This implies that the economy of acquired knowledge is very fundamental and relates closely to the need to survive because of poor economics. The lower the HDI, the smaller the intelligentsia cadre and opportunities to offer and guarantee quality education to a broader community. As a result, the lower the HDI, the more significant the decrement in enrolment rates into secondary and even more prominently into tertiary education. On the more specific healthcare scale, the availability of expertise and/or training programmes in the low and medium HDI countries is much more restricted than in the higher HDI countries (Smit Sibinga et al., 2021). Currently, advanced technology allows us to bridge this gap to an extent by having blended teaching and online learning and teaching programmes, ideally developed, and presented jointly by local and international experts, at relatively low cost with no great need for travel.

This analysis illustrates the need for a specific knowledge pool to be deployed economically. Personnel with a secondary education background are exposed to continued education at a higher and academic (tertiary) education level to graduate as a vocational professional. These vocational professionals then form the pool of (graduate) trainees for an operational or managerial position. As an example, an optimal and quality knowledge economy can help to achieve the ultimate goal in the healthcare of improving patient safety, preventing avoidable harm and achieving better health outcomes in different healthcare systems (WHO, 2021b). Unfortunately, the pool of healthcare graduates is limited in medium and low HDI countries (enrolment ratios 24% and 8% resp.) and marginal (enrolment ratio 50%) in high HDI countries (Table 1) (UNDP, 2018). That brings along a serious competition for a job at that professional level in the healthcare institutions and hospitals, and the risk for a drain of well-equipped professionals away from the smaller institutes to larger hospitals with larger and more diverse and occasionally more advanced diagnostic and treatment programmes.

### 3.2 Operational Knowledge in the healthcare system

An analysis of operational knowledge and skills in the healthcare (primary and in hospitals) illustrates that the educational or knowledge acquisition focus and emphasis points to three integrated groups or categories of health professionals to be educated – doctors, nurses, and (bio-)medical or chemical laboratory professionals, supported by ancillary personnel who do not need a specific healthcare education and knowledge. Most ancillary personnel require a primary or secondary education background and may receive structured apprentice or work-integrated education and training related to professional behaviour (professionalism), institutional values, infection control, safety and risk prevention, in line with their respective roles and responsibilities (Smit Sibinga et al, 2021). Knowledge on professionalism and stewardship is essential at the early stage of entry and training, appropriate to the role and function of the various ancillary personnel (Rambiritch and Smith-Tolken, 2019).

Unsafe medical practices and unnecessary interventions expose patients to the risk of serious adverse events and cause unnecessary harm. Unnecessary interventions also reduce the availability of care and attention for patients who are in need (WHO, 2021b). Therefore, it is recommended to develop systems and benchmarking tools, such as patient blood management (PBM), haemovigilance, and pharmacovigilance, to monitor and improve the safety of clinical treatment processes (Murphy, Saxena and Smit Sibinga, 2013) and outcomes.

## 4. World Bank knowledge economy pillars and the Healthcare system

When benchmarking development in healthcare systems against the mentioned four World Bank knowledge economy pillars (Figure 1) (Chen and Dahlman, 2006), the following could be observed and implemented:

### 4.1 Ad 1 - Institutional structures that provide incentives for entrepreneurship and the active use of knowledge –

The institutional and economic regime like healthcare and integrated support systems like the blood supply need to be such that governance and leadership have incentives for the creation and efficient utilization of knowledge, and thus should have well-grounded and transparent macroeconomic, competition, and regulatory policies. A 'knowledge-conducive' regime, in general, will be free from various protectionist policies in order to foster development through healthy competition, which in turn will encourage entrepreneurship. Government expenditures and budget deficits should be containable, and inflation should be stable and low. The exchange rate should be stable and reflect the true value of the currency to allow uninterrupted imported supplies of

consumables, diagnostics, reagents, test kits, and equipment. The financial system should preferably be one based on cost-recovery, able to allocate resources to sound investment opportunities, and redeploy assets from failed enterprises to more promising ones through consolidation and creation of effective operational economies of scale.

#### **4.2 Ad 2 - Availability of competent (knowledge and skills) labour and a good quality education system –**

A well-educated and skilled population is essential to the efficient creation, acquisition, dissemination, and utilization of relevant knowledge, increasing total productivity and hence economic growth and preventing shortages. Basic or primary education is necessary to increase the capacity of learning and to use information. On the other hand, technical secondary-level education, and higher education in engineering and scientific areas is necessary for technological innovation and adaptation of foreign technologies for use in domestic production processes such as the manufacture of pharmaceuticals or blood products. The production of new knowledge and its adaptation to a particular economic setting is generally associated with higher-level teaching and research. Such training is necessary to monitor technological trends, assess what is relevant for the healthcare, and assimilate new technologies. A more educated population also tends to be relatively more technologically sophisticated and competent. This generates a local quality-sensitive demand for advanced medicinal products, which in turn tends to stimulate hospitals to innovate and design technologically sophisticated interventions and techniques such as use of extracorporeal membrane oxygenation (ECMO) in neonatology (Luban and Short, 2005) and cellular therapies in haemato-oncology (Rebulla, Pacchiana, Montemurro, et al.2003).

#### **4.3 Ad 3 - Access to and exchange of information and communication technology (ICT and AI) infrastructures –**

Information and communication technologies (ICTs) and AI infrastructure in an economy refers to the accessibility, reliability, capacities, efficiency and speed of computers, smart phones, television and radio sets, and the various networks that link them. ICTs consist of hardware, software, networks, and media for the collection, storage, processing, transmission, and presentation of information in the form of voice, data, text, and images. Apart from increasing the supply of information and knowledge, ICTs can overcome geographic boundaries.

ICTs are the backbone of the knowledge economy. and have been recognized to be effective for promoting economic growth and sustainable development. With relatively low usage costs and the ability to overcome distance, ICTs have revolutionized the transfer of information and knowledge worldwide. The past decade have shown that ICT production and ICT usage have contributed to economic or operational growth. One of the most obvious benefits associated with ICT usage is the increased flow of information and knowledge. Because ICTs allow information to be transmitted relatively inexpensively and efficiently (in terms of cost), ICT usage tends to reduce uncertainty and transactions costs of participating in transactions. This tends to lead to an increase in the volume of transactions leading to a higher level of output and productivity. For instance, in the healthcare system, technologies have been acquired and adapted to increased innovation and productivity, reduction in errors, unwanted deviations from standards, and mitigation of patient harm.

#### **4.4 Ad 4 – A vibrant innovation landscape that includes academia, the private and government sectors, and civil society –**

Theoretical economy indicates that technological progress is a significant source of productivity growth, and an effective innovation system is key for such technical advancement whether industrial or in healthcare. An innovation system refers to the network of institutions, rules, and procedures that influence how a country acquires, creates, disseminates, and uses knowledge – the knowledge economy. Institutions in the innovation system include universities, healthcare institutions, public and private research centers and policy think tanks. Non-governmental organizations and the government are also part of the innovation system to the extent that they also produce new knowledge.

An effective innovation system provides an environment and climate that nurtures research and development (R&D), which results in new products and services, new processes and new knowledge and experience, and hence is a major source of technical progress and development.

Currently, most technical knowledge is produced in advanced countries: more than 70% of production of scientific and technical publications are accredited to researchers in advanced countries (Hayes, 2004). The disparity in the production of technical knowledge per capita between advanced and developing countries is even more significant than the income disparity. However, domestic technological innovation is not the sole source of the generation of technical knowledge. There are many ways for developing countries to avoid reinventing the wheel and tap into, adopt, and adapt technical knowledge created in advanced countries. A vital element of an innovation strategy of a developing country is to find the best ways to tap into the growing global knowledge-base and decide where and how to deploy its domestic R&D capability to strengthen existing education systems and research and development structures and accelerate the pace of development of the many weak healthcare systems and research institutes. These are of paramount importance for a successful implementation of the UN (UN, 2015) and WHO (WHO, 2019, 2020) initiatives and development programmes on poverty, education, healthcare and patient safety, and environment.

## 5. Knowledge economy and the WHO Global Patient Safety Action Plan 2021-2030

Over the next decade, much work is to be done to accomplish the set goals of the 2012 Universal Health Coverage (UHC) programme (WHO, 2012), an inspiring goal whereby all individuals and communities receive safe and quality health services without suffering financial hardship by 2030.

This target can be achieved if the world stays on track to achieve the 2016-2030 Sustainable Development Goals (SDGs) (UN, 2015) and the numerous goals in the WHO Thirteenth General Programme of Work (WHO, 2019). However, the SDG agenda will not be met without ensuring that health services are safe. In the absence of such assurance, the benefits of increased coverage cannot be fully realized, and people may experience reduced trust in health services and reduced willingness to seek healthcare – even when they most need it, leading to a steady rise in avoidable harm. May 2019 the 72<sup>nd</sup> World Health Assembly adopted resolution WHA72.6 on “Global action on patient safety” to give priority to patient safety as an essential and fundamental step in building, designing, operating, and evaluating the performance of all healthcare systems (WHA, 2019). Adopting of this resolution was a remarkable milestone in global efforts to take concerted action on patient safety and reduce the burden of patient harm due to unsafe health care, based on an improved knowledge economy. To move forward from global commitment to tangible action, WHO launched a flagship initiative in February 2020: *The Decade of Patient Safety 2020–2030* (WHO, 2020). The challenge for all health systems and all organizations providing health care is to maintain a heightened awareness to detect safety risks and address all sources of potential harm to which accurate data collection is paramount. Patient safety is a framework of organized activities that creates cultures, processes, procedures, behaviours, technologies and environments in healthcare that consistently and sustainably lower risks, reduce the occurrence of avoidable harm, make error less likely and reduce the impact of harm when it does occur. The practice of patient safety involves coordinated action to prevent harm to patients, caused by the processes of health care themselves. Patient safety is a strategic priority for modern healthcare and is central to efforts in the country working towards universal health coverage. The better healthcare and risk prevention knowledge are applied, the safer the offered care will be for the patient community in a country.

Currently, the burden of injuries and other harm to patients from adverse events during medical interventions and nursing is likely one of the top 10 causes of death and disability globally, comparable to that of tuberculosis and malaria. Available evidence suggests that most of this burden falls on low- and middle-income countries, where annually in hospitals, around 134 million healthcare-associated adverse events occur due to unsafe care and contributing to some 2.6 million deaths (WHO, 2021b).

### 5.1 Strategic Objectives

The initiation of the Global Patient Safety Action Plan 2021-2030 (WHO, 2021b) was endorsed during the WHA in May 2021 and focuses on eliminating avoidable harm in health care. The Plan has 7 Strategic Objectives and 35 actions to be implemented step by step over the decade. Looking at the Strategic Objectives it becomes clear that a key element is the way knowledge is to be acquired and applied in an economic way to implement and achieve the objectives and, more importantly to sustain the outcomes through stewardship of the stakeholders involved. The principal partners in action are the governments and the existing healthcare facilities and services. However, even more important is the parallel development of the education infrastructure and environment to facilitate quality education at all levels based on expected outcomes, needed to educate an intellectual workforce to -

1. do zero avoidable harm to patients, a state of mind and a rule of engagement in the planning and delivery of health care all over the world.
2. build high-reliability health systems and health organizations that protect patients daily from harm.
3. to assure the safety of every clinical process.
4. engage and empower patients and families to help and support the journey to safer health care.
5. inspire, educate, skill, and protect health workers from contributing to the design and delivery of safe care systems.
6. ensure a constant flow of information and knowledge to drive the mitigation of risk, a reduction in levels of avoidable harm, and improvements in the safety of care.
7. develop and sustain multisectoral and multinational synergies, partnership, and solidarity to improve patient safety and quality of care.

## **5.2 A Broader Approach**

A much broader approach to patient safety is required for countries with limited resources receiving visits from clinical experts from more affluent countries. What is needed from visitors to a hospital in a low-income country is someone who knows how to establish a safe clinical waste facility, or teach the maintenance of a neonatal incubator, or address the nutritional status of patients. This broader thinking on what constitutes safe clinical care is also required in countries where there is conflict and political instability. There will already be a lack of resources, but the presence of weakened healthcare systems and structures will have greatly increased the need for health care. Large cross-border refugee or migrating populations and encampments, as well as poor hygiene and sanitation contributing to frequent disease epidemics, create enormous challenges. The humanitarian agencies have much wisdom and experience to contribute.

These examples highlight the need for a structured and systems approach in the design of clinical processes. The requirements for safe design will vary from country to country depending on the circumstances and situation, so processes must be tailored accordingly – economics, culture, infrastructure, governance, geographics, climate and distances and above all a balanced knowledge economy. There is no one single approach for all settings.

Although all health workers are committed to keeping their patients safe, the majority will believe that they are discharging this commitment through practising within the ethical code of practice, which is synonymous with being a member of their profession. Fewer will think beyond this to fully appreciate the scope of the risks involved in the delivery of healthcare and the scale of avoidable harm, including preventable and treatable harm, that arise daily within every healthcare system in the world. This lack of awareness and understanding of such an important problem amongst many providers at the point of care may seem puzzling. However, it is certainly not because of any lack of compassion on the part of healthcare professionals.

It is because traditional undergraduate, postgraduate, and continuing education programmes place emphasis on evidence-based practice and standards that are disease or clinical condition oriented. The systems aspects of safety issues are often missing, and programmes provide no training on human factors hence a gap in the provision of knowledge and its economy. It is essential that all health workers, managers and leaders understand patient safety. They must be clear about the nature and importance of risk and how harm is generated, the core concepts of patient safety knowledge and science, the ways in which the causes of unsafe care are investigated and understood, and the actions necessary to ensure that care, and its constituent individual processes, is as safe as is possible – a true managing of knowledge economy.

## **5.3 Patient Safety Education and knowledge production**

WHO has published the *Patient safety curriculum guide for medical schools*, complemented by a multi-professional edition (WHO, 2011). Both have been widely disseminated but have been adopted only in some countries. Major groups of health care providers around the world have developed patient safety educational curricula, and regulatory and professional education bodies in different countries.

Despite this, the influence of these initiatives on existing curricula has been minimal. The challenge is not in creating policies, it is in their implementation. There are multiple barriers to ensuring that patient safety is a significant component of education and training programmes. These include lack of curriculum space, absence of buy-in from stakeholders, weaknesses in educational coordination and planning, limited leadership interest, and insufficient senior medical and nursing champions. These disclose a failing knowledge economy. Several factors have impeded patient safety education, including:

- unfamiliarity of educators or trainers with teaching patient safety as a new area of knowledge and learning.
- reluctance by academic institutions to teach knowledge outside clinical disciplines to health care students because of existing complete curricula.
- failure of education to keep pace with technological and system advances for safe care.

In many low- and medium-income settings, there is not even sufficient training within a discipline. For example, radiation therapists might practice in their specialty without being in any formal, accredited training programme. It then becomes even more challenging to train them in patient safety without basic training in their specialty, illustrating another aspect of failing knowledge economy. Traditionally, education of healthcare professionals give little attention to the importance of patient safety, as a consequence of which

- there is no professional ethos that a practitioner's responsibilities must extend beyond the care of individual patients to ensuring that their service as a whole is safe.
- there is little understanding of the nature of risk in health care and the importance of strengthening systems.
- there is minimal emphasis on the importance of teamwork and communication in protecting patients from harm.
- there is no understanding of the value of an appropriate and efficacious knowledge economy.

Looking at best practices within healthcare and other high-risk industries, it is clear that new radical approaches, including interprofessional and multidisciplinary approaches, are needed if education (knowledge) and training (skills) are to play the full role that they should in improving patient safety surrounded by adequate knowledge economy valuing a countries investment in education.

These observations are not restricted to health care but can be seen in many other fields within a country's socio-economic operations.

## 6. Conclusions and policy recommendations

In summary, knowledge economy is dependent on human capital and intangible assets, such as service and trust or proprietary technology, hence became primary in developed countries. The change in knowledge and skills requirements and a shift in assets through a different approach in customer orientation and appreciation, both with the community as well as with the healthcare organizations include data collection and analysis, creating and working with big data, and cost-recovery financial models, and the ability to innovate, based on well-structured higher and academic vocational and professional education systems. It has placed ICT and AI science and industries at the forefront of overall economic growth through larger and faster computing capacities.

Knowledge economy adds on the one side another valuable dimension to quality culture. However, the downside is a widening of the existing gaps. From the analysis the most essential key elements of knowledge economy to overcome the existing higher and academic education gaps are in the formulation of workable policies that will ensure and guarantee –

- a well-constructed and sustainable education environment, climate and adaptive curricular structure (students, teachers and institutional governance).
- a well-balanced and designed education scope and quality of knowledge.
- intellectual property, stewardship, and ownership.

These elements need a high, sustained, and devoted prioritization in the development to which economic spending, sharing, and exchanging knowledge is paramount. These should be supported and accompanied by a genuine curiosity, continued exploration and a healthy appetite to science and evidence-based knowledge that drive development and determine the pace of acceleration towards advancement and improved effectiveness – safety, availability, accessibility, affordability, equity and equality (Crouch, Rolleston and Gustafsson, 2020), . The available and expanding knowledge should actively and purposeful be shared and exchanged through integrity-based collaboration and cooperation. The quantitative statistical data presented (UNDP, 2018) disclose the enormous differences in UNDP indices and indicators state of development brought about by weak and brittle governance, regulations, leadership and stewardship structures and cultures in an impressively large part and population in the world. This can be solved through the awareness and understanding of those who have the knowledge, willing to share and exchange, and convinced that such attitude is the missing key needed to

unlock and access knowledge as a common human intellectual property to development and progress improvement.

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# On Bridging of the Academic-Practitioner Divide in Business Education: New Opportunities in the New Era

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**Abstract:** When described by management practitioners, academic management research is often characterized as unconcerned with practical problems and outright dismissive of practitioners' needs, in addition to being jargon-laden, overly mathematical, theoretical, and self-referential. That unflattering characterization is generally believed to be a product of rigor vs. relevance paradox, which is at the core of the perceived lack of practical utility of theoretical management research. More specifically, it is a reflection of systemic misalignment of (management) practitioners' informational needs, which center on insight uniqueness as a key 'ingredient' of organizations' ability to create and sustain competitive advantage, and the broadly framed goals of theoretical research, which emphasize the search for universal truths in the form of generalizations. However, the now rapidly unfolding Age of Data is creating an opportunity to bridge – and perhaps even close – the persistently unproductive management theoretical research – management practice divide. The opportunity to bridge that gap stems from the growing importance of ongoing organizational learning centered on thoughtful and methodologically sound utilization of organizational data resources, recently framed as learning with data, and rooted in the notion of data analytic literacy. This article discusses how the need to validly and creatively utilize readily available and vast data resources can lead to a closer alignment of management practitioners' informational needs and management researchers' theoretical objectives.

**Keywords:** academic-practice gap; organizational learning; learning with data; data analytic literacy, evidence-based management

## 1. Introduction

Plato, whose name is nearly synonymous with intellectual astuteness, wrote some 2,500 years ago that '...until philosophers are kings, or the kings...have the spirit and power of philosophy, and political greatness and wisdom meet in one...cities will never have rest from their evils' (Butler, 2001). The spirit of those timeless insights continues to ring true in many contemporary contexts, including higher education, and especially management-focused university education where it takes the form of the academic-practitioner divide (Lilien, 2011; Shepherd and Gruber, 2021). Commonly seen through the prism of the (scientific) rigor vs. (managerial) relevance paradox (Bartunek and Rynes, 2014; Birnik and Billsberry, 2008), which pits the importance scientific soundness against practical usefulness, that tradeoff has long been recognized as a problem without a viable solution. That is because to be scientifically sound, research needs to be framed in highly controlled, limited scope context, but to be practically useful, research contexts need to be as close to real world as possible (Banasiewicz, 2019). Consequently and rather predictably, business management focused academic research is largely shunned by practitioners who tend to see it as practically irrelevant, self-referential, jargon-laden, and unnecessarily abstract and methodologically complex. But even when considered within the confines of scientific merit, theoretical researchers' strong preference for uncovering new insights rather than validating previously reported findings ultimately yields a mishmash of nuanced and contextualized informational tidbits that rarely paint a complete or even a meaningful picture. Perhaps George Bernard Shaw was prophetic in his 1905 play *Man and Superman*, in which he famously declared that 'those who can, do; those who can't, teach'. Right or wrong, Shaw's sentiment has certainly caught on with practitioners, many of whom are fond of using that quote to sum up their disdain for theoretical management research. In the end, Plato's philosophers continue to theorize, while his kings continue to rule with little-to-no regard for philosophers' theories.

That state of affairs, however, is not universal. There are numerous professional practice domains built on the foundation of academic theoretical research – in fact, the now ubiquitous university-based incubators geared toward transforming scientific research into applied systems, products, and technologies offer highly visible and tangible manifestations of mutually beneficial academic-practitioner collaboration (Banasiewicz, 2019; Dev et al. 2020). And even setting aside such expressly collaboration-minded examples, academic research in, for

example, life sciences plays an integral part in ongoing efforts to improve the efficacy of medical diagnosis and treatment, as evidenced by pharmaceutical, biomedical and numerous other life science organizations' commitment to sourcing from – and contributing to – academic research efforts (Madani et al, 2020; O'Brien, Kaluzny and Sheps, 2014)). In short, the theory-practice gap is, at its core, a domain specific problem, and it is particularly profound within the confines of business management, but why?

The earlier mentioned rigor vs. relevance paradox (Bartunek and Rynes, 2014; Birnik and Billsberry, 2008) offers some hints: scientifically rigorous business research tends not to produce results that are deemed practically useful; if it did, those results would be willfully consumed by management practitioners, who are always on a lookout for a yet another source of competitive advantage. That is also why professionals in domains rooted in natural (as opposed to social) sciences, such as medicine or engineering, see staying abreast of theoretical research breakthroughs as a critical part of professional competence. In other words, in those fields, theory leads practice. That, however, is generally not the case in business management, where practice tends to lead theory. The core reason for that is that business management is an occupation, not a profession, in the sense that it does not require specific credentials, or even a well-defined basis of knowledge. In principle anyone can become a management practitioner, and in fact countless successful managers have had no formal academic training in management. Not surprisingly, norm-breaking, innovative management strategies or processes tend to first emerge in practice, and then become subjects of theoretical research. But that is not all: Given that goal of theoretical research in general is to delineate universally generalizable forces governing phenomena of interest, such broad generalizations offer little value to highly nuanced, context- and situation-framed business management. So, whereas engineers, pharmacologists or medical practitioners can – and commonly do – transform scientific research findings into new technologies, drugs or therapies, business management practitioners rarely do the same with outcomes of academic management research.

While the persistence of the academic-practitioner divide in business is widely recognized as a problem in need of a solution (Banasiewicz, 2019; Lilien, 2011; Shepherd and Gruber, 2021), it is generally not seen as posing direct threat to the future of university-based management education. Yet, at the time when many question the value of university education in general, such glaring disconnect academic and applied sides of business management further weakens the argument for indispensability of institutions of higher learning to societal progress and well-being. If what collegiate schools of management provide is non-essential to practice of management, what is the value – for individual students and the society at large – of continuing to support those institutions? Thus far business schools are yet to provide a compelling response to that difficult question, but the massive digital transformation that is currently underway offers an opportunity to do so in an empathetic way.

The goal of this paper is to delineate and discuss the key digital transformation related trends and developments from the perspective of bridging of the academic-practitioner divide. More specifically, it is to expressly address the opportunity to more closely align teaching of business management with its practice, by leveraging the growing centrality of data.

## **2. The Opportunity is Knocking**

One of the many changes ushered in by the unfolding Age of Data is a steady drift away from largely subjective judgment and experience-emphasizing organizational decision-making, and toward predominantly objective, data-driven model (Banasiewicz, 2019). That is not to say that human reason is being replaced by algorithmic rules – rather, it is the essence of reasoning that is changing, as captured in the now-popular (and widely attributed to W. Edwards Deming, a leading management thinker in the field of quality) quote: 'In Good we trust, all others bring data.' It is that persistently ever more central role that data play in organizational management that is at the core of the emerging opportunity to better align the *whats* and the *hows* of business management teaching with the demands of business marketplace.

As attested to by the rapid proliferation of data science and business analytics degree offerings, universities appear to be keenly aware of the importance of meeting the emerging educational needs of the broadly defined learner marketplace – however, the aspect of the current info-technological transformation they seem to overlook is the need to reshape and retool their largely Industrial Era curricula. In other words, institutions of higher learning tend to be more inclined to see the current information technology-led changes as an opportunity to add new programs, and less as a call to fundamentally rethink what and how they teach. Within the confines of management education, adding a degree in, for instance, business analytics all while keeping the

general curricular logic and structure of the existing business administration programs largely unchanged implicitly assumes that the base curriculum correctly captures current needs of their students, and also that only some graduates need to be analytically literate (as only some will pursue a degree in business analytics). Both of those perspectives are myopic. When personal computers began to emerge as an everyday business tool in the 1980s it was not just some of management schools' graduates who needed to be computer literate - similarly, the ubiquity of data now suggests that basic data literacy should be considered a common, elementary competency exhibited by all management graduates, rather than an elective skillset. Meeting that challenge is at the nexus of the opportunity to not just bridge, but perhaps even altogether eliminate the theoretician-practitioner divide in business education.

What curricular changes should be considered to better align management education with the practice of management? It is a loaded question, and while there are numerous important considerations that need to be addressed, the ensuing discussion is focused on two notionally distinct but epistemically closely related curricular considerations: 1. expressly differentiating between what it means to manage 'to' and manage 'by' the numbers, and 2. expressly acknowledging (through instructional content and methods) the centrality of robust data analytic literacy.

### 3. The Genesis of Organizational Management and the Rising Importance of Data

The practice of management, commonly framed as a general process of controlling things or people, is inherent to organized living, simply because the very functioning of human collectives requires controlled and organized efforts (George, 1968; McLarney, 1974; Witzel, 2012). Not surprisingly, the earliest evidence of somewhat formalized management practices dates back more than six millennia, to around 4500 BCE, and the record keeping developed by early Sumerians; however, it was a Babylonian king, Hammurabi, who oversaw the development of more systemic and formally codified control practices about 2,500 years later. Still, it was the work of a Greek philosopher Xenophon (a student of Socrates), titled *Household Management*, that is commonly credited with giving rise to management as a separate domain of study and practice (Blok, 2019).

Centuries later, the gradual emergence of modern commercial organizations brought with it a need for more formal tracking of organizational resources and commercial transactions, which in turn contributed another key set of foundational elements to the ongoing maturation of the art and science of managing. In 1494, a Franciscan monk and a noted mathematician Luca Pacioli (he counted Leonardo da Vinci among his students) published a textbook titled *Summary of Arithmetic, Geometry, Proportions and Proportionality*. While the work was notable as an elegant summary of the collected knowledge of mathematics of the time, its true claim to fame was the now celebrated 26-page guide for merchants on sound accounting and business practices, built around Pacioli's own codification of the Venetian accounting method. Separately titled *Details of Calculation and Recording*, that guide was the first published detailing of the double entry bookkeeping system, which rapidly spread throughout Europe and beyond, so much so that Pacioli is now considered to be the father of modern accounting<sup>1</sup> (Parker, 2019).

While those early contributions framed the practice of management in terms of general keeping track and oversight considerations, the process orientation of modern management practice can be seen as a result of the far more recent and more applied work of Frederick Taylor, an American mechanical engineer (Del Mar and Collons, 1976; Witzel, 2012). Taylor is widely acknowledged to be the first to approach managing of work through systematic observation and study; in his seminal work published in 1911 and titled *The Principles of Scientific Management*, he summarized his theory of effective job and incentive compensation design as a mean of achieving higher productivity. His ideas were widely adopted and, together with other contributions, most notably those by Frank and Lillian Gilbreth (a husband-and-wife duo of industrial engineers), gave rise to what it now known as scientific management, which can be characterized as controlling by means of analysis and synthesis of workflows (Chen and Hitt, 2021). It is worth noting that Taylor's primary focus was on time, thus his studies came to be known as 'time studies'; Gilbreths, on the other hand, were focused on identifying the most efficient ways of accomplishing tasks, thus their research came to be known as 'motion studies.' What is today

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<sup>1</sup> Today, the idea of separating entity's resources from claims on those resources is known as balance sheet; in a broader sense, Pacioli's work laid the foundation for modern financial statements, which offer a concise way of systematically capturing the key financial aspects of business entities, and by doing so provide objective and unambiguous management targets.

known as 'time-and-motion' studies, and sometimes erroneously entirely attributed to Taylor, represents a subsequent merging (by others) of the two distinct areas of research. More importantly, time-and-motion studies gave rise to fact-based, quantitative facet of management practice (Frederick, 1963; Witzel, 2012).

While the rise of scientific management amplified the idea of using objective, numeric evidence as the basis of organizational decision-making, the general idea of managing 'by the numbers' actually predates the emergence of scientific management (Bangs, 1992; Meek, Woodworth and Dyer, 1988). Beginning in the late 1800s, business organizations began to voluntarily<sup>2</sup> publish their financials in the form of balance sheet, income statement, and cash flow statements as a way of attracting investors, who used those documents as proof of companies' profit-making abilities (Daniels, 1980). Today, using a business organization's financials as targets is nearly synonymous with the idea of 'managing by the numbers', as illustrated by popular publications such as *Managing by the Numbers: A Commonsense Guide to Understanding and Using Your Company's Financials* (Kremer, Rizzuto and Case, 2000).

Whether 'the numbers' take the form of financial statements or the earlier outlined operational efficiency metrics, there is little doubt that they represent outcomes of organizational decisions, which raises the question of logical consistency: Is managing organizations by setting explicit performance targets tantamount to truly managing 'by' the numbers, whether those numbers represent production efficiency or aggregate financial results?

#### **4. To or By the Numbers?**

Notionally, managing 'by' the numbers could be likened to piloting a plane in a mode known as 'fly-by-wire', which replaces conventional manual flight controls of an aircraft with an electronic interface. In that mode, automated flight control systems use computers to process flight control inputs and send corresponding electrical signals to actuators that control the key functions such as speed, direction, and altitude; stated differently, when operated in fly-by-wire mode, aircrafts' flight path is determined by data. Similarly, objective evidence-guided organizations' decisions are also shaped by data, which reduces organizations' dependance on the often-biased human judgment. In an abstract sense, organizational management could, under those circumstances, be reduced to a simple stimulus-response model where the relationship ( $f$ ) between the stimulus ( $X$ ) and the expected ( $E$ ) outcome ( $Y$ ) is expressed as a simple function of  $E(Y) = f(X)$  (Bugmann Goslin and Duchamp-Viret, 2013; Islam et al., 2018). Is that what happens when organizations are managed by the numbers? The short answer is no.

In a very general sense, organizational management entails choosing among explicit or implied strategic and tactical alternatives under conditions of uncertainty (Jensen, 2002; Marques, 2019); given that, managing by the numbers implies reliance on objective evidence when making those choices. Operationally, that calls for objectively estimating the relative advantage of each of the available decision alternatives, and then choosing the one with the highest expected value (Mann, 2018). All considered, managing *by* the numbers demands the use of input, not just outcome 'numbers', which calls into question the appropriateness of characterizing the process of aiming to reach specific goals, typically encapsulated in financial performance or operational efficiency targets, via unspecified or unclear means as managing *by* the numbers.

In March of 2019, Boeing 737 Max, a variant of the company's best-selling Boeing 737 aircraft (itself the best-selling plane in commercial aviation history) was grounded worldwide after 346 people died in two separate crashes. While the underlying fact pattern that led up to those tragedies and the subsequent grounding is complex, some of the more striking aspects of that case include evidence that the company historically renowned for its meticulous designs made seemingly basic software design mistakes, now believed to have played the key role in those crashes. According to longtime Boeing engineers, what should have been a routine development project was complicated by the company's push to outsource that work to lower-paid contractors, some being paid as low as \$9/hour; moreover, as reported by the New York Times, the company's decision to sell as 'extra' certain safety features, most notably those known as 'angle of attack indicators', may have also played a role (Tabuchi and Gelles, 2019).

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<sup>2</sup> Following the passage of securities acts in the early 1930s that practice became mandatory for companies with publicly traded securities.

An eerily similar example of profit over safety is offered by the Pacific Gas & Electric Company, commonly known as PG&E, a California public utility. As reported by the Wall Street Journal (Blunt and Gold, 2019), the company knew for years that hundreds of miles of its electric power lines, some nearly 100 years old, needed to be upgraded to reduce the chance of sparking a fire, but the company's bottom line focus kept it from making the required investments. In 2018 the nightmare scenario came true: a felled power line sparked what eventually became the deadliest wildfire in California's history, claiming 88 lives, causing more than \$30 billion in potential legal claims, all of which ultimately pushing PG&E to file for bankruptcy protection. (It is worth noting that while the 2018 wildfire is notable as being the largest, the company's power lines are believed to have caused more than 1,500 wildfires in the span of just 6 years.)

While the cases of Boeing and PG&E are just two, fairly extreme examples, they are nonetheless illustrative of the fundamental difference between managing *to* and managing *by* the numbers. Both Boeing's and PG&E's decisions were clearly shaped by financial considerations – clearly, both companies were managing *to* their respective financial targets. And though managing 'by' the numbers is a widely used label to describe any management approach built around quantitative measures, trying to hit predetermined operational or financial targets is more fittingly characterized as managing 'to' the numbers. It might be tempting to dismiss that distinction as mere semantics, but it is significantly more than that: Managing *to* the numbers entails orienting decisions toward the attainment of express goals, such as the attainment of specific profitability or operational goals, whereas managing *by* the numbers calls for reliance on objective evidence as the basis of decision-making. It is the difference between doing whatever is deemed necessary to reach a stated target, and allowing objective evidence to map out the path going forward. While the former entails using judgment as the mean of reaching predetermined performance targets, the latter entails using objective evidence as the means of setting and reaching performance targets. Or stated differently, managing *to* the numbers effectively subsumes 'how' under 'what', whereas managing *by* the numbers uses evidence emerging from 'how' to set expectations regarding 'what'. All considered, managing *by* the numbers can be seen as a manifestation of evidence-based decision-making (Banasiewicz, 2019; McCann, 2020), whereas managing *to* the numbers is ultimately rooted in unempirical, instinctive judgment-based decision-making. That is a critical distinction that simply has to be made clear in management curricula built around data-centric, evidence-based decision-making.

## 5. Data Analytic Literacy

Implied in the practice of managing *by* the numbers is the idea of data analytic literacy, which is the second key contributor to closing of the academic-practitioner gap. Within the confines of data-driven organizational management, data analytic literacy can be seen as the actuating mechanism of that progressive management philosophy – in other words, it is central to the practice of management and it ought to play central role in teaching of management.

In its simplest definitional form, data analytic literacy can be conceptualized as the ability to extract informative insights out of raw data (Banasiewicz, 2021). It is a summary construct which encompasses elements of analytic reasoning, familiarity with data types and data analytic methodologies, and knowledge of computational tools. Analytic reasoning can be summarized as the clarity of informational purpose, or the 'know-why' dimension of data analytic literacy. While definitionally (and even more so, practically) elusive, the analytic reasoning dimension is critically important, especially in data-rich organizational contexts where overabundance of data can give rise to endless arrays of data analytic outcomes generated not because those outcomes address specific informational needs, but because data and data analytic means are both readily available (Banasiewicz, 2021; Luoma and Martela, 2021; Weinhardt et al., 2015). Stated differently, analytic reasoning is a manifestation of informational discipline, which amounts to staying focused on analytic outcomes that address stated informational needs; it is where the idea that 'less is more' is particularly appropriate.

The remaining two dimensions – familiarity with data types and data analytic methodologies, and knowledge of computational means – can be thought of as the methodological 'know-what' and computational 'know-how', respectively, and comprise what is commonly seen as the core data analytic skillset (Banasiewicz, 2021). The former encompasses a diverse body of knowledge encompassing understanding of data structures, data due diligence and data feature engineering, and familiarity with statistical and/or machine learning approaches to data analysis, while the latter manifests itself in knowledge of appropriate programming languages, such as R or Python, or applications, such as SAS or SPSS.

While each of the three facets of data analytic literacy can be thought of a distinct domain of knowledge or a set of competencies, together they function as a self-contained system. Each part interacts with, and in fact needs the other parts – it is not possible to engage in productive applied analyses of data without adequate command of the ‘why’, ‘what’, and ‘how’ facets. Stated differently, the ability to extract decision-guiding insights out of data calls for a combination of sound data analytic logic, familiarity with statistical techniques and/or machine learning algorithms, and computational programming skills (Banasiewicz, 2021).

Critical to appreciating the importance of data analytic literacy is the role that broadly defined competency plays in the evolving conception of creative business (and other) problem solving. The currently underway 4<sup>th</sup> Industrial Revolution is ushering-in the era of expansive work automation, which is laying the foundation for the new age of information-driven creativity (French et al., 2021; Krishnannair and Krishnannair, 2021). Rapid proliferation of ‘smart’, meaning artificial intelligence-powered technologies is slowly but fundamentally reshaping the nature of work by freeing human time-effort while also producing vast quantities of data, a massive transformation that is creating new human time-effort deployment opportunities. It is important to note that the broadly defined mechanization is not limited to manufacturing - automated and even autonomous systems are fully responsible for a growing array of financial transactions, insurance claims, and other organizational functions traditionally handled by human decision-makers (French et al., 2021; Huynh, Hille and Nasir, 2020). And yet the core aspects of management education are still framed in the now all-but-gone Industrial Era – more specifically, management curricula continue to emphasize assimilation of existing knowledge, even in overtly creative problem-solving contexts<sup>3</sup>. That paradigm needs to change – to meet new challenges created, primarily, by scientific and technological advances, the focus of business education needs to shift more toward competency-enabled creative exploration, in a way that goes beyond looking for old truths in new realities while at the same time retaining enduring truths (i.e., patterns and relationships that persist over time). More on point, business schools’ curricula need to thoughtfully combine acquisition of enduring truths, in the form of ‘tried and true’ elements of managerial knowledge, with learning how to derive completely new insights by creatively yet soundly exploring the vast data riches available nowadays to virtually all organizations. It is in that context that data analytic literacy emerges as a competency of paramount importance, a mean of heightening data-enabled creative thinking potentiality of today’s management learners and future management practitioners.

While its importance is paramount, building broad based data analytic literacy in organizations is fraught with difficulties, most notably because even the most basic analyses of data are unavoidably technical (Frias and Popovich, 2020; Kuzmina et al., 2020). That is not only because analysis of data commonly entails the use of statistical concepts and methods, but also because most raw data require at least some degree of pre-processing to address common deficiencies such as missing or outlying values; quite often, the extent of what is commonly known as ‘data wrangling’ can be considerable, especially when data also need to be restructured, recoded, aggregated, and amalgamated (Banasiewicz, 2019). Those data analytic competency related challenges represent an opportunity for systematic bridging of the academic-practitioner gap by developing curricular collaborations rooted in the idea of practitioners-identified skills and competencies informing learning outcomes of management curricula. To be truly evidence-based, organizational management needs the foundation of broad base data analytic competency which can – and should – be the core element of management education.

## **6. Final Thoughts on Bridging of the Academic-Practitioner Divide**

It is well-known that the core objective of business management is to develop and sustain competitive advantage (Schultz and Flanigan, 2016; Sanchez and Heene, 2010). In view of that, practitioners’ general lack of interest in theoretical management research suggests that those efforts are not viewed as helpful in reaching that goal. Why is that the case? What may be seen at times as academic researchers’ lack of concern for informational needs of management practitioners, might in fact be a manifestation of a systemic misalignment between goals of researchers and practitioners.

Broadly characterized, scientific inquiry is tantamount to search for universal truths, which means that the essence of theoretical research is to produce informational outcomes that describe generalizable patterns and

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<sup>3</sup> Perhaps the most common manifestation of that trend are the ubiquitous case studies in which ‘discovery’ learning tends to boil down to finding of largely pre-arranged patterns, which can ultimately be seen as an alternative mechanism of conveying existing knowledge.

relationships. In contrast to that, attainment (and sustainment) of competitive advantage – by business firms and other organizations – is rooted in informational specificity, not universal generalizations (Holton and Morison, 1979). It thus follows that universal truths-minded outcomes of theoretical management research are not likely to offer the type of insights sought by organizational decision-makers. For instance, a research stream that aims to derive generalizable relationships between certain product attributes and consumer demand will likely be of little interest to brand managers looking for uniquely advantageous mixes of product attributes.

However, the rise of the Age of Data coupled with pervasively disruptive character of rapid info-technological innovation are beginning to radically redefine the character of (management related) theory-practice interactions. More specifically, it amplifies the importance of ongoing organizational learning, centered on thoughtful and methodologically sound utilization of organizational data resources (Banasiewicz, 2021); ; an idea that might sound conceptually straightforward, but usually turns out to be operationally quite complex. Looking beyond the often-raised volume, variety, velocity, and veracity considerations (Business World, 2018), extracting valid and reliable insights from data almost always requires careful separation of informative ‘signal’ from non-informative ‘noise’ (Tolin, 2014), in addition to often extensive data wrangling and feature engineering efforts, all capped with well-informed data analytic approach, technique, and tool selection (Banasiewicz, 2019). In short, practice-focused learning with data is, at its operational core, inescapably academic, simply because the goal of extracting competitively advantageous insights out of vast and ‘dirty’ (i.e., requiring substantial amounts of pre-processing) data calls for deep understanding of know-why and know-how. In that context, theoretical research can make ongoing contribution to strategies, techniques, and tools that are critical to practitioners extracting unique insights out of available data. Yet, that is not all...

## 7. Transcendent Creativity

An even more compelling academic-practitioner divided bridging opportunity stems from the idea of *data-enabled creativity*, and its higher-order manifestation, *transcendent creativity* (Banasiewicz, 2021). Both notions are rooted in a fundamental re-definition of the general conception of creativity, traditionally (and somewhat vaguely) framed as the use of imagination to form new ideas, not already present to or in the senses (Roberto, 2019; Sternberg, Grigorenko and Singer, 2004). The notions of data-enabled creativity and transcendent creativity are both rooted in a fundamental question: Is creativity really tantamount to conjuring up something completely otherworldly, in the sense of not having been experienced, or is it creating a new whole – be it an abstract idea or a work of art – by combining already known elements? And if the latter conception sounds reasonable, does it not seem plausible that immersion in data contained ‘reality’, as in patterns and relationships hidden in raw data, could spark ideas that might not otherwise arise? That line of reasoning captures the essence of data-enabled and, ultimately, transcendent creativity, which in turn suggest an even more fundamental opportunity for linking academic research and managerial practice.

Implied in that more expansive conception of creativity is the organic vs. techno duality, which is a manifestation of the fundamental difference between creativity fueled by individual human experience and reasoning, and creativity made possible by a combination of vast and diverse arrays of data and the rapidly advancing computational technologies, ultimately manifesting itself in advanced computer-rendered simulations. It is the latter of the two contexts that presents a yet another profound opportunity to bridge the academic-practitioner divide: Being able to tap into that practically unlimited informational potential offers incentives for know-how-seeking practitioners to work more closely with know-how-commanding academicians; in fact, it may even redirect at least some of the academic management research away from the search for generalizations and toward situationally emerging knowledge.

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# Swimming with the “Current”: An Access-Informed Exploration of Envisioned Blended Learning at Tishreen University in Syria

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**Abstract:** Today, Tishreen university in Syria is translating its emergency response to crises-prompted disruptions into an intentional blended learning model through the official inception of *Moodle*. The present study adopts a holistic approach to explore faculty's perceptions of this transition at the Higher Institute of languages. To this end, four pilot interviews, the researcher's lived experience and the literature were used to design a web-based questionnaire. The questionnaire, completed by 23 teachers, elicited comparative reflections on teachers' access to *Moodle* as opposed to their other digitally mediated informal experiences of access, mainly to *YouTube*. Analysis was largely informed by the digital divide layers: physical-material, instrumental (tool-related), substantial (content-related), motivational, and usage-related. The article argues that re-thinking academic structure and infrastructure is irreducibly grounded in formal-informal networked experiences. Although access divide models have evolved vertically into layers or generations, the current study suggests the need for a horizontal expansion. Firstly, current access divide models do not lucidly reflect distinctions between formal and informal access. Since the digital landscape we increasingly inhabit is not monolithic in terms of its affordances, structure, modality or genre of information; formal and informal access outcomes are necessarily diverse, yet dynamically intersecting. Secondly, despite accentuating the role of digital proficiency theoretically, access research only tangentially differentiates between the consumption versus production dimensions of substantial content-related skills access. Questions regarding the impact of access on effective blended learning models in general and on academic knowledge in particular, emerge from the data. It is hoped that future research will fathom these distinctions and the relationships between them more profoundly to empower similar initiatives of transition. This is particularly impactful in a country like Syria where an added political-economic affordability layer engulfs the existing physical divide, resulting in mounting boundaries to digital academic and professional knowledge.

**Keywords:** informal digital platforms, blended learning, access, contemporary digital proficiency, academic knowledge, adoption, *Moodle*, *YouTube*

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## 1. Contextual background

Present-day universities world-wide are responding to the profound impact of fast-paced radical changes (Remenyi, Grant and Singh, 2020); the Syrian universities are no exception. Oscillating between the urge for mobilization to counteract pandemic-prompted and conflict-inflicted crises and the need for innovation to keep up with substantial technological strides; long-standing higher education structures have become increasingly precarious.

During the initial phase of Covid-19-induced campus closure at Tishreen university (14 March-31 May 2020), the concern was to maintain a sense of learning continuity and to ensure the circulation of course-related material required for exams. Endeavours were remedial, fragmented, self-initiated and disorganized. However, since the resumption of regular onsite meetings, the learning management system *Moodle* has been launched with the expectation of a more systematic and more planned transition to digital delivery. Training in *Moodle* use has been provided to representatives from all departments. That is, the lockdown underscored the need to revisit the notion of knowledge management (KM) in general, and academic knowledge management in particular. To address the emerging KM gaps, the university recognised the importance of structuring and mediating digital knowledge delivery. The conclusion that technology is an enabler of transparency and effectiveness in KM processes materialised in integrating *Moodle*.

The institutionalisation of *Moodle* is an unprecedented step in a context where the concept of distance learning has, to date, been simply synonymous with no-obligation-to-attend. Nearly two decades ago, the Syrian higher education context witnessed the pioneering establishment of the Syrian Virtual University, an accredited fully-fledged completely virtual university. Since then until the 2020 pandemic disruptions however, no other versions of formal online modality have emerged. Online and traditional instructional models existed in mutual exclusiveness, as dichotomies that were only informally blurred. The introduction of *Moodle* has given rise to a

number of questions. Firstly, given the abundance of open-source high-quality digital resources, what would make *Moodle* content, as opposed to other types of digital content, a competing or compelling option? Secondly, given the currently frail national infrastructure, i.e. prolonged power cuts and costly Internet packages, would *Moodle* be more accessible or preferred over other platforms, especially since its use is neither a marked nor a compulsory activity? Thirdly, with mounting teachers' workload, what are the envisioned dynamics of meaningful interaction online? These reflections, based on lived experience, sparked this research interest. Change was inevitable; translating change into a meaningful sustainable transformation is the ultimate objective.

Ideally, blended learning technologies can be collaborative spaces to model processes of knowledge construction through filtering, organizing, accessing, co-creating and re-generating information. This research proposes that for a competent KM model to be implemented, blended learning infrastructures should further reflect the interconnectedness of individually acquired (informal) and collectively harnessed (organisational) forms of knowledge. In digital domains where information, misinformation and knowledge opportunities abound outside the formal boundaries of institutions, KM takes on new dimensions where knowledge is seen as the outcome of cross-platform engagement. Only in this sense can a blended learning model become an empowering knowledge management system with the capacity to unlock intellectual capital potential more fully and to ensure sustainable development more profoundly.

### 1.1 The research questions and significance

Given the above realities, the main research question of the present study is: what are teachers' perceptions of the ideal blended learning technologies at Tishreen university?

This broad research question subsumes the following sub-questions:

1. What are teachers' experiences of motivational access to *Moodle* and *YouTube*? Specifically, what are their perceptions of digital content on these platforms in terms of multimodality, adaptability and interactivity?
2. What are teachers' perceptions of physical access to either platform?
3. What are teachers' perceptions of skills access to either platform? What are the digital competencies they demonstrate or lack?

To answer these questions, the present study elicits context-sensitive comparative reflections on access to formal and informal platforms. Juxtaposing *Moodle* and *YouTube* is not meant to rule out the potential of other digital forums: the teachers were openly invited to suggest any platforms they deemed integral to successful blended learning. The aim is to promote a viable version of blended higher education in Syria – one that does not steer away from, but keeps pace with, emerging notions of learning and other digitally mediated forms of knowledge. The magnitude of informal learning opportunities makes it impossible to disentangle emerging and established forms of learning or to demarcate lifelong and "life-wide" knowledge acquisition (Meyers, Erickson and Small, 2013, p. 356).

## 2. Theoretical Framework

Although the literature is replete with research on utilizing informal digital venues in higher education, the bulk of existing studies is mainly concerned with learners' experiences. What remains under-researched is the impact of informal learning on formal instructional design (Czerkawski, 2016, p. 144). This gap is underscored with particular reference to the new generation. It is echoed in the call to "activate proposals for reducing the distance between formal educational environments and the extremely active 'digital lives' of teens in social media and online environments" (Scolari, et al., 2018, p. 801). Even when the interplay of informal and formal digital participation has recently become the focus of growing academic interest, limited attention is given to university teachers' experiences. Secondly, there is a dearth of adoption studies "comparing a variety of digital tools in higher education" (Martin, et al., 2020, p.73). The general tendency is to evaluate the potential of digital media platforms in isolation from each other, as self-contained tools. This study diverts from this trend and aims to respond to the call for holistic research: providing insight into "the strengths and weaknesses" of novel technologies in the course of their integration into formal conventional environments (Kaur, 2013, p. 617). Finally, the present study offers a new approach to understanding adoption as access-informed and argues that a more refined expansion of access layers is complex, yet crucial to fathoming the uptake of educational technologies.

## **2.1 The notion of access**

Despite the early polarization of the digital divide in terms of the most tangible hindrance, the physical access, there is growing scholarly awareness that the divide is much “deeper.” It is an “aggregate of many divides, with local barriers to be overcome” (Chakravorti, 2021). This recognition is articulated in terms of “generations” (Hargittai, 2003; Van Dijk, 2017; Van Deursen and Van Dijk, 2019) as contemporary discourse on the digital divide increasingly captures multi-layered disparities.

The conceptualisation of access has transcended the binary physical divide to also include skills (Hargittai, 2003), motivational and usage access (Van Dijk, 2017). The role of motivation – social, cultural, and psychological -- in access and acceptance is pronounced in a number of theories. According to the Technology Acceptance Model (TAM), the initial and continued intention to accept technology is driven by motivation-related determinants of perceived ease of use and perceived usefulness (Venkatesh, 2000; Venkatesh and Davis, 2000). Computer playfulness (intrinsic motivation) and computer anxiety are anchors of the intention to accept technology. Perceived usefulness is also “an instrumental belief that is conceptually similar to extrinsic motivation and is a cognition (as opposed to emotion) regarding the benefits of using a system” (Venkatesh and Bala, 2008, pp. 278,281). Similarly, research into Gratification Theory has highlighted the centrality of motivational access, including access to information or “content gratification” -- gratification attained through engagement with data conveyed via a medium (Balakrishnan and Griffiths, 2017, p. 366).

The second layer of skills access is divided into operational (instrumental or medium-related) and substantial (content-related). Digital skills are classified into discipline and content knowledge, personal-ethical (maintaining personal safety and data security in the digital realm) and personal-professional (including information literacy and the disposition to engage in development to adapt to the ever-changing emerging technologies) (Falloon., pp. 2460-2462). Although substantial skills encompass “information retrieval, communication and content creation” (Van Dijk, 2017, pp. 6-7) with an emphasis on the “prosumer” (producer and consumer) role as a key transmedia skill (Scolari, et al., 2018, p. 810), access divide studies that address the consumption-production distinction are limited. More scholarly attention is directed to which type of proficiency predominates: content-related or medium-related. For example, the “techno optimist” approach to closing access gaps is criticised for falling short of distinguishing shallow from fruitful engagement in the digital realm (Helsper, 2021, p. 74). Research on young learners also warns that the prevalent pre-occupation with developing technical skills at the expense of “critical or evaluation aspects of digital skills” is counterproductive. Conversely, fostering information skills among young people is associated with positive outcomes (Livingstone, Mascheroni and Stoilova, 2021, p. 22). Similarly, in the field of teacher education, calls for a shift from the “overly technical” digital skills to contemporary digital proficiency have proliferated (Falloon, 2020, p. 2451). While the above concerns are valid and impactful, they do not present a complete refined picture of digital skills. Importantly, a holistic approach to digital proficiency should bring to the fore the importance of the formal and informal spaces in which competencies are acquired or applied by considering them “components of a knowledge ecosystem” (Meyers, Erickson and Small, 2013, p. 357).

Usage access is the “last stage of access and its primary goal.” It refers to the breadth and depth of online activities and how active or creative usage is. This type of access includes “information seeking, news, personal development (education), leisure, commerce and transactions, social interaction and networking, and gaming” (Van Dijk, 2017, p. 7-8). In other words, usage access may be considered as outcomes-based.

This fuller picture of access disparities should not, however, overshadow the profound impact of the first-generation physical access. The material divide is a renewed challenge due to the rapid pace of advancements in technological devices and their constantly upgraded and diverse technical capacities. Specifically, the material divide comprises (1) disparities in device opportunities, or replacement of a device with others that have different technical capabilities, (2) differences in the “diversity of devices and peripherals” and (3) differences in the “maintenance costs” of devices and peripherals such as subscriptions (Van Deursen and Van Dijk, 2019, pp. 357, 371).

To highlight the notion of access further, some paradoxes of access to *YouTube* and *Moodle* have been identified in the literature and will be outlined in what follows, threaded with some contextual reflections.

## 2.2 Access paradoxes

### 2.2.1 *Paradoxes of physical access versus multimodality and open access versus credibility*

The pivotal role of *YouTube* in informal and non-formal (higher) education has recently attracted growing attention (Dughera, Bordignon and Azzara, 2021; Helsper, 2021; Maynard, 2021). Additionally, the surge of “*YouTube* scholarship” – published academic articles related to *YouTube* – as early as 2011 (Snelson, 2011, pp. 59-60) and the emergence of terms such as “edutubers” or “creators of educational content” (Dughera, Bordignon and Azzara, 2021 p. 3) reflect the intersection of *YouTube* with academia in a more formal sense.

The importance of *YouTube*'s multimodal content can best be understood in a contextual light: visualization is marginal and animation of complex and abstract concepts is largely a mental activity in Syrian universities where the predominant style of instruction is theoretical and highly textual. Arguably, students' gravitation towards the audiovisual content of edutubers is a compensatory practice that flags gaps in formal learning settings (Dughera, Bordignon and Azzara, 2021, p. 7). *YouTube* videos offer engaging authentic resources for users to reinforce understanding of an academic topic, elaborate on existing content knowledge (Kim and Kim, 2011; Fleck, 2014) and improve memory recall in relation to course material (Fleck, 2014, p. 33). The role of the mnemonic power of images in fostering learning and recall through activating verbal-nonverbal mental associations, is one of the basic tenets of Dual Coding Theory (Paivio, 1986). Informally, instructional *YouTube* videos have “mass appeal” for promoting self-development and the acquisition of new skills and knowledge: the most academic such as “hard-core coding” or the most casual such as “professional make-up” (Helsper, 2021, p. 71). In addition to enabling access to information, the forum promotes a participatory culture of content creation and sharing, being a “dedicated video-sharing application” (Balakrishnan and Griffiths, 2017, p. 363). Another strand of debate, however, highlights the power relations underpinning *YouTube*'s seemingly emancipatory structure (Caplan and Gillspie, 2020). While *YouTube* content is intensely audio-visual, other platforms, including *Moodle*, allow the upload of learning resources in their multiple modalities (audio, visual, text-based) and support the import of videos from external sites. Research on *Moodle* has shown that “interspersing course materials with related *YouTube* videos, graphic interfaces and website links” was conducive to out-of-class active engagement and exploration of learning materials (Amandu, Muliira and Fronda, 2013, p.681).

Despite the advantages, digital divide considerations shape the extent of incorporating media-rich materials into formal learning experiences. Inequitable access is reportedly related to the affordability of modern digital resources (Van Deursen and Van Dijk, 2019; Mpungose, 2020). The provision of on-campus connected computers might facilitate physical access, but it compromises the rationale of overcoming geographical boundaries and the anytime-anywhere access motto upheld by providers of online learning. Remote physical access is especially important in the case of campus closures and emergency immobilisation. At the other end of the device continuum, mobile-only access is described as a “second-class” compromised experience due to the restricted functionality and usability of mobile devices (Napoli and Opar, 2014, p.330). Indeed, mobile devices are deemed a “valuable complement in a broader device ecosystem” (Newlands and Lutz, 2021, p.1355). This contention is endorsed in other studies stressing that cross-gadget engagement is vital for higher-quality participation and diverse outcomes-focused learning experiences. Smart phones and tablets afford continuous communication, portability, second-screening, video-streaming, entertainment and compatibility; desktop and laptop computers support deeper information seeking and “immersive Internet work” (Van Deursen and Van Dijk, 2019, pp. 357-371, Newlands and Lutz, 2021, p.1355).

Another significant paradox of access to academic knowledge lies in Open Access Movements. Open-access journals have diminished the material access inequalities typical of the more established academic publications. Cost is considered “an inhibitor to knowledge creation and development.” On the other hand, the movement was inundated with predatory journals (those that do not conform to academic standards) and counterfeit journals, tempting career academics who are under pressure to publish (Singh and Remenyi, 2016, pp. 50-54).

### 2.2.2 *Paradoxes of interaction versus workload on Moodle, and interaction versus audience on YouTube*

In order to approximate blended learning dynamism to in-person learning, it is proposed that *Moodle* should not be reduced to a depository of static information but rather be linked to familiar social media platforms such as *YouTube*, *Zoom* and *FaceBook*, among others (Mpungose, 2020). Other scholars argue that *Moodle* is intrinsically participatory: “the organization of *Moodle* makes prominent the learning task, not the learning tools” (Cole and Foster, 2008, p. 5). Cole and Foster further contend that *Moodle* does not support a linear transmission of information but rather provides users with the tools necessary for discussion, exchange of

artefacts and the construction of knowledge. Despite being inherently interactive, the extent of deploying its collaborative functions vary widely. In some contexts, *Moodle* was approached as a “repository platform” for exchanging course-related material such as lecture slides while its interactive features such as chat and forums were not fully exploited (El-Bahsh and Daoud, 2016, p. 5). In others, *Moodle* has proved effective in fostering a collaborative culture and heightened participation pre- and post-class times (Amandu, Muliira and Fronda, 2013, p. 683).

*Moodle* at Tishreen university runs in parallel with the regular in-person delivery mode, not as a substitute for some modules or parts of them. Additionally, the economic consequences of Coronavirus in a country rising from a 10-year conflict, the economic sanctions imposed on Syria and the accompanying wave of internal and external brain drain -- all have placed considerable pressure on many academics to work overtime. Given the realities of teachers’ workload, perceptions of out-of-class interaction is a question worth exploring. To increase the uptake of *Moodle* by faculty members, some studies propose exerting “positive social influence” by making *Moodle* use a pre-requisite for academic promotion or contract renewal (Saleem, Al-Saqri and Ahmad, 2016, p. 22). Arguably, employment rewards (or penalties) seem to align with instrumental motivation and do not account for continued use after promotion. Counter to this proposal, it is concluded that faculty “re-appointment, promotion, and tenure” played the least significant part in technology adoption (Martin, et al., 2020, p. 81). It is further contended that technological innovations should serve to “augment the role of the teacher” and free time to enhance their engagement in tasks that require human attributes such as personalised feedback and student support. An alternative to offering employment-related incentives as an accelerator of adoption is “reducing on-ground time” and modelling blended learning through faculty development programmes (Dziuban, et al., 2018, pp. 3,8). Along the same lines and according to TAM, it is the social processes of internalisation and identification, rather than compliance, that make the subjective norm a positive mediator of adoption. Internalisation is the assimilation of a referent’s beliefs into one’s personal system; identification is perceived elevation of social status within a referent group for matching their expectations (Venkatesh and Bala, 2008, p. 277).

In so far as *YouTube* is concerned, the forum is recognised for offering “social gratification” through engagement: liking, sharing, commenting, uploading “original and/or repeated content.” Further, social gratification is seen to be intimately linked with both the activities of content creation and content viewing (Balakrishnan and Griffiths, 2017, pp. 366,386). Interaction on *YouTube* is also described in terms of maintaining “managed connectedness” rather than “managed distance” between content makers and subscribers (Hou, 2019: 551). Like *FaceBook* and other open social media forums, *YouTube* attracts “known and unknown” -- targeted and unintended -- audience, which is a double-edged feature. On one hand, open platforms might compromise or inhibit self-disclosure. Unlike formal forums that require the use of genuine identities for registration, informal open platforms are more prone to the use of pseudonyms which are sometimes misused for cyber-bullying and harassment. This has been found to be an interaction deterrent for faculty members deploying social networks to support learning (Ghounani, 2020, p.35). On the other hand, posting publicly to a broader global audience is a powerful branding tool as users tend to “manifest themselves online to emphasise their skills and proficiency, hence attracting contacts, contracts, customers, or employers” (Van Dijck, 2013, p. 203). Beyond branding, content creation can also simply be a “passionate activity” or “an enhanced function of user engagement” promoting not only social gratification but also the more intrinsic “personal gratification” (Balakrishnan and Griffiths, 2017, p. 373).

### *2.2.3 The paradox of customization versus cross-cultural learning*

Irrespective of the platform, the relevance of the technology-supported content to students’ academic needs is frequently given prominence in previous research. Perceived pedagogical pertinence is reported to be the main drive for using *Moodle* (El-Bash and Daoud, 2016; Al-Kindi and Al-Suqri, 2017; Deepak, 2017). According to Deepak, *Moodle* features that enable the delivery of course material, obtaining feedback, creating quizzes and workshops ranked as the most valuable by instructors (2017, p.128). In the same vein, clear progression towards meeting course objectives was one of the decisive qualities that defined an excellent rating of a blended learning experience (Dziuban, et al., 2018, p.11). Similarly, only those *YouTube* videos that sparked course-related discussions and offered edutainment rather than pure entertainment were regarded as meaningful (Fleck, et al., 2014, p.32). However, the added value of *YouTube* content is its capacity to develop cross-cultural competence through nurturing cultural sensitivity and embracing multicultural and linguistic diversity. As such, it intensifies the sense of belonging to a wider community (Kim and Kim, 2021, p.11) and facilitates establishing connections with external experts (Fleck, et al., 2014, p.33).

### 3. Methodology

This small-scale study is qualitative interpretive: it conducted from an emic perspective, as the researcher is an insider, a faculty member and head of department, experiencing the same access conditions as the participants. In other words, interpretations were contextualised further through ethnographic observations, the lived experience of the researcher and informal conversations with colleagues at the department.

#### 3.1 The research context

The study takes place at the Higher Institute of Languages at Tishreen University, one of Syria's seven public universities. Specifically, the study is set in the English Language Teaching (ELT) department. The department runs two Masters programmes and is responsible for the provision of English language tuition to all the university's faculties. Five professors teach at two MA programmes open to limited numbers of top graduates; 12 permanently employed lecturers teach English language across all the universities' faculties. To meet the demand for teaching, current MA research students and temporary teaching staff are allocated hourly English language teaching assignments when needed. Despite the variation in contracts, the adoption of *Moodle* was a general expectation. All the participants will be referred to as teachers hereafter.

#### 3.2 Data collection

At the outset and in line with the exploratory nature of my enquiry, interview questions were distributed through the department's *WhatsApp* groups, originally created by the dean. The target participants were permanent staff and MA student-teachers at the ELT department. Their total number was 36 at the time of the study. Only four responses were returned. Piloting the interview resulted in altering the data collection tool itself rather than modifying the interview questions. A questionnaire seemed to reduce the teachers' burden in two ways. Firstly, a set of multiple-choice/predetermined categories served as prompts leading to the option "other." Closed questions similarly functioned as a brainstorming exercise leading to the final open-ended question where participants were invited to suggest their vision of an ideal formal blended learning version at Tishreen university. Secondly, participants could access a web-based questionnaire easier than typing responses to the interview using their mobile devices: reliance on mobile devices was notably higher in view of the instability of electricity. The link to the questionnaire created as a *Google* document was posted on the same groups: 23 out of the target 32 teachers completed the questionnaire (the four teachers who answered the interview were excluded from completing the questionnaire). Converting to a web-based questionnaire increased the response rate and yielded sufficient qualitative data. The questionnaire was organised into three sections: the first revolves around *YouTube* use and perceptions of its content; the second around *Moodle* use and perceptions of its content. The final sections invited teachers to suggest their perceptions of the ideal blended learning tools for higher education in Syria.

#### 3.3 Data analysis

The study employed the framework approach to thematic analysis: creating a matrix that synthesizes core themes and subthemes. This approach is believed to take thematic analysis a step further by being more transparent in describing and analysing participants' views and linking the various stages of analysis (Smith and Firth, 2011). A theme is defined as an analyst-generated category that draws on the codes discerned in the transcript and shows close relevance to the research questions (Bryman, 2012, pp. 579-580). The themes were identified using both an "inductive approach" and a "priori approach". In the first, themes are derived from the data; in the latter, from the researcher's prior knowledge including their personal experiences and values, the existing literature and common-sense local constructs (Ryan and Bernard, 2003, p. 88). The data was analysed in terms of the access layers discussed in section 2.1. Under every access theme, *Moodle* was assigned one row, *YouTube* another, and other forums a third. The columns were divided into positive and negative comments and initially included verbatim extracts of participants' words.

### 4. Findings and discussion

#### 4.1 Perceived characteristics of the *YouTube* and *Moodle* content

To answer the first research sub-question, which is related to motivational access as shaped by attributes of the content of the forums under study, the sub-themes of multimodality, adaptability and interaction were investigated.

#### 4.1.1 Multimodality

Teachers emphasised that the main perceived advantage of *YouTube* content over *Moodle* was compensatory: bridging gaps in the Syrian higher education curricula. High-quality academic videos, expert-generated audiovisual content for students in need of discipline-specific knowledge (e.g. medical animations) and authentic international and cultural videos – are all examples of content provided by *YouTube* that would not be accessible otherwise. This is plausible given that the multimodality of *YouTube* content is reportedly conducive to high levels of content gratification (Balakrishnan and Griffiths, 2017, p. 366). *Moodle* was seen on par with *YouTube* in terms of enhancing “neglected areas” of teaching: *“Both are modern and effective ways to enhance neglected areas when teaching the language. They may be used to enhance interaction, engagement, interest and many other aspects.”* Audio-visual content was also underlined as more inclusive of students with visual learning styles: *“Audio-visual materials are good learning materials, par[ticularly] for learners with audio-visual memory. A good blend would be to provide links to relevant YouTube videos inside the Moodle app.”* These excerpts show appreciation of how digital resources can be effectively utilised to resolve identified knowledge and information gaps, which is an aspect of information literacy (Meyer, Erickson and Small, 2013, p.358).

Another important finding was that due to physical access constraints, teachers resorted to reduced modalities (e.g. audio-only narrated explanations with supporting pdf files and static visuals): *“In my opinion, uploading recording audios and aids is enough in our situation since some students and teachers don’t have good internet access... If teachers upload PDF files with a record explaining the files in addition to some pictures if needed, the students will be able to understand.”* In contexts with unreliable digital infrastructure, the provision of both high-tech and low-tech alternatives is considered an inclusive practice (UNICEF, 2021, pp. 14-15). Digital literacy involves decision making about what technologies to use or not to use to attain positive outcomes for oneself and others (Helsper, 2021, p. 77). As such, self-tailoring resources to address contextual limitations emerged as another example of digital literacy.

Overall, the data contained evidence of “curriculum competency,” or the discipline and content knowledge defined as the ability to make “informed and beneficial decisions about digital resource use” (Falloon, 2020, p. 2460). This was mostly manifested in so far as information consumption is concerned. Although fine-tuning online resources to local technological capacity is an important re-production skill, content-related skills in the data were largely consumption-related. Making *Moodle* materials engaging was mainly seen through embedding ready-made videos: only one teacher highlighted the need to create a *YouTube* channel for uploading academic content -- “full lectures” -- which would especially benefit students who struggle to physically attend. This did not, however, resonate with the general attitude: only 8.7% of (n=2 out of 23) teachers reported posting, as opposed to accessing, content on *YouTube*. Annual reports of academic research at the ELT department similarly point towards limited publications of academic articles. It is likely that accessing the digital domain through mobile devices has played a role in compromising academic knowledge production. Mobile devices are found to be specifically restraining for “data-intensive tasks” and inputting information (Newlands and Lutz, 2021, p. 1355), which are essential to academic research.

One teacher pronounced the need for modalities of information other than video such as “exam simulations, worksheets, and academic papers;” re-directing the response to multi-faceted role of teachers, not only as content creators, but also as content evaluators and researchers. Shifts and transitions in the topic in the course of a reply are significant indicators of themes (Ryan and Bernard, 2003, p.90). Videos were also de-prioritized as a non-academic genre of presentation: *“I don’t think that videos are as academic as research papers.”* Such data indicates a gapping divide between the modalities used to create academic knowledge and the more current multimodal presentations of other information. Academic content is expected to be static rather than animated, textual-visual rather than audiovisual. This disconnect is deepened in some scholarly debate contending that the pandemic-prompted move to flipped classroom delivery has led to unrealistic expectations of the role of an academic: “we act as content aggregator, not creator. Creation is done when we have our researcher hats on, not our teaching hats” (Kellermann, 2021). Other scholars call for more contemporary modalities of academic output: faculty-generated *YouTube* videos with metrics that are not related to revenue or watch-time, but rather to authenticity and passion. The major impact of such videos would be mobilizing academic knowledge and empowering casual learners (Maynard, 2021).

#### 4.1.2 Adaptability

*Moodle* was seen as a mediating space where informal and formal learning venues intersect. Most teachers were aware of the forum's capacity to back up different genres of information, including audio-visual material. Content was, moreover, perceived as more attuned to local needs. This was evident in teachers' use of the following phrases to describe potential *Moodle* content: selected "*purposefully to relate to students' needs*," "*topic related videos*," "*more effective as it is always relevant to our modules*," and "*relevant YouTube videos*." This lends support to the existing literature which gives precedence to curriculum-based content as an advantage of *Moodle* (Al-Kindi and Al-Suqri, 2017; Deepak, 2017; Dziuban, 2018). It may also be the case that after the initial emergency response that took on the form of scattered initiatives, there was a need for structured transitions. The perceived reliability of *Moodle* was reiterated using the comparative adjectives: "*more formal*," "*safe and more trusted*," "*more professional*," "*more academic*," and "*more specialized*."

In a sense, *Moodle* was perceived as a middle ground for re-framing and re-appropriating the "most current, authentic, and diverse knowledge and skills" offered by informal platforms, thus narrowing the gap between two spheres (Czerkawski, 2016, p. 149). *Moodle's* mediating role in scaffolding informal learning processes was pointed out in the data. The forum was perceived as a space for "*offering support and guidance for students involved in informal and individual learning processes*." In the digital realm where information and misinformation -- even at the academic level -- are easily accessible (Singh and Remenyi, 2016; Maynard, 2021; Kohler and Dietrich, 2021), the mediation of collective professional knowledge within a formal setting becomes central. Information retrieval or incidental learning "in the wild" (Reinhardt & Sykes, 2012, p. 38) is labor-intensive; however, in the fast-changing landscape of higher education, formal content knowledge is no longer adequate: equipping students with higher-order skills is a requirement for future-proof employment. Teachers' views were in support of such collaboration as they maintained the importance of "*inviting students to share articles, videos or any material that they find of importance and initiating discussions about such materials*." As such, *Moodle* can become the space to collectively mediate sound academic practice and scaffold informal development.

#### 4.1.3 Interactivity

*Moodle* is described by developers of Tishreen university video tutorials as inherently dynamic. The perceptions of all teachers in the MA programmes were analogous: *Moodle* afforded content such as "*interactive videos for students to engage with*," "*web-conferencing tools*," "*built-in forums*" for sharing and discussions, "*feedback*," "*live discussion sessions with instructors*." At the same time, *Moodle* was perceived as an appropriate platform to promote "*autonomy and creativity on the part of the students*" and to encourage some form of independent collaboration: "*students may have access to a discussion room to help them do group/pair work with or without instructor's supervision*." A less optimistic view was expressed by one teacher who actually used *Moodle* at an undergraduate level: "*No student interaction. Students only care about homework and materials for the exam. They don't want any extras even for enriching the subject*". This discrepancy is in line with the finding that collaborative digital tools were rated higher by faculty teaching postgraduates than by those teaching undergraduates (Martin, et al., 2020, p. 82). This is justifiable in view of the large numbers of students in some faculties (the overall number reaching 79203, as the university's website statistics reveal) and the extra workload implied in managing online interaction with students. One proposed solution was enhancing engagement on *Moodle* through assigning "*graded extracurricular activities*" while leaving interaction to face-to-face meetings. Indeed, the deep-seated exam-oriented mindset and fossilized culture of easy access to information can compromise the interactive potential of *Moodle*. Using *Moodle* was therefore viewed as a marginal activity.

As far as *YouTube* is concerned, there was consensus among teachers that *YouTube* is not a platform for meaningful social networking: no one opted the option "*to interact with others*" as a reason for using *YouTube*. This was attributed by one teacher to the fact that "*YouTube is accessible for all people. Teachers maybe overworking by answering hundreds of comments of people who are not their students*." Paradoxically however, 65.2% (n= 15 out of 23) respondents selected the option "*YouTube strengthens my belonging to a wider/international community*." It may be the case that interaction on *YouTube* is more content-centred than user-centred. The social information generated in comments might have been considered secondary to author-generated original content. It is also possible that being able to have cross-platform identities has made teachers inclined to associate certain tasks with certain platforms. Enhanced engagement through "multi-platform

representation" or "multiple media presences" is approached more synergistically in the literature and is facilitated by convenient access from mobile devices (Hou, 2019, p. 549).

To answer the second research sub-question regarding the impact of physical access on adoption, the data was searched for subthemes of affordance and material access.

## **4.2 Physical access**

Physical access was reportedly hampered by prolonged power cuts, unreliable or costly Internet connection and lack of equipment. Asymmetrical access, described by one teacher as *"inability to make the learning platform available to students who cannot afford having the technology needed,"* was also brought up as an aspect of physical access disparity. In addition to issues of connectivity, the monetized nature of some *YouTube* videos and cost implications of access were highlighted in the data: *"some academic YouTube videos take a lot of time to explain something which one can read in less than one minute. For example, I watched a video about the glottal stop sound, which takes 9 minutes, but then I read the script in less than one min and both gave me the same benefit."* Unnecessarily long videos may be a source of higher revenue, although educational value is attached to shorter bite-sized segmented videos as they reduce the working memory cognitive load (Clark and Mayer, 2008, p.184). Resorting to the textual version of the video demonstrates "awareness of the value of traditional tools in conjunction with networked media and social networks", which is an important digital literacy (Koltay, 2011, p. 216). Another reference to the monetized nature of *YouTube* underlined that original updated content is sometimes copyrighted and not open-source: *"YouTube needs money for some videos. Some materials are outdated in terms of information."*

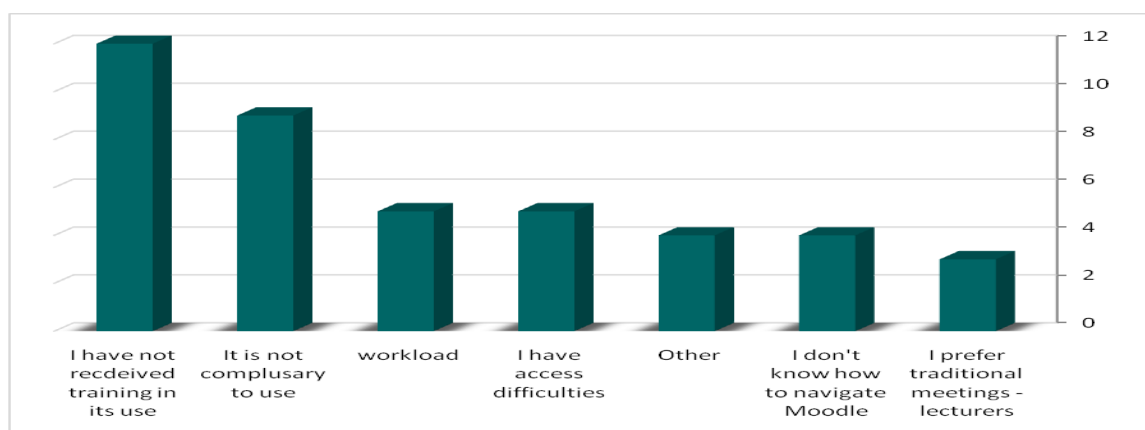
On the other hand, in a context with a destroyed power infrastructure, access from mobile phone devices has become the norm: mobile device batteries are more durable and users can connect using pre-paid Internet data bundles. Previous research has shown that mobile device users are more in favour of accessing applications such as *YouTube* than Web-based *Moodle*. The application's adaptability makes informal learning experiences, including the download of content, seamless (Al-Kindi and Al-Suqri, 2017, pp.79, 82). The compatibility of other high-tech content with the device programmes remains a cause of concern for students with older mobile devices. This brings the discussion back to the role of traditional physical resources and "low-tech or no-tech modalities" such as printed textbooks in attaining equitable blended learning (e.g. Mpungose, 2021; UNICEF, 2021) which, at least partly, explains Syrian students' inclination to buy lecture notes despite their availability in digital formats. By doing so, they take advantage of "peripheral diversity" (printers in this case) even if printers are not privately owned. Printed resources are accessible regardless of electricity and connectivity and are, therefore, more trusted. This conclusion validates the significance of the "device opportunity" and "device and peripheral diversity" aspects of the material divide. It also corroborates the finding that relying on mobile devices only compromises potential participation in versatile outcomes-based digital activities (Van Deursen and Van Dijk, 2019, pp. 355, 357, 370).

To answer the third research sub-question, the data was analysed in search for the skills that teachers showed or lacked and their impact on adoption. The study does not claim measuring the complex construct of digital proficiency of teachers. The participants were not asked to rate their skills, so the confidence bias (Helsper, 2021, p.78) was largely eliminated. Instead, implicit references to skills surfaced in the responses, as will be next discussed.

## **4.3 Skills access**

### **4.3.1 Operational (medium-related) access**

While all respondents reportedly used *YouTube*, only 26.1% (no= 6 out of 23) used *Moodle*. Although *Moodle* at Tishreen university is relatively in the early phases of adoption, usernames were activated 3 months prior to the study. Because "a non-event can also be data" (Remenyi, 2012, p. 34), teachers were asked to choose or add their reasons for abandoning *Moodle*. One of the most salient challenges was related to operational or tool-related access, namely the perceived need for training and navigational issues, as figure 1 illustrates.



**Figure 1:** Moodle use: perceived challenges

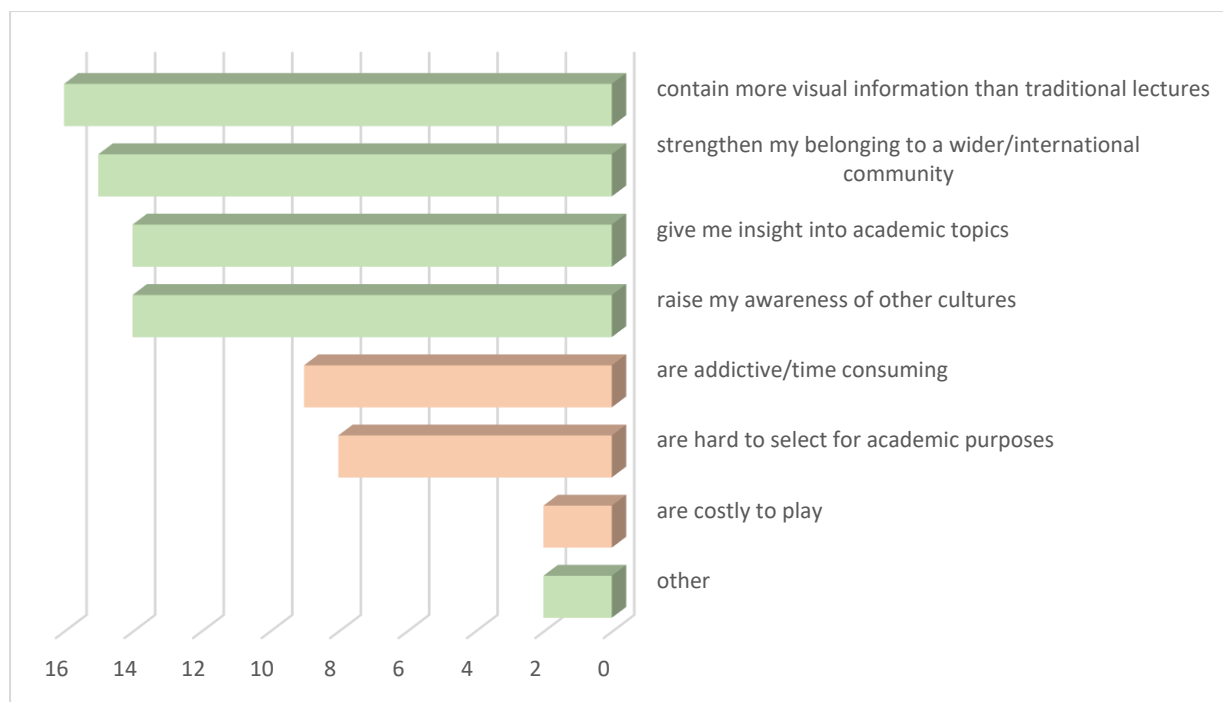
These obstacles are related to *control* beliefs: perceived computer self-efficacy or *control* beliefs about individual ability to use a system, and perceptions of external control or “facilitating conditions” such as beliefs about organisational resources and support structure (Venkatesh and Bala, 2008, p. 278). Under “other,” navigational issues were re-phrased as invisibility of *Moodle* to search engines. As one teacher elaborated, *Moodle* is embedded into the university’s website whose interface was not user-friendly and was undergoing upgrade. This made *Moodle* hard to locate and created the impression that it was equally unwieldy.

Perceptions and actual use yielded different descriptions of navigation experiences as those who actually experimented with the platform found it “easy to navigate but time-consuming.” Evidence from TAM research indicates that even with hands-on experience, perceived self-efficacy and facilitating conditions remain strong determinants of system acceptance that are anchored to general beliefs. (Venkatesh, 2000, pp. 357, 360). This might explain this disparity as the beliefs of teachers with prior experience are likely to have accumulated into positive perceptions of self-efficacy. Video tutorials modelling *Moodle* functions were created by the university’s IT professionals. Making them available to all staff might mitigate unfamiliarity and increase teachers’ confidence, i.e. alter perceived self-efficacy early in implementation. Other factors for abandoning *Moodle* included voluntariness of use, workload and preference for traditional styles. Physical access difficulties and occasional access difficulties were added as comments. The fact that non-mandatory use was opted by 9 out of 23 participants also supports TAM2 finding that the subjective norm has no influence on intended usage in voluntary contexts (Venkatesh and Davis, 2000, p. 198).

Finally, despite abandoning *Moodle*, most teachers were aware of its potential and the learning opportunities it can create, as discussed previously. This supports the scholarly debate that “knowledge, access, and skills are not identical” (Helsper, 2021, p. 78).

#### 4.3.2 Substantial (content-related) access

Provided with a multiple-choice question gleaned from the literature, the participants were asked to select descriptions of *YouTube* content. Figure 2 sums up the responses.



**Figure 2:** Perceived attributes of *YouTube* videos

In the “other” category, two teachers who chose the option “*YouTube videos are hard to select for academic purposes*” further explained that such videos “*maybe misleading because the content is not always true, authentic, or trusted,*” and that they “*aren’t always reliable. They may not be provided by experts.*” The algorithms underpinning *YouTube* were also flagged for diverting users from their learning intentions, consolidating thereby the image of *YouTube* as an entertainment, rather than an educational, tool. Following the continuous streaming of suggestions made by *YouTube*, the user might end up watching irrelevant content, as one teacher explained: “*I think YouTube can be too distracting because it’s mostly linked to entertainment purposes in the minds of most users. There is always the risk of heading to YouTube for learning purposes and then going down a rabbit hole of suggested videos that are more appealing to users.*” These reflections exemplify an array of substantial skills including information literacy and the identification of “negative digitally-mediated behaviour” such as addiction, the latter is a crucial personal-ethical aspect of contemporary digital competencies (Falloon, 2020, p. 2460). Indeed, *YouTube*’s evolving tools such as the recommendation filtering algorithm for suggesting content and the creation of channels do not simply re-define the platform technologically speaking, but rather reshape its users’ interactions and practices within the platform (Pires, Masanet and Scolari, 2021).

Substantial skills also relate to the previous discussion of content perceptions where awareness of the commercial nature of the platform surfaced. This revenue-driven nature of *YouTube* is well documented in recent literature: it is evident in “smoothing links between commercials and contents” (Hou, 2019, p. 538), in imposing strict copyright policy on original content and in demonetization of created content (Caplan and Gillspie, 2020). Not infrequently, the message “this content is not available in your country” pops up as reminder of the reality that access is a matter of economic and political considerations.

On the other hand, as figure 2 reveals, perceptions of the attributes of *YouTube* content as positive outweighed negative associations. Advantages were mainly academic and cultural knowledge-related. This was corroborated in the reported purposes for *YouTube* use (table 1).

**Table 1:** Reported reasons for using *YouTube*

| Reasons for using <i>YouTube</i>                                 | number |
|------------------------------------------------------------------|--------|
| To select audiovisual content for an academic lecture            | 17     |
| To watch films or listen to songs (for entertainment only)       | 17     |
| To deepen my understanding of an academic topic                  | 20     |
| To interact with others                                          | 0      |
| Other: To search for new skills/ To educate myself about a topic | 2      |

In this question, respondents were invited to check as many options as applicable; therefore, responses were re-grouped as follows:

**Table 2:** Reasons for using *YouTube* classified

| Reasons for using <i>YouTube</i>             | percentage | Number |
|----------------------------------------------|------------|--------|
| For entertainment purposes only              | 8.6%       | 2      |
| For academic purposes only                   | 26.08%     | 6      |
| For both entertainment and academic purposes | 65.21%     | 15     |

Despite questioning the credibility, quality and distribution equity of some *YouTube* content and despite ruling out the importance of this platform as a destination for social networking, the majority of respondents reported utilizing *YouTube* content for either academic only purposes, or for academic and entertainment purposes alike. Only two found its value purely entertaining.

This suggests that the participants might have been able to distinguish the user-generated from the professionally-generated videos flooding open platforms. The user-generated content characteristic of open platforms nurtures higher-order skills such as information literacy and critical evaluation of message quality (Snelson 2011, p. 167); the professionally-generated content brings up issues of copyrighted content, commercialisation of *YouTube* and access equity. It is also likely that the participants' familiarity with informal technologies has matured long before the introduction of formal tools, which has made them more receptive to *YouTube's* integration.

#### 4.4 Preferred blended modality

The inclination to favour the incorporation of *YouTube* into a blended learning model either partially or completely was pronounced in the responses to the concluding question inviting participants to propose their own preferred blend of digital tools. This is summarized in table 3.

**Table 3:** Teachers' preferences regarding formal blended learning technologies

| Preferred Formal Blended Learning platform | percentage                                      | number |
|--------------------------------------------|-------------------------------------------------|--------|
| Both <i>YouTube</i> and <i>Moodle</i>      | 50%                                             | 10     |
| <i>YouTube</i>                             | 20%                                             | 4      |
| <i>Moodle</i>                              | 5%                                              | 1      |
| Other forums                               | 5% ( <i>Zoom</i> )                              | 1      |
|                                            | 5% (ready online courses like <i>Coursera</i> ) | 1      |
| No answer                                  | 13.04%                                          | 3      |
| Open ended-answer                          | 13.04%                                          | 3      |

The open-ended answers all conveyed uncertainty: two teachers ruled out *YouTube* as an official instruction platform for its addictive, informal and non-interactive nature, but they were not sure about the effectiveness *Moodle* either. One of the two teachers who left this question unanswered rephrased in his own words that he preferred a combination, the other reiterated uncertainty about *Moodle* and similarly excluded *YouTube* as a formal educational space.

Research shows a positive association between technology use for general purposes and its use for instructional purposes (Soomro, et al., 2020, pp. 14-15). Since *YouTube* is available as a mobile application, increased exposure and experimentation time might have accelerated its acceptance. Because of the crises-wrecked electricity infrastructure, Syrians have found in online sites in general and *YouTube* in particular a substitute for the more traditional media sources of information and entertainment like television and radio. Social applications were also the way to connect geographically dispersed families. In short, on-ground immobility at times of crises might have led to virtual mobility. Such extensive engagement with informal digital environments is positively approached in the literature. It is argued that informal landscapes provide "an alternate venue for skills instruction" where skills are recontextualised to accord with learners' interests (Meyer and Erickson, 2013, p.359). The findings support this line of thought where some skills were the byproduct of engagement in informal digital participation.

## 5. Summary and conclusions

This article has employed an access-informed approach to understanding perceptions of blended learning delivery in Syria. In the present study, the notion of adoption is positioned in the broader context of access with an emphasis on the impact of digital competencies and informal-formal digital engagement. The study argues that while the existing access divide research delves deep into layers of access, it only tangentially touches on significant distinctions. The main contribution of this study lies in proposing a horizontal expansion of the digital divide layers to reflect formal/informal access and creation-related/consumption-related aspects of substantial skills. Systematic research is needed to pinpoint and elucidate the impact of these dimensions on contemporary models of higher education and blended learning.

In the context of the present research, physical access impediments did not seem to hinder the growth of content-related skills in relation to consumption. The data manifested instances of knowledge assembly competencies (Koltay, 2011, p. 216), awareness of the commercial nature of some videos, and evaluation of the currency, credibility, origin and originality of multimodal messages. Actually, some physical access obstacles have occasionally sharpened Syrian teachers' content-related skills. Not having the luxury of extensive navigation and immersive engagement has made teachers more adept at critically seeking and evaluating information. Teachers were also sensitised to contextual limitations, which has prompted them to appropriate sophisticated technological resources to their immediate contexts. Although this is an important re-productive skill, physical access disparities have largely confined the scope of original knowledge production.

This negative impact was especially evident in the dearth of multimodal content creation and academic research. To establish a digital identity, academics need to become more prolific. Publishing multimodal information remains a more critical challenge, given the fiercely competitive videos produced with cutting-edge techniques. On the other hand, *YouTube's* analytics are based on purely social metrics, as opposed to academic indications of the authenticity of videos, which gives content-creating knowledge experts the advantage of trustworthiness (Kohler and Dietrich, 2021). Whether faculty-generated informative videos are viable regardless of monetized metrics such as watch-time and numbers of subscribers (Maynard, 2021), or whether interdisciplinary collaboration in video production is needed -- remains to be seen. What is more certain is that involvement in video production/editing techniques, such as annotations and chunking, informs effective video evaluation (Snelson, 2011, p. 167). Additionally, how willing academic institutions are to invest in media production, given the politicised demonetization and increasingly confining governance rules on *YouTube*, is another question to be explored.

Findings also unveil an added layer of political-economic affordability access in Syria. That is, the economic sanctions have adversely impacted access to academic knowledge. Some digital bookstores are blocked, e-payments and international shipments of books are restricted. Subscriptions to unlock updated high-quality content and fees to publish in reputable academic journals (Singh and Remeneyi, 2016) have become disproportionate to professors' income.

Another main contribution of the present study lies in its recognition of cross-platform competencies in an academic context. The implication for policy makers and practitioners is that *Moodle* can be a mediating space for scaffolding informal academic engagement and promoting collective tasks that complement, not replicate, traditional learning -- at least at times of no disruptions. Another implication is that *YouTube* may be the appropriate space for re-configuring the presentation of academic information to meet the knowledge demands of the casual and self-directed learner, to relate more closely to communities and to reinvigorate academic knowledge dissemination and visibility. Content creation and sharing on user-generated platforms is recognised as a key contemporary skill (Meyer, Erickson and Small, 2013, p. 358). Multimodal content creation and sharing across multiple platforms -- digital and traditional, formal and informal -- may be a more elaborated definition of this aspect of digital proficiency.

Remarkably, academic referencing styles are increasingly inclusive of videos, blogs and even informal communications as credible sources of information. Despite this growing acceptance of multimodal academic information, authoritative text-based academic knowledge is still the most widely trusted. The genre and modality of academic knowledge remains a fertile ground for future research.

In the not-too-distant future, discussions of Web 2.0 technologies and user-generated content may even become obsolete and be replaced by 4.0 Artificial Intelligence technologies. The emerging Metaverse vision embodies how digital immersion might overwrite digital participation. In the meanwhile, to survive, blended learning in Syria needs to capitalise on the merits of formal and informal platforms and to deliver knowledge that *fits* into the standards of contemporary societies: it is a survival of the *fittest*.

## 6. Limitations and directions for future research

This study was limited to the ELT Department at Higher Institute of Languages where most permanent staff are MA or PhD graduates from British universities, which means that the participants have the advantage of English language command. This might have positively mediated their perceptions of *YouTube* and facilitated harnessing internationally produced content and re-appropriating it to their academic and teaching needs. Despite this limitation, the findings will provide a solid basis for comparing access divide and its impact on the adoption of blended learning. Future larger-scale research should be extended to other departments and study students' access disparities, perhaps at a more advanced stage of *Moodle* use so that perceptions are grounded in experimentation. This would also achieve a degree of triangulation and give interpretations more analytical rigour.

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# Examinations in the Higher Education Space

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**Abstract:** Universities are central to society in that they contribute extensively to the delivery of competencies, skills and knowledge essential to the hi-tech world we have developed since the beginning of the industrial revolution. The Covid pandemic has forced academe to rethink the strategies that are used to assess students' competence. The purpose of this interpretive paper is to reflect on online examinations. In this paper, a short outline of traditional examinations is considered and compared with current examinations. This is important because it appears that examination strategies have not sufficiently evolved over the years to reflect the current circumstances. The different issues that affect the digital learning space are examined and some of the challenges are assessed. The practical implications of this research are that we as academe need to co-create the learning journey with our students.

**Keywords:** Examinations challenges, Ritual of examinations, Assessments challenges, examination trust, Open Distance e-Learning, Cheating in examinations, Digital Scholarship

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## 1. Introduction

The purpose of the paper is to highlight the challenges faced by the academic system to the creation, delivery, and evaluation of examinations. Examinations have always been important to the academic system, but they have not evolved to support current academic needs and this issue must be addressed. The purpose and importance of examinations is multifold and can be considered from the perspectives of the candidate, the academic teaching staff, the university, and external stakeholders. From the candidate's perspective successfully passing an examination indicates a level of mastery of the required academic material. From the point of view of the teaching staff, the examination is used as a means of measuring the effectiveness of their teaching ability. The university uses examinations as a vehicle to promote successful candidates to the next academic level of the learning journey as well as to claim funding from government agencies. Finally, external stakeholders trust that the examination process has produced capable graduates with whom they can engage. The role of examinations within the university space is complex.

The University has long been recognised as the pinnacle of our education system. University education begins with admission into an undergraduate program, which for some is also the foundation for postgraduate studies. In some rare circumstances, recognition of prior learning would allow some individuals access to undergraduate programs (based on the maturity of the candidate or industry experience) or certain postgraduate degrees. Generally, however, postgraduate courses are sophisticated research-driven degrees that are built on the foundation of an appropriate undergraduate degree. The research candidate is expected to identify a researchable problem, then use appropriate technologies and methods to develop a better understanding or solution to the problem. Before the Internet, and in the tradition of undergraduate shared "group" work, postgraduate research candidates would work in small communities of practices or groups and would share their research findings within those groups. The Internet has changed the culture of universities meaning that increasingly undergraduate and postgraduate candidates are using the internet to support their learning journey.

It is important to note that apart from governments, universities have been at the forefront of adopting or developing new technology. Universities have over the years invested in hardware, software, networking infrastructure, online databases, and mobile platforms. Despite this investment, university technology has often appeared fragmented or disorganized, but due to the COVID-19 pandemic university systems are being revitalised and a new form of scholarship is taking root - 'digital scholarship'. Remenyi & Greener (2016) refer to digital scholarship as the use of the internet, the Web as well as other electronic technologies to facilitate the development of research. They confine their definition to the postgraduate journey, but the COVID-19 pandemic has encouraged us to see digital scholarship with a wider lens and to include the undergraduate journey as well.

The undergraduate journey has largely been influenced by examinations (summative assessments) that evaluate the candidate's proficiency at the end of the academic year or semester. An examination can be seen as an

opportunity for candidates to demonstrate their level of understanding and competence within a particular area of study. Examinations are important events for both candidates and academics, and produces a variety of outcomes, some of which are not always satisfactory. Due to the importance placed on examinations, some form of cheating will inevitably occur. Furthermore, examinations have always been problematic for faculty because the faculty members must explore innovative ways to establish what the candidates have learnt. This innovation requires intensive labour both for the preparation of the examination and the evaluation of the examination. Examinations do not produce a good feeling for the candidates or the academics. This challenge with examinations has become even more intense with the massification of the high education system.

## **2. Academe in Context**

The COVID-19 pandemic has revealed gaps within the academic space. All academic disciplines find themselves in an uncomfortable predicament. University management and academics have had to make difficult and unpopular decisions within a constrained environment (Felson and Adamczyk, 2021). The academic community appears to lack the sophistication to adequately factor in the emotional well-being of students (Güner, 2021; Liu, Chen and Dang, 2021) and colleagues (Bashitialshaaer, Alhendawi and Avery, 2021). Some universities have developed safety nets to protect their students and examinations (Chadha, Maraj and Kogelbauer, 2020). Examinations are an important event during the academic journey of a student and with the COVID-19 pandemic, universities are developing sophisticated proctoring strategies (Khalaf *et al.*, 2020). Proctoring or online proctoring is the act of using computer hardware and software with some level of artificial intelligence to monitor candidates taking an examination. While the general sentiment towards online learning appears positive (Asare *et al.*, 2021), universities lack the appropriate experience to deliver effective online proctored examinations (Clark *et al.*, 2020). The question that arises is “How have universities advanced examinations?”

## **3. Context: The author, ODeI, and digital scholarship**

Within the higher education space, there are two broad approaches to education: the first is the residential university with face-to-face teaching and the second is distance education. The author is an academic and academic manager at the largest and only Open Distance e-Learning (ODeI) university in South Africa. In 2018, the University enrolled 373,747 candidates and delivered 52,318 graduates (University of South Africa, 2018). Previously students would register at the university, conduct their learning via an online portal, and at the end of the module students would write an in person examination. The ODeI model aspires to develop a community of practice between the key stakeholders, i.e the academics, the candidates, and the institution (Manyike, 2017) by actively using technology (Ngubane-Mokiwa, 2017). The unintended consequence of the ODeI model is that the entire community has become digital scholars. During this pandemic, social distancing to prevent the spread of COVID-19 was not an issue because the university was already using an ODeI model and the University management agreed that all examinations proceed as scheduled, the caveat being that they would be online and that examination papers would be modified to suit the online environment.

## **4. Reflection on Examinations**

### **4.1 The Ritual of Examinations /Assessments**

Examinations/assessments are the bedrock of our contemporary education system (Hickey *et al.*, 2006). Remarkably at the undergraduate level, very little has changed with the format of examinations over the years. Imperial Chinese examinations are the first known written examinations (Wilbrink, 1997). Much like in the Chinese tradition, sophisticated memorisations (Hu, 1984) of material to be regurgitated at examinations are still the order of the day. It was not uncommon for aspiring Chinese scholars to “collect essays by successful candidates in previous examinations” and try to replicate these essays in their examinations. Within the Chinese system, several inappropriate practices developed (Hu, 1984), such as:

- Memorising essays of successful candidates to be reproduced in examinations,
- Cribbing,
- Substitution of a student which involved bribing examiners,
- Post examination switching of examination papers which involved bribing examiners.

The Chinese authorities introduced countermeasures such as:

- Frisking examinees from head to toe, (today's digital equivalent is signal jamming technology)
- Constant patrolling of the examination hall, (we still invigilate examinations in person and with technology)

- Anonymity of the examiners, (we still use second examiners, moderators, and re-mark examiners)
- Reproducing essays to avoid recognition through handwriting, (we have developed sophisticated multiple-choice questions as one deterrent)
- Re-examination of successful essays, (we still use the moderator and external examiner) and
- Execution, (today we have trial by social media which negatively affects the university's image leaving a digital scar against the university (Singh and Mendy, 2019)).

The University of Paris and the University of Bologna in the 12 century were the first modern era universities to introduce examinations. The candidates knew the examination questions in advance and were required to demonstrate their ability to memorise the material (Madaus and O'Dwyer, 1999). Joan Cele is credited with creating the European examination model, with the objective of promoting candidates based on merit (Wilbrink, 1997). It was not uncommon, much like in the Chinese tradition, for 'examination compendia' containing model solutions to past questions to be made available to candidates. Within the European model, failing a student was a rare event, and the system experienced the same challenges as the Chinese system, namely, fraud, stress, coaching, cheating, and lying (Wilbrink, 1997). With both the Chinese and European models of examinations, only a small sample of the examinee's understanding of the material (Madaus and O'Dwyer, 1999) gathered in a stressful environment was obtained. Within the European system, the practice of payment by results emerged as teachers were offered an additional reward for each student that passed. This reward practice still exists today in the form of government subsidies for candidates that successfully graduate.

Much like in the past, contemporary academics still struggle to develop authentic examinations (Madaus and O'Dwyer, 1999). In an attempt to develop authentic examinations at the author's ODeL university, a variety of new tools are used (Dierick and Dochy, 2001):

- Portfolio Assessment – a purposeful written/electronic collection of the candidates' learning journey.
- OverAll Test – a sophisticated test that measures the extent to which a student can analyse and problem solve in a defined context.
- Self-Assessment – candidates make judgments about their success and challenges through the learning journey.
- Peer-Assessment – a process where individual candidates or groups of candidates rate their peers.
- Co-assessment – both candidates and academic staff are involved in the assessment process.

These are sophisticated, labour-intensive examination strategies. It may be argued that at the undergraduate level some of the examinations are an intellectually barren exercise. We have not progressed much from the early Chinese and European systems. What has been successfully achieved is the development of sophisticated examinations using frameworks such as Bloom's Taxonomy. Examinations at the undergraduate level, driven by the massification of the education system, appear to serve a ritualistic function – a right of passage to the next level.

Within the academic space, cheating in examinations is frowned upon at best, or regarded as a disciplinary matter leading to expulsion at worst. The question is "*why is cheating in examinations still frowned upon?*" There is the argument that the cheater is taking an unfair advantage and the examination process is being undermined. This view is probably driven by the long-standing moral imperatives of "Thou shalt not steal" and "Thou shalt not bear false witness against thy neighbour" (The Church has had a long-standing relationship with the university and has influenced university culture). Is it not plausible that these traditional moral imperatives are less appropriate for our contemporary society? In Information Systems and Computer Science, we teach programming and the notion of reuse. There are several repositories on the Internet that provide free programming code that can be "copy, cut, and pasted" into a software artifact with little to no recognition of the original programmers. The Open Access movement is arguing for the lifting of restrictions on academic research. The Free and Open-Source software movement is also championing the lifting of restrictions on software. Some websites provide free access to research papers. These are some examples of the blurring in attitude to the idea of originality (Simons, 2011). Within our learning spaces, we are developing learning communities and we are encouraging the sharing of knowledge, sometimes without acknowledging the original authors of these ideas. Is this a bad phenomenon? Possibly the question we should be asking is: *Why not (cheat) re-purpose?*

## 4.2 Online Examinations

Online examinations have introduced a different level of trust issues for the candidate. With traditional examinations, universities would develop strict policies that:

- Banned mobile devices in examination halls,
- Provided pre-seating for candidates,
- Ensured reasonable distancing to minimise communication.

In some bizarre situations, the cheating deterrents can be described as inhumane, Figure 1 for example demonstrates some demeaning examination practices.



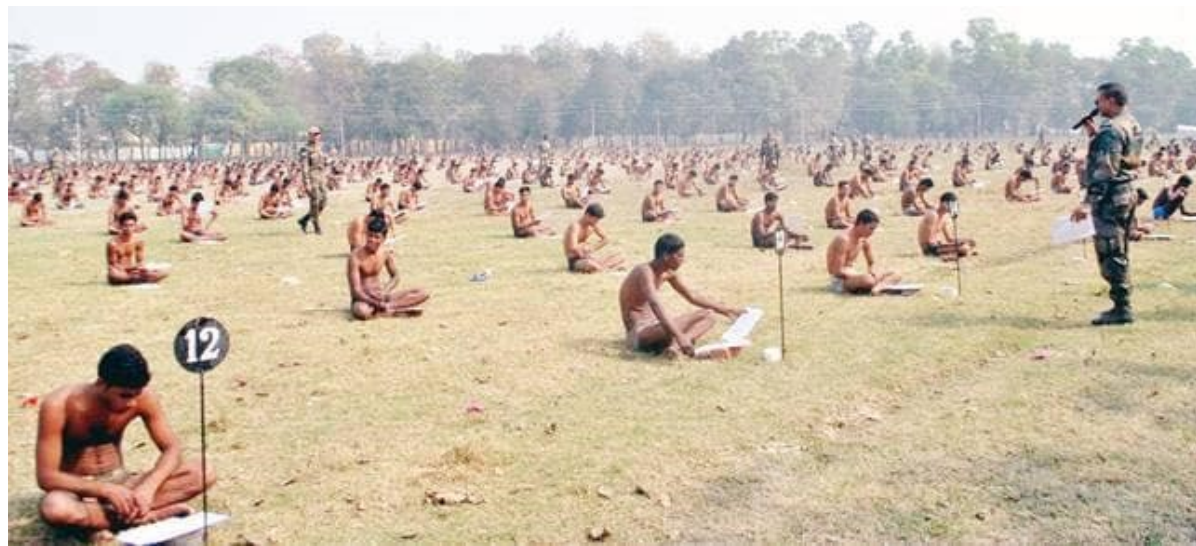
Source (W1, 2017)

Candidates wear newspaper hats to prevent examination cheating



Source (W2, 2020)

Candidates wear boxes on their heads to prevent examination cheating



Source (W1, 2017)

Army recruits were asked to strip off their clothes, as a deterrent to prevent examination cheating, and appear at the examination venue in their underwear.

Figure 1: Inhumane examination conditions

In online examinations today, students and academics have been subjected to unfamiliar examination strategies. The university ICT infrastructure was not designed to accommodate online examinations. Academics were

required to redevelop assessments for an online environment and students had to cope with an unfamiliar examination strategy.

Before embarking on the online examination journey, academics in the authors' School were asked what they considered would be required for successful alternative assessments. As a result of this engagement, some of the issues that were raised are outlined in Table 1.

Table 1: A snapshot summary of alternative assessment opinions

| Theme                                        | Response                                                                                                                                         | Other Concerns of academics                                                                                                                              |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Plagiarism                                   | Use of anti-plagiarism software by all students and staff                                                                                        | Students will need to complete a multiple choice (MCQ) exam, but there is still a risk                                                                   |
| Technology and proctoring                    | Access to Microsoft Teams®, where sessions can be recorded and students have to provide a 10 minute video via Dropbox® as part of the assessment | ICT system stability is an issue, as is access by all students to a computer with a suitable internet connection                                         |
| Sophisticated application of Blooms Taxonomy | If possible, require justification for MCQ answers for additional marks                                                                          |                                                                                                                                                          |
| Cheating                                     | Timed assessment                                                                                                                                 | There is no way to maintain integrity – It is not possible, for example, to know if a Computer Science student gets help from an experienced programmer. |
| Proctoring                                   | Skype Oral, student card verification.                                                                                                           | Some modules are technical and venue-based is the only way to maintain the integrity                                                                     |

The concerns raised by academics regarding plagiarism, cheating, and proctoring of assessments displayed a distrust of their students, which is not unfounded. There appears to be an entire online industry dedicated to inappropriately assisting students. In Appendix A there are screenshots of websites and social media postings that advertise inappropriate student assistance. So, it is not unreasonable to assume that digital scholars have already begun to 'outsource' some of their learning activities, demonstrating that the intellect has become lethargic during assessments.

To develop a better understanding of students' attitudes towards online examinations, a tag cloud was developed using sentiment analysis in conjunction with Tweets. Sentiment analysis is the process of detecting positive or negative sentiment in text. The software that was used to conduct the sentiment analysis was Sentiment Viz® which was developed by the Department of Computer Science at NC State University. A tag cloud is a visual representation of words found in the text. The tag cloud in Sentiment Viz® has an x-axis going from left to right with the labels *unpleasant* to *pleasant* and a y-axis from the top to the bottom with the labels *active* to *subdued*. The tag cloud that was developed, as shown in Figure 2, shows that the word exam appears in all 4 quadrants. This is no surprise as candidates react differently to examinations (in our case online examinations).

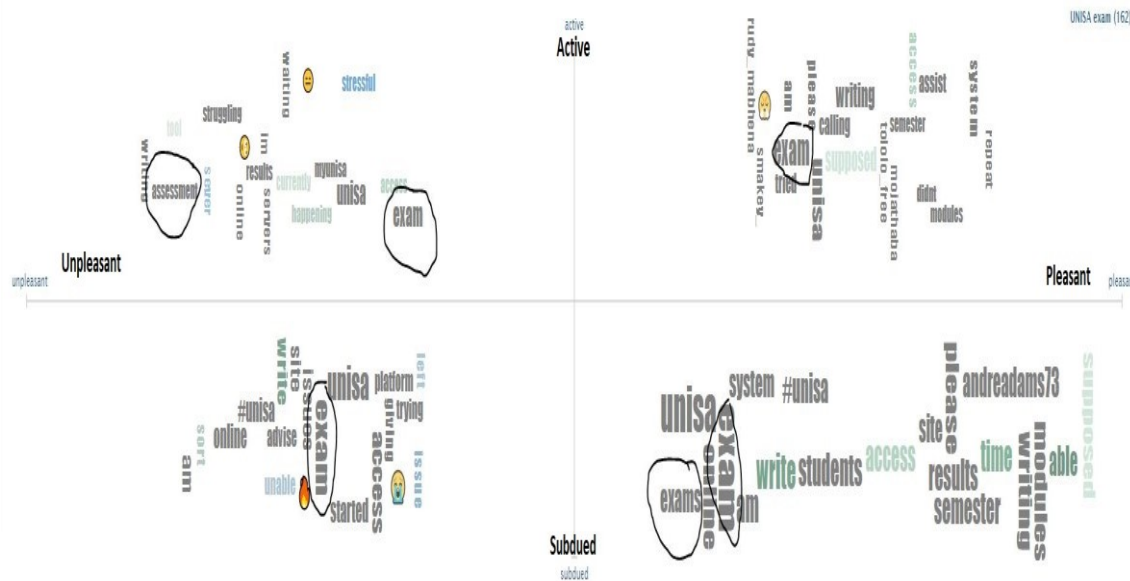


Figure 2: Sentiment Visualisation (Sentiment Tool: [https://www.csc2.ncsu.edu/faculty/healey/tweet\\_viz/tweet\\_app/](https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/) )

### 4.3 New Challenges

Section 4.2 reflected on some of the challenges experienced in the online examination space. Within the digital scholarship space, other areas of concern have arisen in the form of the student's voice, the referral, and the professional tutor. These are outlined in Figure 3.

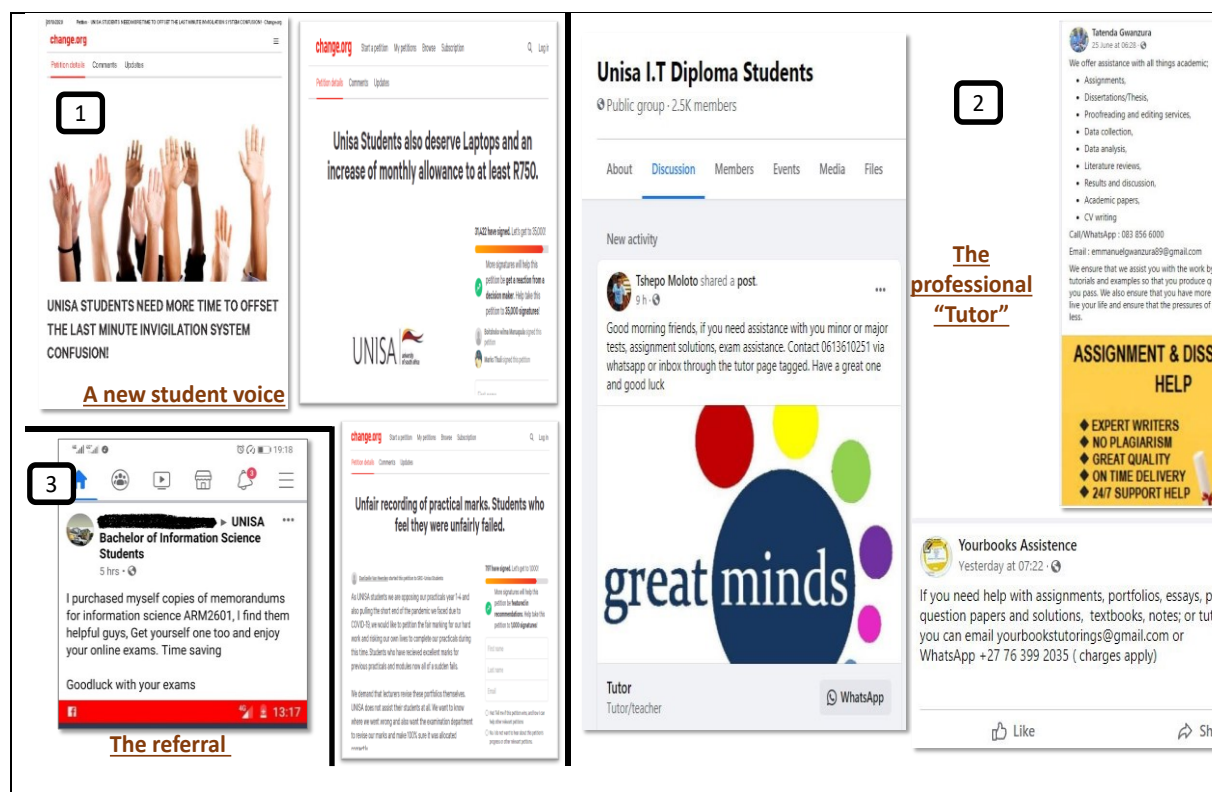


Figure 3: New areas of concern

Looking at each of these in more detail:

- **A new student voice:** Traditionally examinations used to be a closed system within the university. But now, academics face the issue that other interested groups are trying to influence the whole



them a hand up. South African universities have invested significantly in technological support for candidates, but the candidates do not appear to have the appropriate skills to take advantage of this support.

The bureaucracy within the University system does not support innovation in examinations. Staff have outdated technology, university procurement is challenging, and university legal services could be paralysed by the legal implications of using technology-enhanced examinations.

Universities have a long history of operating as independent entities, so much so that they have begun to compete with each other for limited resources and candidates. There is a significant amount of duplication at universities, particularly when it comes to setting examinations. Perhaps there should be a union of universities that share the responsibility to develop high-quality assessments?

Increasingly students are seeking the assistance of “professional online tutors”, the cost-benefit of which appears to have created a market for students to cheat their way through their studies at a marginal cost. As academics, we should be asking ourselves who is really occupying our learning spaces. Is it the students? Is it the professional online tutors? or is it both the students and the professional online tutors? A further concern is, are the voices that we are hearing in our academic spaces those of our actual students or of interested sub parties that may not approve of a particular curriculum or academic.

Academics are knowledge workers and therefore it is entirely plausible for them to work from alternative spaces. However, this introduces the challenge of how or whether to invigilate examinations. Some academics have resorted to using tools such as MS Teams®, Zoom®, and Google Hangouts® to invigilate large examinations. These invigilation practices are driven by external key stakeholders who have a vested interest in the quality of the examination (engineering councils, certification boards, or professional societies). Other academics prefer using tools like Skype for one-on-one examinations, but this is not realistic for large cohorts of students. The premise is that technology will assist in reducing the tendency to cheat. In reality, however, it just introduces other challenges such as those related to the digital divide, human resource constraints, and technology challenges for candidates, academics, and the university. The result is that academics are using new technologies to mirror old practices.

Universities can be considered a trust system. The community trusts the University’s research and the graduates that it produces. However, within the university system, there is a mutual *distrust* between students and academics. Why is it that we do not trust our candidates? Why is it that we as academics spend so much time on the lower-performing student who may cheat? Should we not invest this time on the above-average student? Cheating will happen, but this is a self-correcting system as the cheaters will usually be exposed sooner or later.

Communication channels within the university during examinations have become blurred leading to catapult versus slingshot communication. With catapult communication candidates communicate directly with university top management, and vice versa, about online examination queries, bypassing departments, and academic managers. The disenfranchised academics are informed by candidates about some of the university’s decisions or via the press. With slingshot communication the student catapults an individual examination concern directly to university top management, by-passing the responsible academic and academic managers. The university top management in turn slingshots the student query to the structures below, typically: student query to principal/Vice-Chancellor, principal/Vice-Chancellor to the dean, dean to the school director, school director to the chair of the department, chair of the department to responsible academic. This ineffective type of communication creates a stressful hyper-reactive environment which is open to abuse.

With traditional examinations candidates received an examination paper and at the end of the examination, all papers were collected from the candidate. The university had a policy permitting candidates to query aspects of the examination and we as academics had a safety net to make “adjustments”. In the case of online examinations, candidates are taking screenshots of all questions. They analyse the questions and then pointedly query them and/or the marks that are awarded. It is also plausible that candidates are taking screenshots of the examination questions and sharing the questions with candidates in other countries or with candidates in different time zones.

## 6. Conclusion

The COVID-19 pandemic has brought to our attention that technology must play a greater central role in the learning journey as opposed to a supportive role, but it is also clear that technology cannot be used as a band-aid solution for replicating intellectually lethargic examination practices. We need to develop context-appropriate examination strategies for our society. Our current reality of the examination journey, as shown in Figure 3, will be characterised by social distancing, inappropriate examination venues, and hyper hygiene requirements

In a society plagued by time poverty (Walker, 2013) surely there are better ways of assessing young adults' grasp of knowledge that does not create a stressful environment.



Source (W3, 2020)

Jobseekers in South Korea undertake examinations in a football stadium to reduce the spread of COVID-19.



Source (W4, 2020)

Cleaner disinfects examination venue



Source (W5, 2020)

Candidates take outdoor examinations and maintain social distancing

Figure 3: The New Reality

Academics, in general, are overburdened with tuition obligations, academic citizenship, research, and administration. The academic space by design is a research space, where academics are first and foremost researchers and then tuition leaders. Why should academics have to become detectives to investigate cheating in undergraduate examinations? Academics are a scarce resource, whose time should be used more productively. It has been recognized that technology is evolving and so is education, but people will still cheat.

It is important to note that some students have realised that the examinations system has to evolve, and this evolution is to protect the academic integrity of the degree and the recipient of the degree, see Figure 4. While students are recognising that professional certifications are being proctored, it is only a matter of time before online proctoring will become standard practice at universities.

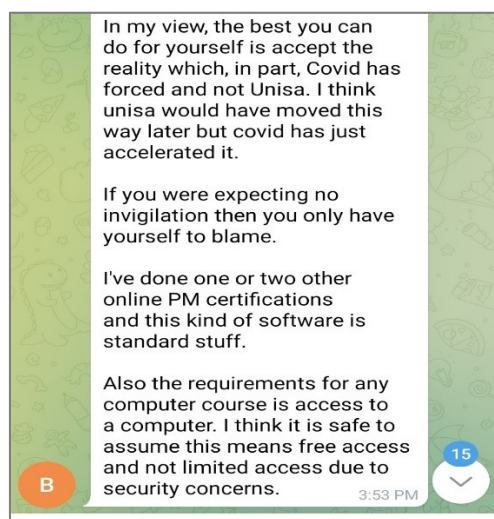


Figure 4: Student Voice

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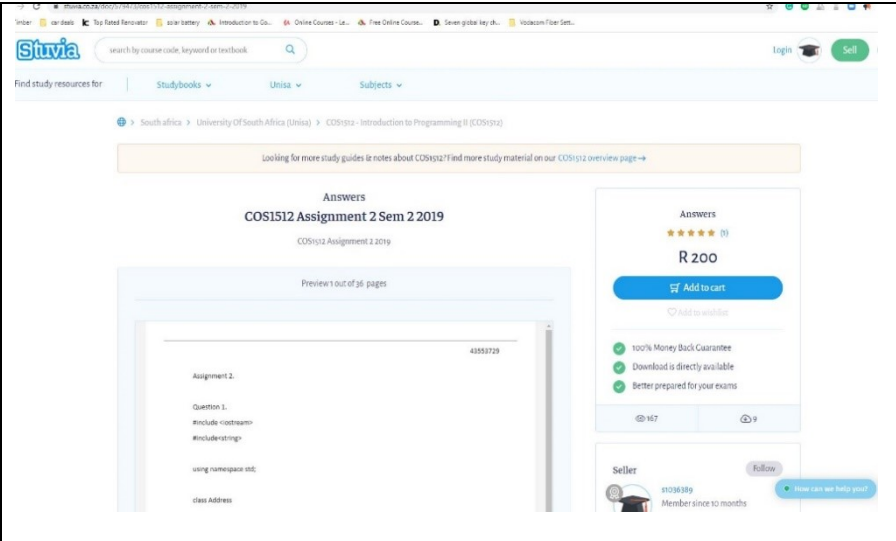
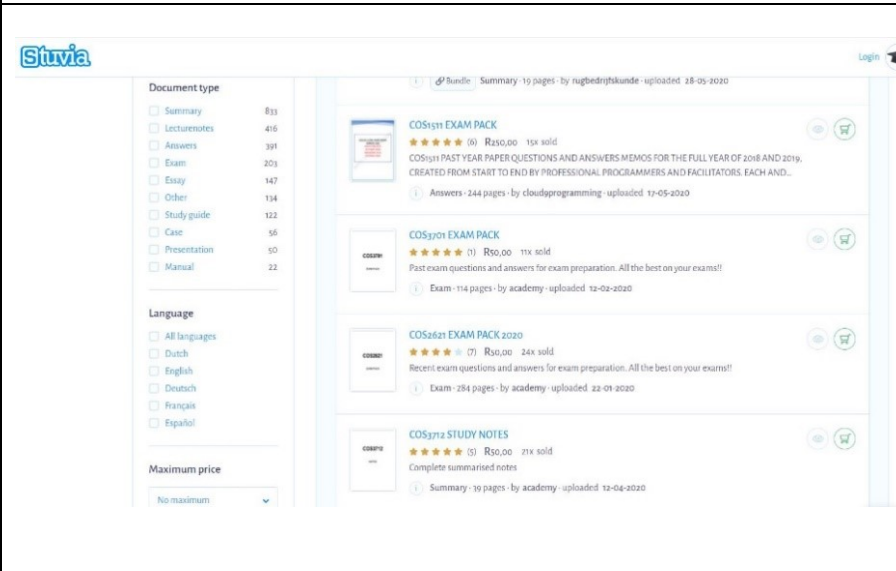
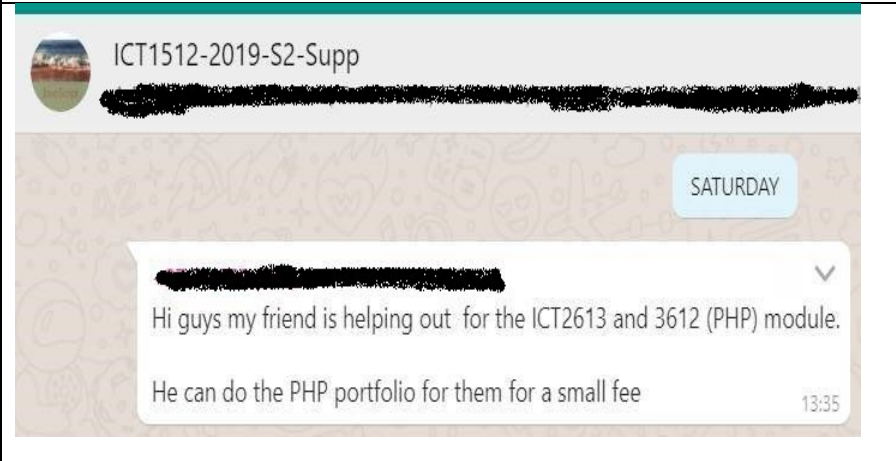
## References

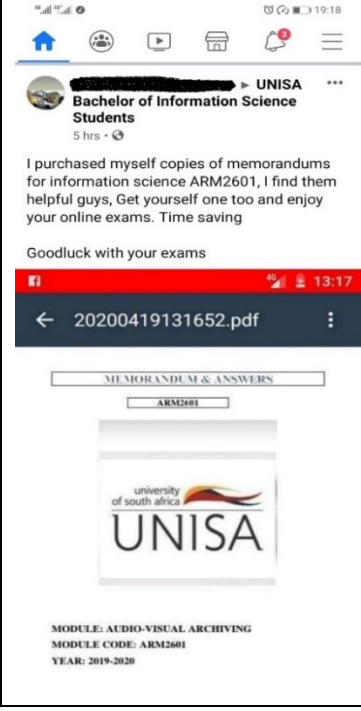
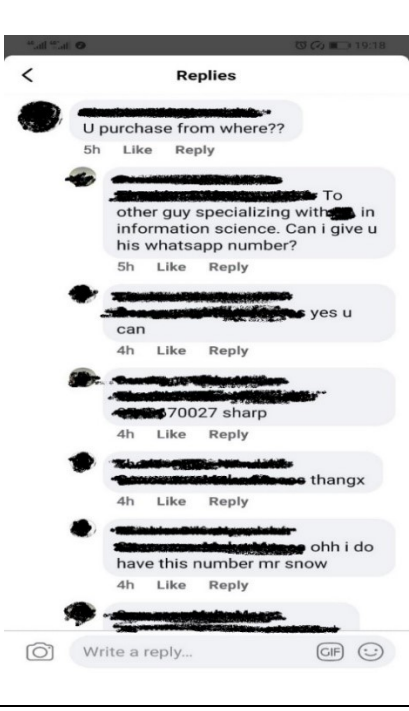
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## Appendix A

### Technology-driven cheating

|                                                                                      |                                                                                                               |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|    | <p>A website that sells solutions<br/>(<a href="https://www.stuvia.co.za/">https://www.stuvia.co.za/</a>)</p> |
|   | <p>A website that sells solutions<br/>(<a href="https://www.stuvia.co.za/">https://www.stuvia.co.za/</a>)</p> |
|  | <p>WhatsApp      Cheating<br/>Group</p>                                                                       |

|                                                                                   |                                                                                    |                                     |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------|
|  |  | <p>WhatsApp Group      Cheating</p> |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------|