

# Digital Technology Use in South African Higher Education Teaching and Learning: A Comparative Study



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## ABSTRACT

The technology advancements which have been made possible by the Fourth Industrial Revolution are increasingly making information and communication technologies (ICTs) an integral part of both basic and higher education. The South African TVET sector, has received less attention in research on ICT integration in its activities, both in terms of teaching, learning and its information management. The key objective of this article was to determine the level of technology use in the teaching and learning (instructional) practices of two different higher education institutions in South Africa. The researchers employed mixed methods to collect quantitative and qualitative data from one university (North West University, Vaal Triangle Campus) and one TVET institution (Sedibeng TVET, Leko and Vanderbijlpark Campuses) in South Africa. We found that there is a substantial technological gap between the university and the TVET college under study, negatively affecting the adoption of digital technology in the TVET institution. Findings of this study reveal wide disparities in the two institutions' adoption and utilisation of ICTs, particularly those that promote an e-learning environment in efforts to harness technology for teaching and learning. The study revealed that higher education institutions, particularly TVET institutions, need more ICT support, coupled with a more defined ICT/Digital policy framework governing their use of digital technology to thrive in the digitally driven administrative landscape of the era of digital governance. The paper recommends the need for more ICT capacity building in the TVET colleges. This study makes a unique contribution to digital technology use in the context of the TVET sector.

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## INTRODUCTION

The use of information and communication technology (ICT), driven by pedagogical and socio-economic factors and the Covid-19 pandemic, is fast changing the organisation and instructional delivery of higher education institutions (HEIs). Change has been happening at an uneven pace in the higher education sector, driven by tremendous advancements in technology that are seeing far-reaching developments in administrative systems. The diffusion and use of technology as an enabler of the education process has thus become part of international best practice because of the digital revolution of the 21<sup>st</sup> century. This has led to one key conclusion by the scholars and researchers that ICT utilisation has become a necessity for higher education administration.

Technology advancements made possible by the Fourth Industrial Revolution are increasingly making information and communication technologies (ICTs) an integral part of both basic and higher education. Literature points to several benefits of integrating digital technology into teaching and learning.<sup>1</sup> Higher education institutions and students should keep up with ICTs rapid pace of ICT's technological innovation, paying particular attention to digital media. Globally, digital media and communication have thus become a part of studying and delivering knowledge. In spite of the uncertainty surrounding the impact of the 4IR transformations on society, nearly any aspect of life, including education, is likely to undergo rapid and intense changes. Thus, incorporating ICTs into the teaching and learning functions of higher education institutions, which are a hub for skill development,<sup>2</sup> is important to ensure anticipation and preparedness for current and future challenges. Hence, the OECD states that institutions of higher learning should move from reactive to proactive policy making on service delivery by anticipating citizens' needs before they ask for service.<sup>3</sup> One of the OECD's key recommendations is, therefore, the establishment of integrated service delivery methods that ensure accessibility of services and information across multiple channels and methods.

As digital technology has become more accessible in South Africa, it is necessary to incorporate it into the effective running of all higher learning institutions. However, Yasak and Alias argue that most studies attempted in the area of ICT application in TVET are mainly theory-based without much empirical evidence.<sup>4</sup> Although numerous studies have been carried out on the application of ICT in universities,<sup>5</sup> there is scarce literature on the application of ICT in TVET college knowledge administration. This avenue still requires research attention if digital technologies are to bring benefits equally to both universities and TVET institutions.

With the arrival of the 4IR, it is imperative that the focus of today's higher education be in line with the demands posed by current technological advancements and the ever-changing needs of citizens.<sup>6</sup> The current population of students in higher education institutions mostly consists of a cohort of learners who have grown up surrounded by technology. According to Thinane, these learners are digital natives, greatly affected and influenced by the arrival and rapid spread of digital technology during the final decades of the 20th century; hence, they adapt easily to technological changes.<sup>7</sup> Advancements in technology should, therefore, give the South African higher education sector an opportunity to rethink current service delivery models (SDMs) in order to address service delivery challenges and other social challenges affecting South African communities and students at present and in the future. Internal organisational environments that are capable of delivering on their mandates and increasingly improving their processes to the delight of customers are now a prerequisite for public organisations, so that they are responsive to the dynamic external environments. Effective ICT adoption and online service is the way to go for the enhancement of administrative efficiency and meeting the needs of a dynamic and digital society.

Nonetheless, while UNESCO emphasise the importance of ICT integration in universities, the question to ask is, what role is ICT adoption and digitalisation playing in other higher learning institutions other than universities in South Africa? Are TVET colleges, which also fall under the higher education

<sup>1</sup> e-Learning Africa, "E-Learning Africa Report," 2012, <https://www.elearning-africa.com/index.php>; Innocent Baguma, *Integrating ICT into the Teaching Practice of Academics at a University* (University of Pretoria (South Africa), 2018); R Moyo, "Adoption of Information and Communication Technologies in Teaching and Learning at a University," *South African Journal of Higher Education* 33, no. 5 (2019): 42–60; Joseph Crawford et al., "COVID-19: 20 Countries' Higher Education Intra-Period Digital Pedagogy Responses," *Journal of Applied Learning & Teaching* 3, no. 1 (2020): 1–20.

<sup>2</sup> Zanele Buthelezi, "Lecturer Experiences of TVET College Challenges in the Post-Apartheid Era: A Case of Unintended Consequences of Educational Reform in South Africa," *Journal of Vocational Education & Training* 70, no.3 (2018):364–83.

<sup>3</sup> OECD, *Education at a Glance. 2019 OECD Indicators* (Paris: OECD Publishing, 2019).

<sup>4</sup> Zurina Yasak and Maizam Alias, "ICT Integrations in TVET: Is It up to Expectations?," *Procedia-Social and Behavioral Sciences* 204 (2015): 88–97.

<sup>5</sup> Tyoden G Nanbam, ABDULLAHI S Ringim, and U B A A Ringim, "Effective Practices of ICT Administration in Higher Institutions in Nigeria.," *Journal of Information Technology Educators and Researchers (JITER)* 1, no. 1 (2018); Roseline Unoma Chidobi, "Extent of ICT Application in the Management of Administrative and Student Personnel Records in the Public Universities in Enugu State, Nigeria.," *World Journal of Education* 5, no. 4 (2015): 64–71; UNESCO, "ICTs in Higher Education\_ Background Paper.," *UNESCO Conference on Higher Education* ( Paris: UNESCO, 2009).

<sup>6</sup> William Anthony. Bates, "Teaching in a Digital Era Age," Pressbooks, 2019, <https://opentextbc.ca/teachinginadigitalage/>.

<sup>7</sup> Tsekelo Shadrack Thinane, "The Institutionalisation of Effective Rehabilitation Programmes at Groenpunt Maximum Security Prison" (North-West University, Vaal Triangle Campus, 2010).

scope in South Africa, equally tapping into the benefits of ICTs in their administration?<sup>8</sup> Saud et al recognised the scarcity of literature on the application of ICTs in the TVET sector in developing countries. They argue that the area of ICT application in this sector has attracted few scholars of advocacy, with a few contributions from TVET professionals like Yasak and Alias.<sup>9</sup>

Seemingly, research in the area of ICT application in administrative functions of a variety of higher education institutions is not very evident in the South African context. Few research studies have focused on the classroom-level importance of ICTs in university institutions without much attention to the other HEIs. However, Moyo is concerned that despite being the second largest economy on the continent after Nigeria, South Africa has not really set a role model in seizing opportunities offered by digital technologies in all the institutions of higher learning.<sup>10</sup> The South African government aims to position the country as a significant player in the development and utilisation of ICTs and to accelerate its uptake in all sectors through the country's e-Strategy code-named "Digital Society South Africa."<sup>11</sup> In spite of this, implementation of ICT strategy and policies is slow, and implementation capacity thereof in higher education is also limited, according to observations made by Moyo.<sup>12</sup>

The South African TVET sector seems to have less research attention in the area of ICT integration in its activities, both in terms of teaching, learning and its information management, as studies tend to focus more on basic education and universities.<sup>13</sup> These gaps in the literature on ICT usage in TVET colleges need research attention so that TVET institutions do not continue to lag behind in their uptake of technology and improvement of their administrative efficiency. There is a need for more probing into the potential uses and benefits of ICTs in both universities and TVET instructional processes, thus steering the whole Post School Education and Training (PSET) sector in tune with the 21<sup>st</sup> century drive ushered in by the Fourth Industrial Revolution.

The key objective of this article was to determine the level of technology use in the teaching and learning (instructional) practices of two different higher education institutions in South Africa. Furthermore, the study sought to establish factors influencing the adoption of technology or non-adoption thereof in the teaching and learning process of the institution based on Rogers's innovation adoption factors.<sup>14</sup> This was done through analysing the extent of ICT use in the teaching and learning processes of one TVET college and one university in the Gauteng province. This study sought to answer the following key questions:

- i. In what ways are higher education institutions using digital technologies in promoting effective knowledge administration (teaching and learning)?
- ii. What factors influence the technology adoption levels in higher education practices?

## METHODOLOGY

The study incorporated a case study of one university (North West University, Vaal Triangle Campus) and one TVET institution (Sedibeng TVET, Lekoa and Vanderbijlpark Campuses) in order to enable an investigation of a phenomenon within its real-life context through an empirical inquiry. The researcher purposively sampled students and academic staff of the two institutions and recruited them via email, WhatsApp and telephonically. Heads of Departments, senior lecturers and programme coordinators were also conveniently targeted/sampled. The totals for the samples were 150 students for the quantitative survey and 18 respondents for the qualitative study, made up of nine students and nine academic staff. In this study, only lecturing staff and students were respondents to the survey questions; hence, not all 27 staff members indicated in the original staff sample were involved. This makes the total sample size 168 respondents. The number of campuses per institution from which the samples were derived determined

<sup>8</sup> UNESCO, "ICTs in Higher Education\_ Background Paper."

<sup>9</sup> M Saud et al., "Applicability of Information and Communication Technologies (ICTs) in the Administration of Technical and Vocational Education and Training (TVET) in a Knowledge-Based Society," *International Journal of the Physical Sciences* 6, no. 28 (2011): 6513–20; Yasak and Alias, "ICT Integrations in TVET: Is It up to Expectations?"

<sup>10</sup> Moyo, "Adoption of Information and Communication Technologies in Teaching and Learning at a University."

<sup>11</sup> DHET, "Open Learning Policy Framework for Post-School Education and Training" ( Pretoria: Government Printers, 2017).

<sup>12</sup> Moyo, "Adoption of Information and Communication Technologies in Teaching and Learning at a University."

<sup>13</sup> Godwin P Dzvapatva, Zoran Mitrovic, and Anthony D Dietrich, "Use of Social Media Platforms for Improving Academic Performance at Further Education and Training Colleges," *South African Journal of Information Management* 16, no. 1 (2014): 1–7.

<sup>14</sup> E. M. Rogers, *Diffusion of Innovations*, 5th ed. (Tampa, FL: Free Press, 2003).

the number of participants; hence, there were more TVET participants than university ones in both the quantitative and qualitative samples.

The researchers used mixed methods, an exploratory sequential design to collect quantitative and qualitative data. Caruth posits that in this approach, the researcher first gathers quantitative data and follows up with gathering qualitative data to enhance the quantitative findings.<sup>15</sup> After ethical clearance was granted by the North-West University, quantitative data were collected during the period July and November 2020 using a literature study, website analysis of the two institutions' e-services and a structured survey questionnaire shared with students. The questionnaire was distributed online during the Covid-19 pandemic, Alert Levels 5, 4 and 3 in South Africa, owing to challenges posed by the Covid-19 pandemic on contact research. Telephone and in-person semi-structured interviews were conducted with knowledge instructors (lecturing staff) and students sampled from the three campuses from which the study was conducted, that is, NWU Vaal Campus, Sedibeng TVET Lekoa Campus and Sedibeng TVET Vanderbijlpark Campus, between January and February 2021, as a follow-up on the quantitative survey findings. Interview questions were derived from the quantitative data. The qualitative sample was independent of the quantitative sample, as participants were not derived from the quantitative sample. The researcher applied the following codes to easily identify the interview respondents:

- i. UNL1 = university lecturer 1
- ii. UNS1 = university student 1
- iii. TVL1 = TVET lecturer
- iv. TVS1 = TVET student 1

## PRESENTATION OF FINDINGS AND DISCUSSION

The researcher used IBM SPSS Software version 27 to analyse and present the questionnaire data, particularly using simplistic descriptive statistics. The empirical findings were based on simple statistical analysis, displayed in frequency tables and graphs. The data from the interviews were analysed using thematic analysis. The researcher triangulated data from the literature study, the quantitative survey, interviews and website analysis to corroborate the emerging themes from the quantitative and qualitative data. Triangulated data informed the study findings and discussion insofar as the integration of technology in higher education institutions' knowledge administration is concerned. Descriptive theme categories based on Rogers' innovation characteristics of relative advantage, complexity, compatibility, trialability and observability were drawn and discussed in the presented findings.<sup>16</sup>

### Current Level of Digital Technology Use in Higher Education Institutions' Knowledge Administration

This section presents and discusses the empirical findings of the study done on the use of ICTs for knowledge administration (teaching and learning) by one TVET college and one university in South Africa. Table 1 presents students' opinions on the availability of specific online service facilities in their institutions.

**Table 1: Availability of online service facilities**

	Tvet College			University		
	Yes	No	Total	Yes	No	Total
E-learning portal availability Count	70	15	85	64	1	65
Percentage	82.4%	17.6%	100%	98.5	1.5%	100%
Online internal assessments Count	2	83	85	62	3	65
Percentage	2.4%	97.6%	100%	95.4%	4.6%	100%
Online distance learning and exams Count	7	78	85	61	4	65
Percentage	8.2%	91.8%	100%	93.8%	6.2%	100%

<sup>15</sup> Gail D Caruth, "Demystifying Mixed Methods Research Design: A Review of the Literature.," *Online Submission* 3, no. 2 (2013): 112–22.

<sup>16</sup> Rogers, *Diffusion of Innovations*.

Online library Services	Count	0	85	85	65	0	65
Percentage		0.0%	100%	100%	100%	0.0%	100%

### ***i. Availability of E-learning Management Portals***

Learning management systems, synonymously known as e-learning portals, play a significant role in bringing benefits to both learners and instructors in facilitating teaching and learning.<sup>17</sup> The quantitative surveys checked if the institutions had functional e-learning portals that enabled student-student and student-educator interactions at all times. Results (Table 1) revealed that both the university and TVET College had in place an electronic portal, which can facilitate online teaching and learning since they are both connected to the internet. Of the 85 TVET college respondents to the questionnaire, the vast majority (42.67%) acknowledged the presence of an e-portal for use by students and lecturer interaction, while 21% stated its absence or were not sure of its presence. Most of the university students, on the other hand (64 participants), confirmed the presence of the e-learning portal, except for one who said it did not exist.

Findings from the website analysis done by the researcher also revealed that both institutions have electronic portals/learning management systems to facilitate teaching and learning, thus corroborating survey findings above. Nonetheless, there are slight differences in the nature of the institutions' Learning Management Systems. The University institution makes use of an open source software eFundi, powered by Sakai, while the TVET College makes use of an on-premises, licensed product, Sedibeng Online, which is installed on the organisation's server to the specifications of the organisation. Both systems are, however, remotely accessible as they are cloud-based. Both require registered students and staff to have login credentials that give them access to the portal. Both portals enable uploading and downloading of teaching and learning materials, support text, graphics, as well as audio-video resource sharing, though the video sharing is limited on the TVET portal. They also provide gateways for both staff and students to upload assessments and download feedback; however, with no facility for real-time interaction between users, for example, chat room facilities.

During the structured interviews, the majority of students from both the university and TVET College also confirmed having an e-learning portal. UNS2 was quoted saying:

*There is an online portal for our institution (eFundi) where we can access uploaded resources and assessments from our lecturers. We also submit our tasks through the same portal; we do not necessarily have to submit paper-based assessments.*

One of the TVET respondents (TVS4) also responded thus:

*I followed instructions on the website to create passwords that enable us to log into the e-learning portal, where we can access information uploaded for us by our lecturers. There, we can get assessments and upload them for our lecturers to mark. Furthermore, on the same platform are links that we can click to download YouTube videos and links to support materials from Future Managers, where I often look for Exam question papers and memoranda.*

TVL4 and UNL3's responses showed agreement on the components of the portal. Their responses indicated common e-learning tools on the university and TVET College's portals, namely: a notice board, online assessment, teaching and learning resources, evaluation and progress recording tools.

### ***ii. Technology Use in Internal Assessments***

The survey also checked if institutions were making use of online assessments. In Table 1, the majority of TVET students (97.6%) confirm that their institution does not use online assessments. On the other hand, the majority of university students (95.4%) acknowledged the presence of online assessment services in their institution. Generally, the overall results show that electronic assessment is very common in the university and non-existent in the TVET College, showing that the TVET institution still relies on manual processes of assessments regardless of the benefits presented by technology in this area of educational practice.

<sup>17</sup> e-Learning Africa, "E-Learning Africa Report"; Baguma, *Integrating ICT into the Teaching Practice of Academics at a University*.

Mooney et al suggest that in this era of digital influence, online assessment presents greater advantages to both students and staff. They argue that though online assessments are accessible via a variety of devices ranging from iPads, mobile cell phones, laptops etc., with which most of today's generation is familiar.<sup>18</sup> If institutions can take advantage of technology for assessments, then it would go a long way to reduce costs, including printing costs, invigilation and venue costs, as everything will be electronic.

In the face of the COVID-19 challenges affecting the education landscape, Mukhtar et al opine that online assessments present advantages for education continuity.<sup>19</sup> These multi-fold advantages of online assessments, among others, should influence the transition to online/digital modes in the TVET College in order to comply with the requirements of the digital era and the Covid-19 pandemic on education.

Nonetheless, it is important to note that certain factors might be affecting the college's move to online assessments. For instance, challenges of technology adoption by expected users and infrastructural barriers may have a bearing on the capacity of an institution to employ technology in its assessment practices.<sup>20</sup> Therefore, before labelling the TVET institution as a laggard in technology adoption, research is needed on the preparedness of all types of HEIs in South Africa for effective integration of technology.

### **iii. Option for Online Distance Learning and Online Exams in the Institution**

This study aimed to determine whether the two institutions had an option for online distance learning, as well as conducting exams online for off-campus students as a way of extending access to higher education through virtual classes. Results presented in Table 1 revealed that 93.8% of university respondents acknowledged the existence of online distance learning and examinations in their institution, while 91.8% TVET participants indicated that there was no option for online distance learning and examination in their institution.

Through the website analysis, the researcher found out that the university offers distance-learning programmes, thus corroborating quantitative findings. There is a link to open distance learning (ODL) on the website (<https://distance.nwu.ac.za>), and a list of programmes offered is accessible under this link. The site also shows links to distance learning support in the form of

- Student resources
- Lecturer recordings
- Gateway to the university's LMS (eFundi), which provides distance learners with access to the online library, indirect interaction with lecturers, as well as links for uploading internal assessments.
- Exam Timetables

The information on the website reveals that the university has learner support centres used for online classes across South Africa and Namibia, thus offering expansion of access to learning opportunities to both local and international students online. The university also has 104 distance learning examination centres used for conducting paper-based exams. The TVET College website, however, does not show the availability of distance learning facilities. This indicates that the TVET institution has not yet harnessed the power of technology to expand access to higher education and administer knowledge through online tuition and distance learning. In other words, the university provides both contact and online access to teaching and learning services, while the TVET institution still depends largely on face-to-face pedagogy to fulfil its mandate.

Sustainable Development Goal (SDG4) of the United Nations Development Programme (UNDP) targets the achievement of universal access to quality education for all by 2030. In line with this goal, higher education should ensure noticeable progress towards ensuring the provision of equal access to

<sup>18</sup> Christopher J Mooney et al., "Rapid Transition to Online Assessment: Practical Steps and Unanticipated Advantages.," *Medical Education* 54, no. 9 (2020).

<sup>19</sup> Khadijah Mukhtar et al., "Advantages, Limitations and Recommendations for Online Learning during COVID-19 Pandemic Era," *Pakistan Journal of Medical Sciences* 36, no. COVID19-S4 (2020): S27.

<sup>20</sup> Nurce Arifiati et al., "University Students Online Learning System during Covid-19 Pandemic: Advantages, Constraints and Solutions.," *Systematic Reviews in Pharmacy* 11, no. 7 (2020).

education<sup>21</sup> through the creation of online/digital learning opportunities. Universities in South Africa use e-learning in a variety of ways, from email provision, online journals, to creative software solutions for managing information in teaching, research and administrative systems.<sup>22</sup> Sadly, the increasing use of ICT in South African higher education has not automatically tipped over into curriculum changes and pedagogical practices in the TVET institution under study. The TVET sector, as one of the skills development sectors, needs to embrace online distance learning to cater for people who may have limited access, for example, the disabled and employed people whose time schedules cannot allow them to attend classes. Hence, there is a need to appraise the potential of ICTs to deliver knowledge flexibly and on a large scale, thus addressing the demand for knowledge economies for a skilled workforce and improved access to higher education.

#### iv. Availability of Online Library Facilities

One aspect of an effective higher education system lies in its ability to maintain a good library management system. The digital age makes this possible by incorporating technology in the management of library systems to make library resources and information available to users 24/7. The survey checked whether both institutions had an online library system that enabled remote access to library resources. All the TVET college questionnaire respondents (Table 1) indicated the non-availability of online library services in their institution, while all university students agreed that an online library was available and accessible for students and lecturers both on campus and remotely.

The researcher checked the website for information that suggests the existence of remotely accessible library services in both the TVET College and the university. The results indicated that the university has a gateway/ link to the institution's library <https://library.nwu.ac.za/>. The portal/gateway gives monitored access to the library, information services, providing both students and staff with links to, among other things.

- Catalogues which allow searching for journals and books available in the library collection.
- Online book renewals
- Lists of electronic databases like Emerald Insight Journals, Boloka, and Google Scholar. In total, the library has 320 databases that are accessible to both staff and registered students anytime.
- Libguides, where resources are arranged according to subjects.

This facility is available to all registered students and staff by use of login credentials provided by the university, making it possible for distance learning students to access library services anywhere at any time, thus reducing the hassles of having to travel to the campuses.

On the TVET website, on the other hand, no evidence exists of an internet-accessible library. However, under the college's gateway to academic services, there are links to additional online resources from two book publishers, Future Managers (<https://www.futuremanagers.com/lecturer-support/>) and MacMillan (<https://www.macmillan.co.za/tvet-downloads>). The two publishers provide links to lecturer and student support where they can download materials like lecturer guides, past exam papers, YouTube videos from different courses, etc. This generally means TVET students rely mostly on physical library resources, if any, thus they cannot have 24/7 access and resources in digital format (e-books, articles, and other database resources) like their counterparts in the university, regardless of being higher education students too. Follow-up interviews revealed mixed feelings about the nature of the institutions' library services. One of the university students (UNS1) during the structured interview stated:

*One good thing is that we access library resources 24/7 through a link provided on the website. As long as one has internet access, there is no need to visit the library daily.*

Responding to the same question on the nature of the library found in their institution, TVET Student 1 (TVS1) had this to say:

<sup>21</sup> e-Learning Africa, "E-Learning Africa Report."

<sup>22</sup> Emily Bagarukayo and Billy Kalema, "Evaluation of Elearning Usage in South African Universities: A Critical Review," *International Journal of Education and Development Using ICT* 11, no. 2 (2015).

*Whenever we need library resources, we have to visit the campus library, which does not have many books, especially modern ones. Most of the books are old, and sometimes they have no content covered in the curriculum. I have never accessed the library remotely for the two years I have studied here.*

Another student, TVS3, was even shocked to hear that a library can be accessed remotely. He only knew that a library was found on the premises of the college as a building with many books. His comment was:

*This is the first time I have heard of an internet-accessed library. Is it not that a library is a building where we can find a variety of reading materials that can help us in our studies? If this type of library depends on the internet, I do not think I will benefit from it a lot because internet data is expensive.*

This response from TVS3 revealed that the student may represent a number of students who are still uninformed about the possibility of accessing library resources at any place and time through an electronic library system, something a higher education student should be well versed with in order to enhance their knowledge acquisition skills. Furthermore, it reveals the digital divide that still prevails among the students, as not all have internet connection capability due to data costs that are unaffordable for some.

Clearly, all results from website analysis, qualitative and quantitative surveys show that the TVET College has not yet integrated ICTs in the library system, therefore, it still depends on physical/traditional library resources for the benefit of its students and staff, unlike the university institution. Hence, there is a need for tertiary institutions to upgrade and overhaul their systems to stand up and meet challenges at the global level through technological innovation. An upgrade to the institution’s LMS to one that can accommodate more features is probably a possible solution to the TVET College’s improvement in ICT integration in the library system. Considering that TVET students enrol in semester and trimester courses that have short timeframes for completion, an online library would go a long way in enhancing their studies as they would be able to make use of library resources anytime and anywhere and improve their performance.

**v. Frequency of e-Learning Portal Use**

Amin observed that the new digital and knowledge society of this millennium demands that academics move from traditional teaching and learning methods towards more innovative ways of instructional delivery.<sup>23</sup> The researcher was therefore interested in finding out if the staff and students of the two institutions were actually using the innovative e-portals frequently, as well as the number of e-learning tools on the portals that they actually use, in order to determine their level of use of the portals. Quantitative results were analysed by checking the perceptions of students on the frequency of e-portal use per institution, as illustrated in Table 2 below:

**Table 2:e-Portal use frequency per institution and frequency of internet use in studies**

	University				TVET College			
	Never	Sometimes	Often	Always	Never	Sometimes	Often	Always
1. Portal use frequency	0	5	38	22	77	8	0	0
	0.0%	7.7%	58.5%	33.8%	90.6%	9.4%	0.0%	0.0%
2. Frequency of internet use in studies	0	4	21	40	5	40	32	8
	0.0%	6.2%	32.3%	61.5%	5.9%	47.1%	37.6	9.4

<sup>23</sup> Jayendrakumar N Amin, “Redefining the Role of Teachers in the Digital Era,” *The International Journal of Indian Psychology* 3, no. 3 (2016): 40–45.

The question of the tools on the portal that respondents actually use and the frequency of use revealed wide disparities in the level of use of the e-learning portals by university and TVET College respondents. University staff and students indicated using around four of the tools on the portal (eFundi), namely, noticeboard, assessments, learning resources, online library and course guides. UNS3's comment was:

*I personally use the portal almost every time I want to submit my tasks to the lecturers for assessment. It is not as if we have a choice; our college policy makes it compulsory for all students and lecturers to use the portal, especially now that we do not have contact classes due to Covid-19.*

Another student (UNS2) mentioned that he regularly checks the noticeboard for announcements from lecturers, uploads assessment tasks for marking, checks feedback (participation marks), checks uploaded resources and links to the library via the e-portal. All of the university students representing 43.33% of the whole student questionnaire sample indicated that staff and students in their institution do use the portal frequently for teaching and learning interaction. One university lecturer also confirmed this when they said:

*We have always used the system of online assessments even before the COVID-19 pandemic. University policy requires staff and students to make use of e-Fundi as it enables us to connect remotely. It also allows uploading and downloading of assessments and resources at one's convenience. With our fully equipped computer labs and offices, as well as fast Wi-Fi on our premises, the use of the portal does not pose many challenges to both staff and students.*

In view of the responses above, it is evident that the university largely makes use of its e-learning portal, e-Fundi and has yielded benefits from its use for a long time now. University policy, coupled with the availability of resources, seems to be a driving force behind the high adoption of the e-learning portal by both staff and students. TVET respondents, however, showed a very limited use of the electronic portal (Sedcol Online) in their teaching and learning practices despite its availability. The majority of TVET participants (90.6 %) hinted that staff and students never use the online learning portal for teaching and learning activities. Generally, the data gives evidence of the unpopularity of the online teaching and learning initiatives in the TVET College as compared to the university. Data in Table 2 above shows that the majority of TVET students never connect to the online learning portal, while only eight of them sometimes access the portal. This further agrees with the comments by TVS6, who, during the interview, responded to the same question. When asked how often the students and staff use Sedcol Online, the college's e-learning portal, one student from the engineering department (TVS6) said:

*I would be lying if I said the portal is used for teaching and learning. Most of the students just heard about it for the first time when we came back to campus in June after the hard lockdown. This portal was recently introduced, and those without internet connection and WhatsApp groups with their lecturers did not get to know about it during the lockdown break. Even when we came back to campus, lecturers never posted anything on this portal. It seems like it is not functional. I am not sure if in other departments and campuses they are using it.*

During one of the interviews with TVET lecturers, TVL3 had this to say:

*The only use I ever make of the portal is when I access the Future Managers' link to lecturer support materials. Apart from that, all the other tools are just like window dressing. It is frustrating to use them, seeing that most students complain of having no internet access, hence they never open anything I post, so I gave up.*

The TVET institution's participants made very little use of the LMS because they felt it was not clearly explained to them. Moreover, it required internet access all the time, which most students did not have; therefore, it was not worth the effort. This supports the observation by Rogers that an LMS

implementation requires substantial preparation and convincing users of the innovation's benefits in order for them to embrace it.<sup>24</sup>

One of the questions checked if the students made use of the internet in their studies. Out of all the students who participated in the quantitative survey, only five, constituting 3.3% of the sample, indicated never using the internet in their studies. A cumulative percentage (96.6%) of the total sample indicated using the internet for study purposes, though at different frequencies, as shown in Table 2. This is evidence that non-use of the portal is not because students cannot use the internet, but rather an expression of other reasons, like not realising its relative advantage.<sup>25</sup> In the Diffusion of Innovations theory, Rogers argues that the extent to which expected adopters of an innovation perceive the innovation as having more advantages than the current system in use determines its adoption.<sup>26</sup> TVET participants do not seem to have noticed any difference that using the portal brought to their teaching or learning; therefore, they did not see the need to change from their usual methods.

According to Rogers, the attributes of an innovation as perceived by its target users/adopters play a significant role in its adoption rate.<sup>27</sup> One such attribute is whether the innovation is compatible with the beliefs, values, past experiences and needs of the adopters. This is because the diffusion of innovations takes place within a social system where expected behaviours and needs can be enablers or barriers to the diffusion of the innovation.<sup>28</sup> As administrators and educational leaders think of new approaches to pedagogy, the question to consider is whether the use of educational technology is well matched with the existing experiences and expectations of both staff and students in the institution.

Responses from TVET staff and students thus indicated that they mainly use one tool, the link to staff and student support, which enables them to access limited resources from two book publishers, namely Future Managers and McMillan. From the website analysis, the researcher nonetheless picked up the fact that the resources uploaded on these links do not cover all courses and levels, although they do provide a narrow extension to resources found in the library for the few programmes that are fortunate to have information. This, therefore, means there is a great possibility that some of the students and staff do not use the portal at all. It is evident that the TVET e-learning portal, Sedibeng Online, will remain more of a “White elephant” until expected users start using it and yield more benefits from it. Thus, Baguma emphasised the need for higher education management teams to be prepared to handle increasing demands and expectations of tech-savvy students and staff, especially in these current times of the Covid-19 pandemic challenges that render traditional teaching methods ineffective.<sup>29</sup>

#### ***vi. Use of emerging digital technologies in teaching and learning***

The surveys also checked staff and students' engagement with specific emerging technologies during teaching and learning practices. The list of emerging/digital technologies checked was populated through findings from literature reviewed on common digital platforms used by staff and students in supporting pedagogy.

Both samples (qualitative and quantitative) were asked about the software/technology they use to enhance teaching/learning. As indicated by Figure 1 below, both TVET and university students use WhatsApp on a regular basis for educational purposes.

<sup>24</sup> Rogers, *Diffusion of Innovations*.

<sup>25</sup> Rogers, *Diffusion of Innovations*.

<sup>26</sup> Rogers, *Diffusion of Innovations*.

<sup>27</sup> Rogers, *Diffusion of Innovations*.

<sup>28</sup> D. Wilson and Conyers M., “ Transform Teaching With the Diffusion of Innovation,” Edutopia, 2015.

<sup>29</sup> Baguma, *Integrating ICT into the Teaching Practice of Academics at a University*.

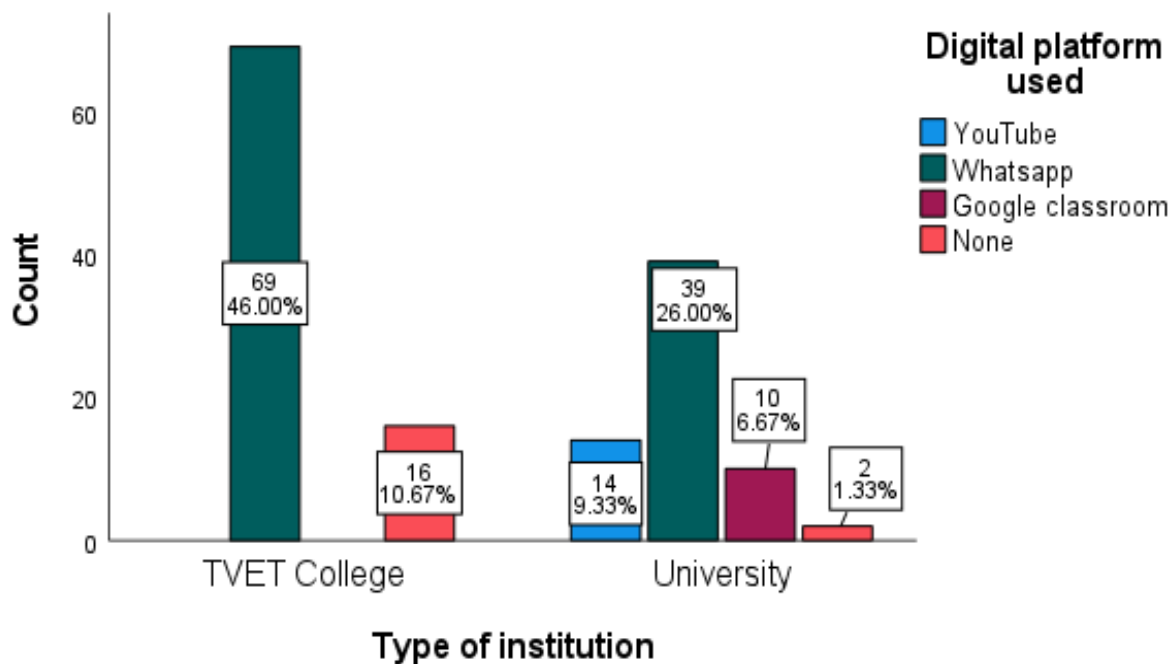


Figure 1: Digital platforms used to enhance teaching and learning

The findings in the quantitative survey indicate that TVET students primarily use WhatsApp in the institution to enhance teaching and learning, while university students use other platforms, namely, YouTube (9.33%) and Google Classroom (6.67%). TVS5's comment was:

*Most of the time, our lecturers send us information via WhatsApp. That is the only technology we can afford as students since data costs are killing most of us. At least most of us have mobile phones and are familiar with this app; it is easier to access information on WhatsApp than on the college portal, with its complicated login processes and the need for more internet data. If the problem of internet access for students is addressed, I think we would also benefit from YouTube videos, Zoom and all other internet-based forms of communication that can benefit us, especially during this difficult time of the Covid-19 pandemic. We are losing a lot of learning time due to these reduced class sizes, and I don't see us really completing the syllabus.*

During the interview, both TVET and university staff indicated using mainly PowerPoint presentations and WhatsApp to supplement their usual face-to-face teaching methods. TVL4 commented saying:

*This thing of technology is not very user-friendly for some of us who did not have great exposure while growing up. Hence, for me, creating YouTube videos or organising Zoom meetings with my students is something I have never attempted. In addition, where do I get the time, seeing that I first need to learn the use of technology, and at the same time, I need to cover up for lost time and make students ready for the exams?*

Another lecturer, UNL1, mentioned that he prefers to use PowerPoint slides to summarise content for his students. He also indicated not using many of the Web 2.0 technologies, as they required lots of time, which they did not have, to put the content together. This agrees with Rogers, who observed that the complexity with which users perceive an innovation influences their rate of adoption.<sup>30</sup> Lecturers in the study perceived the use of emerging technologies as time-consuming, hence their preference for PowerPoint. This finding on lecturer preferences in technology use also agrees with findings by Riehemann and Jucks, who observed that while lecturers prefer conventional methods like e-mail,

<sup>30</sup> Rogers, *Diffusion of Innovations*.

PowerPoint and the institution's LMS, students are more interested in using social media tools (YouTube, WhatsApp, Zoom, Facebook etc.) that fall under the Web 2.0 technologies.<sup>31</sup> Most students, being digital natives, perceive Web 2.0 technologies as user-friendly based on their day-to-day experience with the technology, which influenced them to adapt them into their learning practices. As such, there is a need to consult with and seek the opinion and perception of both educators and students about the use of technology in knowledge management in a bid to inform future best practices in digital media use in education.

Both findings from the quantitative and qualitative surveys suggest that students are mainly interested in using emerging technologies, based on the number of applications they use compared to lecturers. Most students have turned to the informal e-learning platforms powered by Web 2.0 technologies (e.g. WhatsApp, Facebook, YouTube, Google search engines) in conjunction with formal platforms since most students are more exposed and knowledgeable in such informal platforms. Bagarukayo and Kalema observed that such technologies could act as pedagogical agents that allow learners to identify the people and resources they need to solve problems and add them to their social networks, since information spreads fast, creating opportunities for networked learning.<sup>32</sup> This finding agrees with Riehemann and Jucks, who also observed that students identified advantages of digital media in supporting tutorials, learning success, communication and cooperation, implying that it has a higher relative advantage.<sup>33</sup> Hence, Mpungose suggests that South African higher education institutions should develop governance structures and strategic plans for the infusion of emerging technologies into institutional life.<sup>34</sup> An interesting finding that both TVET and university students are using WhatsApp and YouTube regularly in their studies supports Mpungose in his argument that South Africa seems to have more mobile learners ('M' learners), who have a higher preference for mobile technologies.<sup>35</sup> This study thus pushes the argument in favour of emerging technologies and their enhancing effect on pedagogical practice in SA higher education teaching and learning environments through their capability to promote prompt feedback, collaboration and student-lecturer / student-student interaction.

The limited number of technologies used by lecturers as compared to students is a reflection of lecturers' divisive attitude towards integrating ICT into pedagogy, since lecturers should be the ones to teach and promote e-learning tools. This agrees with innovation scholars who cited the lack of technology adoption by knowledge instructors as a hindering factor to effective e-learning adoption.<sup>36</sup> The findings above, however, point to a poor ICT adoption rate among TVET respondents, which can generally be true for the whole institution. From these findings, it is arguable that students, some of whom may be digital natives, are possibly being deprived of embracing technology for efficient and effective knowledge acquisition through the negative attitude shown to technology by knowledge instructors. Conversely, digital immigrants among lecturers and students, i.e., those born before or suffering from the digital divide, may find it difficult to switch between traditional and technological teaching and learning methods. This calls for effective capacity building for ICT use for both staff and students in order to change negative attitudes shown towards the integration of technology in teaching and learning.

Although ICT does offer affordances for HEIs to enhance their pedagogy, it is not always readily acceptable to all institutions. While the South African environment offers a lucrative foundation for ICT integration in higher education, particularly e-learning, not all higher education institutions have effectively integrated technology into their teaching and learning practices. Higher education in South Africa faces the challenge of a diverse range of institutions with different levels of readiness for ICT-enhanced practices. A gulf is widening between the technologies used by university and TVET

<sup>31</sup> Jens Riehemann and Regina Jucks, "How Much Is Teaching and Learning in Higher Education Digitized? Insights from Teacher Education," *International Journal of Higher Education* 6, no. 3 (June 6, 2017): 129, <https://doi.org/10.5430/ijhe.v6n3p129>.

<sup>32</sup> Bagarukayo and Kalema, "Evaluation of Elearning Usage in South African Universities: A Critical Review."

<sup>33</sup> Riehemann and Jucks, "How Much Is Teaching and Learning in Higher Education Digitized? Insights from Teacher Education."

<sup>34</sup> Cedric Bheki Mpungose, "Is Moodle or WhatsApp the Preferred E-Learning Platform at a South African University? First-Year Students' Experiences," *Education and Information Technologies* 25, no. 2 (2020): 927–41.

<sup>35</sup> Mpungose, "Is Moodle or WhatsApp the Preferred E-Learning Platform at a South African University? First-Year Students' Experiences."

<sup>36</sup> Moyo, "Adoption of Information and Communication Technologies in Teaching and Learning at a University"; Dalton Kisanga and Gren Ireson, "Barriers and Strategies on Adoption of E-Learning in Tanzanian Higher Learning Institutions: Lessons for Adopters," *International Journal of Education and Development Using ICT* 11, no. 2 (2015); Hamed Fawareh, "Elearning Management Systems General Framework," *World Academy of Science, Engineering and Technology* 7, no. 9 (2013): 1221–25.

stakeholders, those used by educators and those provided by students. This study sought to determine the extent of ICT integration in the pedagogical practices of one university and one TVET College in South Africa.

Findings of this study revealed wide disparities in the two institutions' adoption and utilisation of ICTs, particularly those that promote an e-learning environment. While the university institution has shown great strides in its use of technology by both students and staff, the TVET institution is seen to be lagging behind in efforts to harness technology for teaching and learning. Generally speaking, there is not much use of the college's e-learning portal (Sedcol Online) by lecturers and students alike, with both of them preferring WhatsApp as a learning and teaching platform. Assessments are still done face-to-face, and the TVET institution still depends largely on a traditional library system. Hence, it can be concluded that while the university institution is largely using technology to enhance knowledge administration, the TVET College is still in its infancy concerning technology integration in teaching and learning practices. The use of technology is minimal, with a stronger reliance on traditional methods of knowledge administration.

A close analysis, however, shows that this limited utilisation of technology among the TVET sector participants should not be deemed as foot-dragging, as this is perpetuated by a variety of factors that are not equally affecting the university. Institutional constraints are shown to influence user willingness and ability to adopt emerging technologies in their practice. These impeding factors in the TVET institution range from poor ICT infrastructure in the campuses, inadequate computer labs for out-of-class use, lack of internet access by most students off-campus, inadequate ICT literacy for staff and students, as well as unequal ICT support for staff and students. Given this scenario, although the TVET institution is not showing great strides in its use of technology for knowledge administration, it will be unfair to label the institution as a laggard in the diffusion and adoption of technological innovations. Factors, namely complexity, compatibility, relative advantage, observability and trialability of innovations, greatly affect the rate of diffusion and adoption of innovations.

## **RECOMMENDATIONS**

The study posits that higher education institutions, particularly TVET institutions, need more ICT support, coupled with a more defined ICT/Digital policy framework governing how they use digital technology to thrive within the digitally driven administrative landscape of the digital era governance. The study further proposes that TVET management teams consider the importance of online distance learning to extend training opportunities beyond the physical boundaries of campuses, thereby helping meet the SDG4 indicated above through the adoption and effective use of digital technologies in pedagogy. The college can benefit greatly by learning from the university's best practice in digital teaching and learning systems, as the university is just a few kilometres from the TVET institution.

## **CONCLUSION**

This study has highlighted a substantial technological gap between the university and the TVET college under study, negatively affecting the adoption of digital technology in the TVET institution. Findings point to the need for more ICT capacity building in the TVET colleges. In this study, the factors of innovation complexity and compatibility played a more negative role on the uptake of e-learning technology in the TVET College than in the university, as revealed in quantitative and qualitative findings. Tackling the above-mentioned challenges that contributed to the complexity and incompatibility of innovations in the TVET institution could bring more fruitful outcomes of ICT integration, lest the gap between universities and TVET institutions' use of technology will continue to widen despite them falling under the same higher education sector in South Africa. As a result, the researchers agree with Moyo that private-public partnerships are necessary for the acquisition, utilisation, and introduction of technology in teaching and learning, especially in TVET. Furthermore, the implications of this study centre on both students and staff in order for them to have a better appreciation of technology and remain relevant in this era of digital governance worldwide. It was observed that training and reskilling of educational instructors and students in using state-of-the-art and modern digital technologies and other relevant learning management platforms should be made compulsory at all institutions of higher learning. Only then can

one realise the effective integration of ICTs in higher education pedagogy across all institutions of higher learning.

## BIBLIOGRAPHY

- Amin, Jayendrakumar N. "Redefining the Role of Teachers in the Digital Era." *The International Journal of Indian Psychology* 3, no. 3 (2016): 40–45.
- Arifiati, Nurce, Ety Nurkhayati, Ela Nurdiawati, Giantoro Pamungkas, Suhroji Adha, Agus Purwanto, Octoberry Julyanto, and Enji Azizi. "University Students Online Learning System during Covid-19 Pandemic: Advantages, Constraints and Solutions." *Systematic Reviews in Pharmacy* 11, no. 7 (2020).
- Bagarukayo, Emily, and Billy Kalema. "Evaluation of Elearning Usage in South African Universities: A Critical Review." *International Journal of Education and Development Using ICT* 11, no. 2 (2015).
- Baguma, Innocent. *Integrating ICT into the Teaching Practice of Academics at a University*. University of Pretoria (South Africa), 2018.
- Bates, William Anthony. "Teaching in a Digital Era Age." Pressbooks, 2019. <https://opentextbc.ca/teachinginadigitalage/>.
- Buthelezi, Zanele. "Lecturer Experiences of TVET College Challenges in the Post-Apartheid Era: A Case of Unintended Consequences of Educational Reform in South Africa." *Journal of Vocational Education & Training* 70, no. 3 (2018): 364–83.
- Caruth, Gail D. "Demystifying Mixed Methods Research Design: A Review of the Literature." *Online Submission* 3, no. 2 (2013): 112–22.
- Chidobi, Roseline Unoma. "Extent of ICT Application in the Management of Administrative and Student Personnel Records in the Public Universities in Enugu State, Nigeria." *World Journal of Education* 5, no. 4 (2015): 64–71.
- Crawford, Joseph, Kerrynt Butler-Henderson, Jürgen Rudolph, Bashar Malkawi, Matt Glowatz, Rob Burton, Paola A Magni, and Sophia Lam. "COVID-19: 20 Countries' Higher Education Intra-Period Digital Pedagogy Responses." *Journal of Applied Learning & Teaching* 3, no.1(2020):1–20.
- DHET. "Open Learning Policy Framework for Post-School Education and Training." Pretoria: Government Printers, 2017.
- Dzvapatsva, Godwin P, Zoran Mitrovic, and Anthony D Dietrich. "Use of Social Media Platforms for Improving Academic Performance at Further Education and Training Colleges." *South African Journal of Information Management* 16, no. 1 (2014): 1–7.
- e-Learning Africa. "E-Learning Africa Report," 2012. <https://www.elearning-africa.com/index.php>.
- Fawareh, Hamed. "Elearning Management Systems General Framework." *World Academy of Science, Engineering and Technology* 7, no. 9 (2013): 1221–25.
- Kisanga, Dalton, and Gren Ireson. "Barriers and Strategies on Adoption of E-Learning in Tanzanian Higher Learning Institutions: Lessons for Adopters." *International Journal of Education and Development Using ICT* 11, no. 2 (2015).
- Mooney, Christopher J, Sarah E Peyre, Nancy S Clark, and Anne C Nofziger. "Rapid Transition to Online Assessment: Practical Steps and Unanticipated Advantages." *Medical Education* 54, no. 9 (2020).
- Moyo, R. "Adoption of Information and Communication Technologies in Teaching and Learning at a University." *South African Journal of Higher Education* 33, no. 5 (2019): 42–60.
- Mpungose, Cedric Bheki. "Is Moodle or WhatsApp the Preferred E-Learning Platform at a South African University? First-Year Students' Experiences." *Education and Information Technologies* 25, no. 2 (2020): 927–41.
- Mukhtar, Khadijah, Kainat Javed, Mahwish Arooj, and Ahsan Sethi. "Advantages, Limitations and Recommendations for Online Learning during COVID-19 Pandemic Era." *Pakistan Journal of Medical Sciences* 36, no. COVID19-S4 (2020): S27.
- Nanbam, Tyoden G, Abdullahi S. Ringim, and U B A A Ringim. "Effective Practices of ICT Administration in Higher Institutions in Nigeria." *Journal of Information Technology Educators and Researchers (JITER)* 1, no. 1 (2018).
- OECD. *Education at a Glance. 2019 OECD Indicators*. Paris: OECD Publishing, 2019.

- Riehemann, Jens, and Regina Jucks. "How Much Is Teaching and Learning in Higher Education Digitized? Insights from Teacher Education." *International Journal of Higher Education* 6, no. 3 (June 6, 2017): 129. <https://doi.org/10.5430/ijhe.v6n3p129>.
- Rogers, E. M. *Diffusion of Innovations*. 5th ed. Tampa, FL: Free Press, 2003.
- Saud, M, Babawuro Shuaibu, L Tahir, Yahaya Buntat, Noraffandy Yahaya, and A Gital. "Applicability of Information and Communication Technologies (ICTs) in the Administration of Technical and Vocational Education and Training (TVET) in a Knowledge-Based Society." *International Journal of the Physical Sciences* 6, no. 28 (2011): 6513–20.
- Thinane, Tsekelo Shadrack. "The Institutionalisation of Effective Rehabilitation Programmes at Groenpunt Maximum Security Prison." North-West University, Vaal Triangle Campus, 2010.
- UNESCO. "ICTs in Higher Education\_ Background Paper." *UNESCO Conference on Higher Education*. Paris: UNESCO, 2009.
- Wilson, D., and Conyers M. "Transform Teaching With the Diffusion of Innovation." Edutopia, 2015.
- Yasak, Zurina, and Maizam Alias. "ICT Integrations in TVET: Is It up to Expectations?" *Procedia-Social and Behavioral Sciences* 204 (2015): 88–97.

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