

# **Students' experiences in relation to the use of online learning and collaborative technologies during COVID-19 outbreak in South African Universities**

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## **Abstract**

Student's experiences on the use of online collaborative technology continues to attract attention of researchers in education and social sciences. Of particular interest is the reliance on technological and digital platforms, using web-based strategies during the outbreak of COVID-19 in institutions of learning. This study used an unlinked, anonymous survey to explicate experiences of students on the use of online technologies during the COVID-19 pandemic in South Africa. Consenting participants constituted a study population that was made up of first year accounting students in a public university in South Africa, drawing a sample of 190 from a population of 371. Using a theory of connectivism, the study found that students were eager and confident that collaborative technology could lead them to pass their examinations even if face-to-face intervention was missing. Collaborative technology consisting of tools such as WhatsApp, Blackboard and Zoom made it easy for them to relate with instructors and faculty who were making efforts to deliver content in a simplified manner. The study further concluded that efforts have to be made to study the benefits of collaborative technology both to learners and faculty at institutions of higher learning.

**Key Words:** Technology, E-learning, Universities, Online learning Blended-learning

## **1. Introduction**

The outbreak of COVID-19 did not only disrupt lifestyles across every sector of every nation but created a need for fast-paced and accelerated acquisition of technological skills by members of different disciplines and occupations (Schleicher, 2020). Delivery of learning support by faculty members in institutions of higher learning in South Africa was severely impacted, due to skill levels of faculty in terms of digital and technological platforms (Mpungose, 2020). On the other hand, albeit the fact that student's comprehension of technology is not a problem, there were other related factors such as access to internet or costs of data that affected their progress with learning.

Across university campuses around the world, students reported that stress and mental well-being have a detrimental impact on them (Mok, Xiong & Rahman, 2021; Cao *et al.*, 2020; Wang *et al.*, 2020). Unlike traditional online learning elements such as Massive Open Online Courses (MOOCs) and learning management systems (e.g., Moodle or Canvas), this 'rush-to' transfer has ushered in a new phenomenon known as "emergency online learning," which has left instructors, students, and higher education administrators perplexed (Chung, Subramaniam & Dass, 2020; Korkmaz & Toraman, 2020; Xiong, Jiang & Mok, 2020). These disruptions also underscore the need for timely empirical and theoretical research to offer solutions to the issues of emergency online learning.

### **1.1 Online learning**

Online e-learning is defined as learning experiences that take place in synchronous or asynchronous environments using various electronic devices (e.g., computers, laptops, smartphones, etc.) with internet access. Online e-learning could be a platform for making the educational process more student-centred, creative, and adaptable (Singh & Thurman, 2019). Online course distribution is cost-effective and convenient, especially when offering material to students in rural and remote places (Dhawan, 2020). The United Nations (UN) and the World Health Organization (WHO) regard online e-learning as a valuable instrument for satisfying educational needs, particularly in poor countries (Colace, De Santo, & Pietrosanto, 2006). To counteract the situation, medical schools have developed a variety of innovative solutions, including the use of software/apps such as Google Classroom, Zoom, and Microsoft Teams to offer online classes. For most universities, the concept of virtual class of e-learning was initiated to increase the students' conviction and faith in their faculty throughout the COVID-19 epidemic (Kaur, Dwivedi, Arora, & Gandhi, 2020), not only to complete the course but also to keep in continual contact with the learners.

## **1.2 Collaborative Technology**

According to Huber and Huber (2007), the terms "collaboration" and "cooperation" are used interchangeably in several publications, yet these terms underline the different use of these terminologies (Huber & Huber, 2007). Product orientation is associated with an understanding of collaboration, whereas process orientation is associated with cooperation. On the pedagogical discourse, product is characterised as experience. Experience is defined as the accumulation of knowledge, abilities, and attitudes acquired over one's life, which are positively assessed by the individual, reinforced in one's habits, and applied in a range of activity scenarios. Furthermore, neuropsychological results about brain activity as intrapersonal, interpersonal, and introspective processes (Roth, 1997) broaden the idea of knowledge and allow for deeper product definition as a knowledge triangle of education, research, and innovation. Thus, collaboration is defined as "a coordinated, synchronous activity that is the consequence of a continuous attempt to develop and sustain a common conception of a problem" (Roschelle & Teasley, 1995), of which cooperation with the use of e-collaboration technology is an essential component. Blending WhatsApp, Facebook, Blackboard, Moodle and other related technologies may be defined as use of collaborative technology. Online learning is contextually viewed as teaching accessible via the internet. Merging online learning and collaborative technology may provide an opportunity for universities in advent of pandemics and other future disruptors.

## **1.3 Global Experiences of using Collaborative Technology in education**

The present Covid-19 pandemic has produced unparalleled upheaval, and the resulting economic and social measures have resulted in tremendous transformation (Krishnamurthy, 2020; Costa, 2020). The education sector was also severely impacted, with UNESCO pointing out that universities were completely closed in April 2020 in 185 countries, impacting teaching and learning to over 1 million students globally (Marinoni, Van't Land, & Jensen, 2020).

It is against this backdrop that universities, as with all other institutions, had to immediately transform themselves as digital institutions, reliant on proper use of collaborative technologies and online platforms, as a new normal. The reality of the new normal, as disrupted by COVID impacts, has resulted in a drastic restructuring of education and training, with global higher education being one of the sectors undergoing major digital revolution (Dwivedi, et al., 2020). Due to the necessity to adjust quickly to total e-learning environments, academics and students have found themselves in "unfamiliar territory" as a result of the sudden forced closure of face-to-face education (Carolan, Davies, Crookes, McGhee, & Rox-Burgh, 2020).

Universities have had to adapt to online education in record time, implementing and adapting the collaborative technology resources available and incorporating professors and researchers who lack natural technological capabilities for online teaching (Dwivedi, *et al.*, 2020). In a world of digital transformation, disruptive technology innovation, and rapid change in the educational framework, the university system must be prepared to provide high-quality education. Disruptive innovation is a period of risk and uncertainty, but it is also a time of opportunity, bringing talent and creativity to education. From a global perspective, experiences of students as well as those of faculty are hereby observed.

Students cited technical difficulties as the most difficult aspect of adjusting to online instruction (Mishra, Gupta, & Shree, 2020). Some scholars point out how online schooling can exacerbate the digital divide (Govindarajan & Srivastava, 2020). Institutions should mobilise resources to ensure that all students have access to a proper IT infrastructure and broadband connection, as well as specific technical support to resolve technical issues (Carolan, Davies, Crookes, McGhee, & Rox-Burgh, 2020). Universities must ensure that students from less affluent socioeconomic backgrounds are not disadvantaged in this new environment in order to ensure an equitable student experience. Students reported the following key hurdles (among others) to maintaining attention in a solely online context: boredom, sense of isolation, lack of time to follow the various themes, and lack of self-organising capacities (Mishra, Gupta, & Shree, 2020). Professors also mentioned that isolation was a big issue when it came to designing the courses, implying that the best balance of individual student-centred learning and collaborative learning, as well as fostering virtual communities of practice to boost student peer engagement and collaboration, is needed (Carolan *et al.*, 2020). Students cited technical difficulties as the most difficult aspect of adjusting to online instruction (Mishra *et al.*, 2020). Some scholars point out how online schooling can exacerbate the digital divide (Govindarajan & Srivastava, 2020). Institutions should mobilise resources to ensure that all students have access to a proper IT infrastructure and broadband connection, as well as specific technical support to resolve technical issues (Carolan *et al.*, 2020). Universities must ensure that students from less affluent socioeconomic backgrounds are not disadvantaged in this new environment in order to ensure an equitable student experience. Students reported the following key hurdles (among others) to maintaining attention in a solely online context: boredom, sense of isolation, lack of time to follow the various themes, and lack of self-organising capacities (Carolan, Davies, Crookes, McGhee, & Rox-Burgh, 2020). Professors also mentioned that isolation was a big issue when it came to designing the courses, implying that the best balance of individual student-centred learning and collaborative learning, as well as fostering virtual communities of practice to boost student peer engagement and collaboration, is needed (Carolan *et al.*, 2020).

## 1.4 South African Experiences of using Collaborative Technology in education

In South Africa, almost all institutions of higher learning have relied on face-to-face learning since the inception of higher education, from colonisation to decolonisation (Cuban, 1986). Jansen (2004) argued that face-to-face learning is considered traditional and excludes students' experiences because it takes place in the presence of a lecturer depositing knowledge for students in a delineated classroom, using traditional methods (lecturer-centred) and traditional resources such as textbooks, charts, and chalkboards. However, these physically defined classrooms are inaccessible in the event of a crisis, which could range from student protests to pandemic outbreaks.

Face-to-face learning allows students to interact with materials and others in real time, occurs within a predetermined contact period, and delivers immediate feedback to students (Black & Wiliam, 2006; Waghid, 2018). E-learning is alternatively referred to as online learning, and it is a catch-all phrase for any type of learning that occurs over a distance and not on a face-to-face platform (Anderson, 2016; Mpungose, 2020). Additionally, Choudhury and Pattnaik (2020) assert that the definition of e-learning advances in lockstep with the evolution of the Web from Web 0 to Web 4.0. Thus,

"Web 0, which was a read-only site, introduced the world to Internet-based learning. On this basis, Web 2.0 and Web 3.0 enabled real-time engagement and networked intelligence, respectively. We are currently witnessing Web 4.0, in which computer and human brain can communicate directly" (Choudhury & Pattnaik, 2020:2).

The terms "e-learning," "remote education," "online education," and "web-based education" have all been used in the literature. However, Rodrigues, Almeida, Figueiredo and Lopes (2019:88) assert that both of these ideas share the characteristic that "they are a type of instruction that takes place between a learner and an instructor and is held at various times and/or locations, utilising a variety of different types of material." Arkorful and Abaidoo (2015) define e-learning as the use of educational technologies to facilitate online access to educational and instructional materials.

Thus, the importance of e-learning in 21st century university education is apparent, particularly for today's students who are digital natives (Bennett, Maton & Kervin, 2008; Prensky, 2001). According to Amory (2010) and Khoza (2019), e-learning is capable of delivering course content online due to the widespread usage of modern technologies such as hardware resources (computers, laptops, and mobile phones) and software resources (learning management system, software applications, social media sites and others).

This implies that students have the ability to access course information/content at any time and from any location, regardless of the threat posed by a pandemic outbreak—as long as they have access to hardware and software resources. Complicating the preceding issue, other researchers (Nikoubakht & Kiamanesh, 2019; Liu & Long, 2014) claim that face-to-face learning is irreplaceable and is the bedrock of all learning institutions, even if current discourse and technological advancements compel the usage of e-learning. According to the latter studies, there is still a paradox between face-to-face (live synchronous interaction between individuals) and e-learning (self-paced learning in an asynchronous platform). Other experts (Anderson, 2016; Bates, 2018; Graham, 2006) argued that blended learning, which mixes online and face-to-face instruction, is preferable, because it allows students to access course content in a variety of ways based on their needs (strengths/limitations). It is for this reason the authors sought to answer the following research question: *What are students' experiences in relation to use of online learning and collaborative technologies during the COVID-19 outbreak in South African Universities?*

## **2. Theoretical Framework**

The Theory of Connectivism was selected as a suitable lens through which this study was investigated within the educational paradigm. As an educational theory, connectivism has its roots in distributed learning (Siemens, 2004). Its supporters argue that it is relevant to today's digital society, and it holds a different epistemological position than Driscoll's(2005) classification which includes objectivism (linked to behaviourism as learning theory), pragmatism (linked to cognitivism), and interpretivism (linked to constructivism). Education planners should rethink the notion of learner engagement alongside the evolution of learning as the final principle. Another proponent of Connectivism as a suitable theory in the educational domain proclaimed that:

"The idea that knowledge is distributed across a network of connections, into its nodes, and that learning consequently consists of the ability to generate and traverse those nodes connected into networks" (Downes, 2012:9).

Connectivism focusses on connectivity, information, and communication technology integration into education through varied networks and distribution channels (Siemens, 2004). It is common knowledge that in a network, there are many connections and links between entities that can be referred to as nodes and each node has or needs information as a form of knowledge. The term "node" can refer to a person, group ,machine or even abstract concepts and communities.

A change in data at one node triggers a change in data at another. The nodes of a network play an important role in distributing information that can be translated into true knowledge

through comprehension. Knowledge and insight are represented through deep relationships. Learning in connectivism is actionable information in its purest form. Learners exploit weak links between nodes, notice patterns, connect to the little realm of individual knowledge (meaning making), and extend their personal network. The assumption of connectivism is that individuals or organisations with some skill in a given field share their information, as Siemens and Downes demonstrate (Downes, 2012; Siemens, 2004). This sharing of knowledge will be mapped to data collected and useful in analysis thereof.

### **3. Methods**

The philosophical paradigm of this study is positivism. Literature that underpins this study was retrieved through google scholar database. An unlinked, anonymous survey of students in the accounting department of a public university institution was conducted, using a Likert Scale. The purpose of the survey was not to generalise findings, but to draw understanding of experiences (Huber & Huber, 2007). The study sample was made up of 190 students from a population of 371 first year accounting students.

Survey Monkey was used for both sample calculation and online data collection. It was chosen as a viable and dependable tool for gathering quantitative data. A five-point Likert type scale was used in this investigation. The tested in the study were student's experiences and use of collaborative technology. Thus, the dependent variable was student's experiences while the moderator variable was use of technology and the independent variable being collaborative technology.

### **4. Ethical Considerations**

After permission was granted to carry out the research, the respondents were engaged to ascertain their willingness and availability to participate voluntarily in the study. This study carefully applied research principles consistent to informed consent, anonymity, confidentiality and no harm to the participants.

### **5. Findings and Discussion**

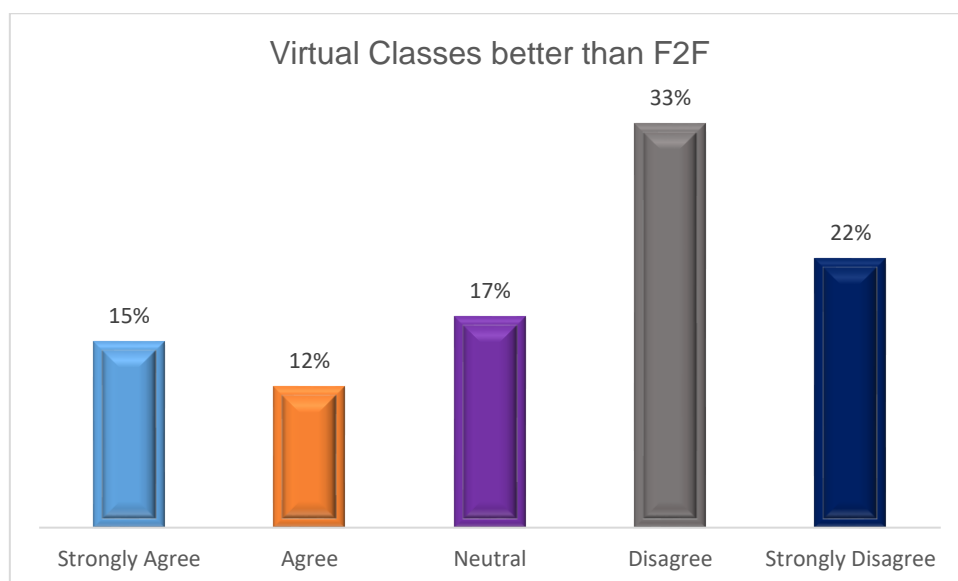
The concept of students experiences as a result of sudden shift to online learning platforms and collaborative technologies have attracted scholars from diverse disciplines within social and educational sciences. Some worldwide studies have looked into the issue of access as it relates to the pandemic-related shift to online learning. For example, two Turkish studies found that after switching to online instruction, issues with technology hampered their learning (Arici, 2020; (Hebebcı, Bertiz, & Alan, 2020). Students in Algeria and Saudi Arabia both reported comparable issues (Blizak, Blizak, Bouchenak, & Yahiaoui, 2020).

While there are few studies on accessibility specifically related to the switch to online instruction as a result of the present pandemic, there is more research on accessibility difficulties in general. Whereas post-secondary students prefer face-to-face learning (Sutiah, Slamet, Shafqat, & Supriyono, 2020), some concerns have been made concerning online information and tools being accessible to specific demographics, such as students with impairments and low-income students.

The following sections provide a combination of findings and their interpretation.

***Survey Statement 1: Virtual classes are exciting and better than face-to-face interactions with the lecturer***

This statement sought to describe students' perceptions regarding the online and collaborative technology with traditional face-to-face experience. The outcome indicated that 55% (33+22%) of students preferred face-to-face classes as opposed to collaborative technology. This was surprising because most students in class belong to a generation known as the digital natives (Zur & Zur, 2011; Rosen, 2010). The fact that 55% of participants in this study prefer face-to-face settings, and another 17% were neutral, needs to be further investigated in an indepth study to understand potential contextual factors and reasons for these views.

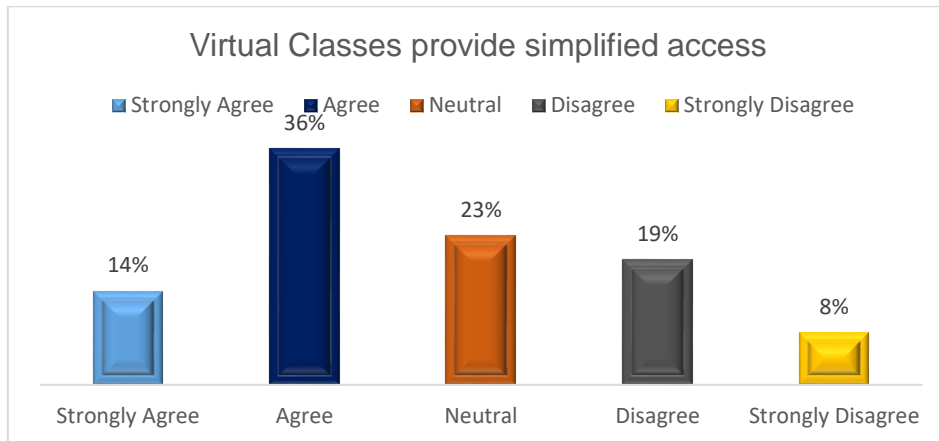


**Figure 1: Comparison of virtual and face-to-face (F2F) learning**

***Survey Statement 2: Accessibility of content, learning instructions and communication is simplified with Virtual Classes.***

Contrasting Statement 1 and Statement 2 provides results that are even more interesting, whereby 50% (36+14%) of participants agree that virtual classes provide simplified access to learning content while only 27% responded in the negative, leaving 23% on a neutral position.

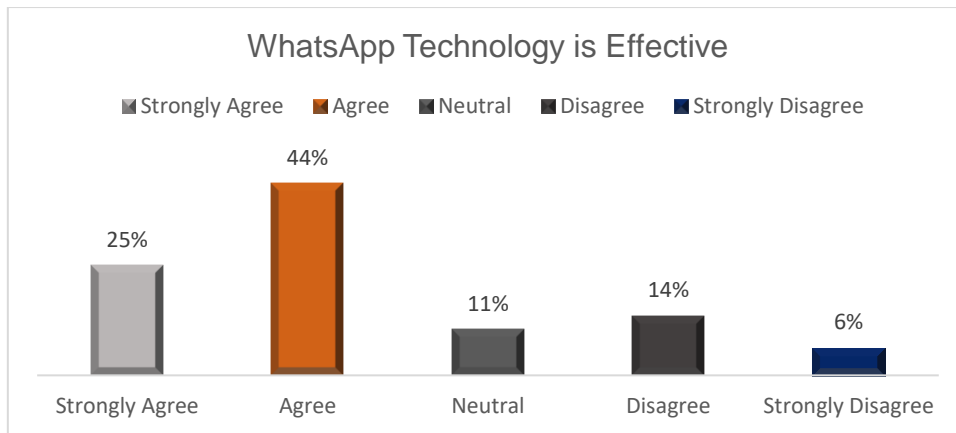
These views support findings of a study conducted by Roddy *et al.*, (2017). Simplified access could also include benefits such as flexibility in learning delivery and realtime content delivery. Creators of online content and faculty need to take advantage of this statistic as it provides noteworthy opportunities in learning and education.



**Figure 2: Simplified content access through virtual learning**

***Survey Statement 3: The use of WhatsApp technology is effective in terms of communication between the lecturer, tutors and students.***

Students favoured the use of WhatsApp technology as part of collaborative learning technology. Within the sampled population, 44% agreed while an additional 25 % strongly agreed to the benefits of using this platform as part of their online learning tools. Interestingly, this constitutes 69% of positive responses, while 20% remained in the negative. Only 11% of the respondents were in neither agreement nor disagreement. These findings compare favourably to a recent study in Indonesia (Munir, Erlinda & Afrinursalim, 2021). In Munir *et al.* (2021) findings indicated 73.2% favoured the use of WhatsApp as opposed to 26.8% who responded in the negative.

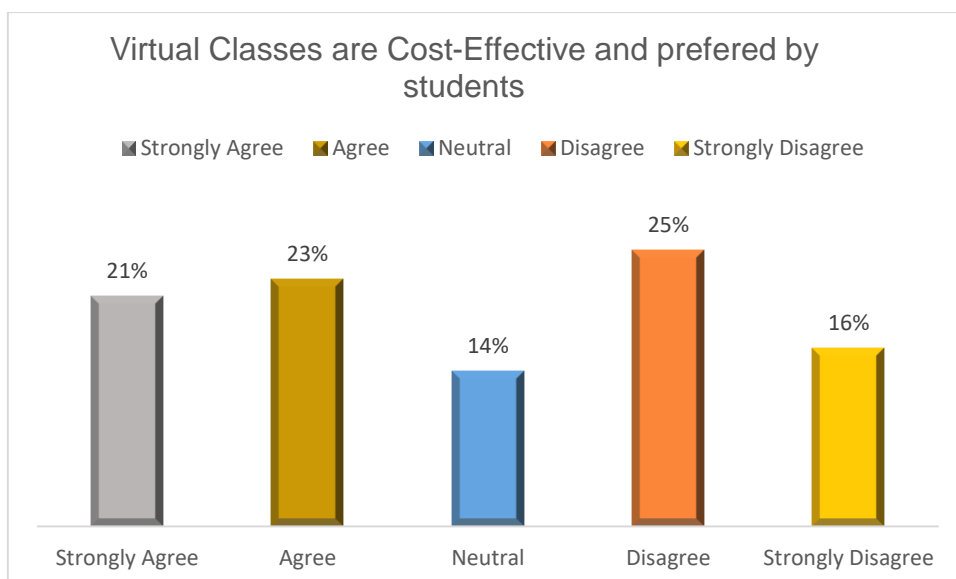


**Figure 3: Effectiveness of WhatsApp Technology**

WhatsApp provides an opportunity to be used as a medium for conducting online learning. Furthermore, its numerous characteristics assist pupils in becoming more enthusiastically involved in learning activities (Sahidillah & Miftahurrisqi, 2019).

***Survey Statement 4: In terms of cost saving, Virtual classes are effective and preferable as opposed to commuting to classes.***

There were almost equal perceptions regarding the effectiveness of virtual classes, with 44% in agreement while 41% disagreed. Of those who responded, only 14% were neutral. These findings were also supported in literature by Pakdaman, Moghadam, Dehghan, Dehghani and Namayandeh (2019), who propounded the support of the notion for cost-effectiveness in the study.

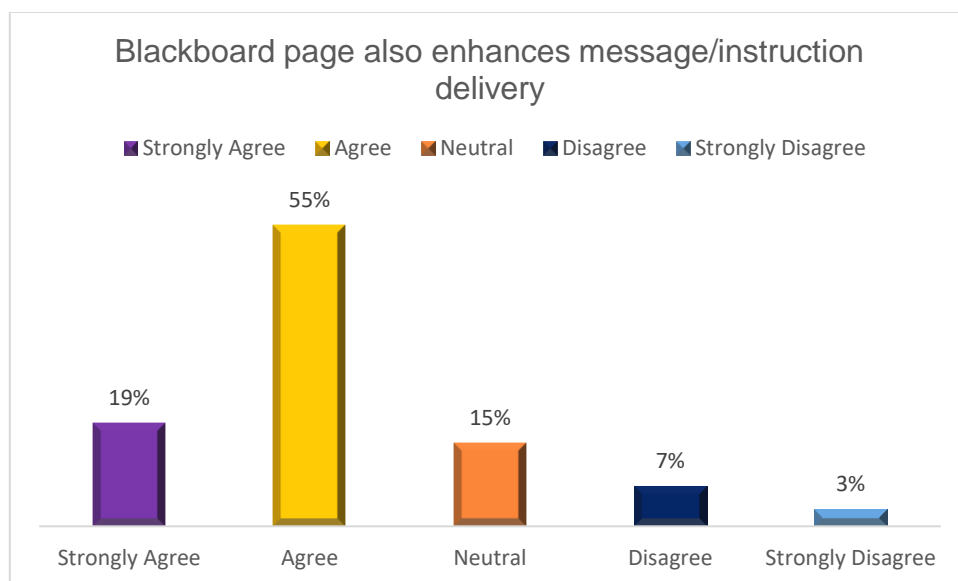


#### Figure 4: Cost-effectiveness of Virtual Learning

It is true that virtual education has many advantages, but there are also drawbacks. These include high start-up costs for virtual classrooms, a lack of standard hardware and software requirements for students, a lack of teacher-student relationships that can foster mutual respect and learning, and bandwidth limitations for multimedia courseware. The drawbacks could also include considerations for students with disabilities, especially those who are visually impaired.

#### ***Survey Statement 5: Blackboard page also enhances message/instruction delivery and student interactions with instructors***

Blackboard was highly preferred by students as pivotal in message and learning delivery while at the same time enhancing interactions with instructors. A significant number of respondents (55+19=74%) were positive while only 10% disagreed and the remaining 15% were neutral.



**Figure 5: Use of blackboard**

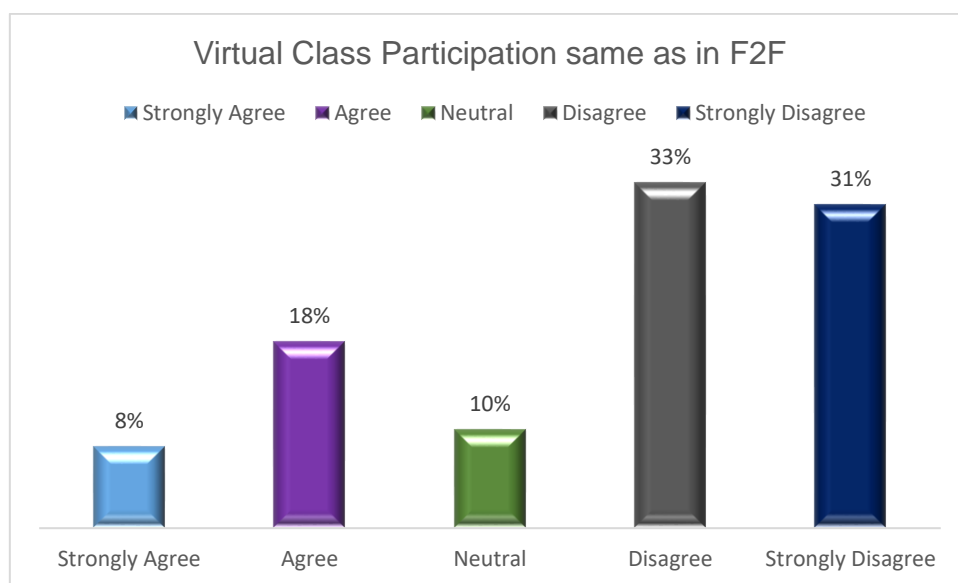
Many of these techniques can be put into action using Blackboard's interactive features. It is an "...activity and/or action between individuals and/or computers" that is defined as "interactive" (Barretto, Piazzalunga, Ribeiro, Dalla & Filho, 2003:272). It is possible to see four sorts of interactivity in learning management systems like Blackboard: content, educator learner/interface (Ellis, Ginns, & Piggott, 2009). Asynchronous and synchronous Blackboard

interactions are also possible. Since much learning occurs in social environments, having more contacts with teachers and other students is extremely beneficial for expanding one's knowledge (Liaw, 2008).

Interactions can be facilitated by using Blackboard features such as announcements, discussion boards and virtual classrooms, as well as by using chat and email (Bradford, Porciello, Balkon, & Backus, 2006-2007). It is easy to send messages to the entire cohort using the announcements section on Blackboard homepages, while the email facility allows students to contact professors on an as-needed basis without taking up valuable class time (Ballard, Stapleton, & Carroll, 2004). Some of Blackboard's features foster a learner-centred approach. Blackboard's asynchronous online discussion tool, in particular, enables students and educators to communicate often.

***Survey Statement 6: Participation in a Virtual Class is not really different from participation in a face-to-face class setting***

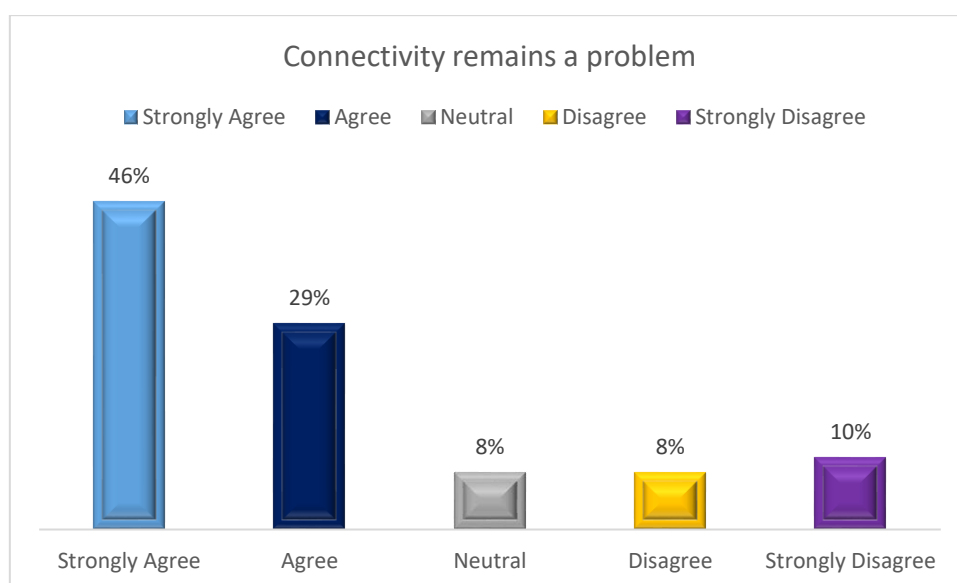
In terms of class participation, 64% (33+31%) of respondents stated that class participation was not the same as in face-to-face setting. There are many reasons why students feel the online participation is not the same as the face-to-face setting. One of the most significant obstacles for online learners is their capacity to use technology and obtain timely feedback and communication from professors. A similar study discovered that students' perceptions of their performance, obstacles, satisfaction, and achievement varied significantly between online and face-to-face modalities (Mathera & Sarkans, 2018).



**Figure 6: Virtual Class Participation**

**Survey Statement 7: Connectivity remains a problem - sessions are usually disrupted due to network issues**

Responses to Statement 6 compare favourably with responses to Statement 5 in relation to participation and access. Online platforms during COVID-19 were problematic mainly due to connectivity, data costs and broadband (Costa & Tumagole, 2020). Almost 75% (46+29%) of the sample cited the issue of connectivity as a major problem, while 18% did not have any problem related to connectivity, with the remaining 11% being neutral.

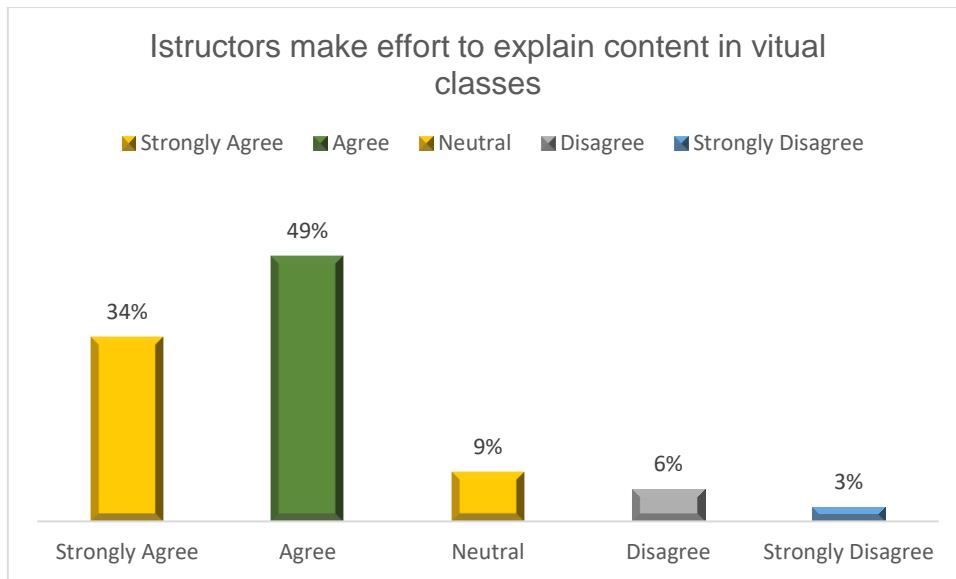


**Figure 7: Connectivity Problems**

Connectivity problem is one that has been well researched before and during the COVID-19 pandemic, with its disparities fitting descriptions of digital divide. Many scholars have published on this issue, being labelled as one that affected most communities across all sectors, and in particular within the education system (Cullinan, Flannery, Harold, Lyons & Palcic, 2021; Silva, Badasyan & Busby, 2018; Gonzales, McCrory & Lynch, 2018).

**Survey Statement 8: The instructors do make their effort for us to understand content during the use of Virtual Class sessions**

It was interesting to note how most faculty transformed immediately to meet the needs of students in using collaborative technology in the virtual learning space. Regarding this issue, 83% (34+49%) of participants felt that their professors were doing all they could to help them understand content and grow in knowledge, while only 9% disagreed. The effort made by faculty during the COVID-19 pandemic is well noted and acknowledged by the outcomes of this study.

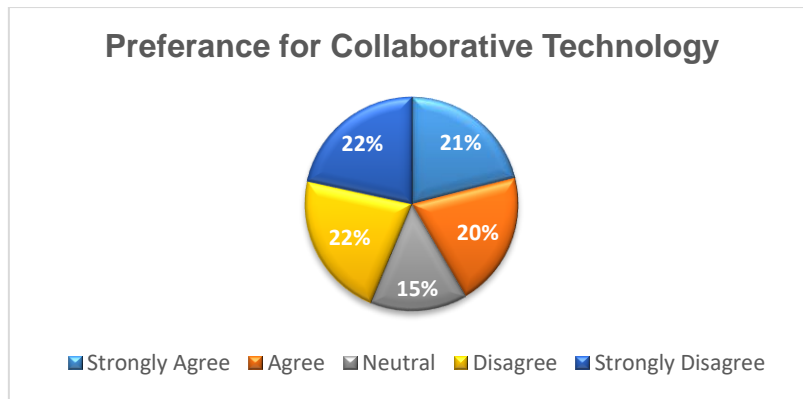


**Figure 8: Instructor's efforts in online content delivery**

A significant difficulty has been the sudden and unanticipated request to teach formerly face-to-face university courses online (Jandrić, 2020). Online teaching and learning require a certain amount of pedagogical content knowledge primarily in the areas of designing and organising for improved learning experiences and building distinctive learning environments using digital technology (Rapanta & Koole, 2020).

***Survey Statement 9: If given an opportunity, I would prefer taking lessons via Virtual platforms and messages with WhatsApp, emails, Blackboard page as this is effective, cost saving and timesaving.***

Students' responses on this statement were distributed evenly, which was surprising when compared to Statement 3 above, which was also related to WhatsApp technology. While 41% (21+20%) agreed, 44% (22+22%) disagreed and 15% were neutral. It is understood that this statement is still indicating student's preference in favour of collaborative technology as earlier found in Statement 3 above. An opportunity exists for planners and policy makers to understand those in the negative in terms of their experiences and those in the neutral.

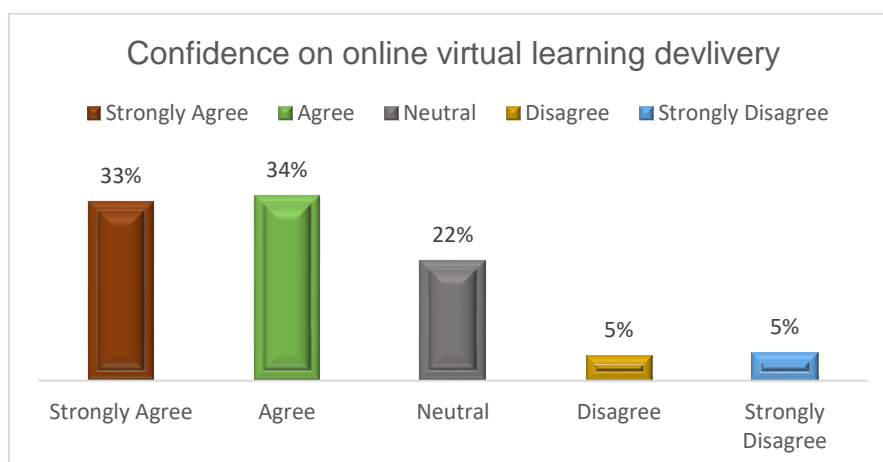


**Figure 9: Preference for Collaborative Technology**

***Survey Statement 10: I am confident that I will pass this course through this method of delivery during this COVID-19 lockdown period***

On the question of confidence to successfully complete examinations using online collaborative technology, 67% of students were confident that they would pass exams. Ten percent were in disagreement whereas 22% remained neutral. The confidence levels of students on using online tools has been well- established (Alqurashi, 2016; Pajares, 1996; Bandura, 1986).

Researchers have investigated students' abilities to handle online classes in a variety of methods, including measuring students' self-efficacy. Self-efficacy is defined as one's belief in one's ability to do a certain activity (Bandura, 1986) and is best defined and quantified with specific reference to the domain or task under investigation (Pajares, 1996). When applied to online learning, self-efficacy has been researched in three ways: computer self-efficacy, internet and information-seeking self-efficacy, and finally e-learning management system (LMS) self-efficacy (Alqurashi, 2016).



**Figure 10: Confidence on Virtual Learning Platforms**

## **6. Conclusion and recommendations**

As the use of online learning expands, there is a growing awareness of the need for qualified online educators. Developing institutional competency for online education necessitates a methodical approach to online instructor training as well as a significant investment in staff training and development (Gregory & Lodge, 2015). While it is true that face-to-face teaching skills such as curriculum knowledge and pedagogy translate to online settings, it is equally critical to understand the unique skills required for online teaching effectiveness, as well as the role of institutions in defining instructor tasks and responsibilities (Alvarez, Guasch, & Espasa, 2009). Despite online student preparedness having received much attention in the past, online educator readiness has always become an emerging and equally essential component of pedagogic integration (Oomen-Early & Murphy, 2009).

In view of a range of roles and skills used in online environments, prior evidence suggests that effective online training necessitates a more flexible approach to skill development for both dimensions of users in the capacity of students and faculty (Bawane & Spector, 2009). The development of diverse online teaching competencies is also necessitated by key contextual differences between online and on-campus learning contexts. The strength of the findings is that digitising learning in a blended approach is the way of the future. In fact, the notion of a classroom is no longer brick and mortar but should also include virtual and remote learning. These considerations have significant implications for the character and infrastructure requirements at Universities of the future.

## References

- Alqurashi, E. (2016). Self-efficacy in online learning environments: A literature review. *Contemporary Issues in Education Research*, 9(1), 45–51. Retrieved February 02, 2022
- Alvarez, I., Guasch, T., & Espasa, A. (2009). University teacher roles and competencies in online learning environments: a theoretical analysis of teaching and learning practices. *European Journal of Teaching and Education*, 32, 321–336. doi:doi:10.1080/02619760802624104
- Amory, A. (2010). Education technology and hidden ideological contradictions. *Educ Technol Soc*, 13(1), 69–79. Retrieved March 2022, 04
- Anderson, T. (2016). Theories for learning with emerging technologies. *Emerging technologies in distance education*, 7(1), 7–23. Retrieved March 2022, 05
- Arici, B. (2020). Analysis of university students' opinions on the Covid- 19 process and the distance education method applied in this process: The sample of Muş Alparslan University. *African Educational Research Journal*, 8(2), 344–352. Retrieved March 2022, 02
- Arkorful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology and Distance Learning*, 12(1), 29–42. Retrieved March 2022, 03
- Ballard, S., Stapleton, J., & Carroll, E. (2004). Students' perceptions of course websites used in face-to-face instruction. *Journal of Interactive Learning Research*, 15(3), 197-211. Retrieved March 02, 2022
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4(3), 359–373. Retrieved March 03, 2022
- Barretto, S. F., Piazzalunga, R., Ribeiro, V. G., Dalla, M. B., & Filho, R. M. (2003). Combining interactivity and improved layout while creating educational software from the Web. *Computers and Education*, 40, 271-284. Retrieved March 03, 2022
- Bates, A. (2018). *Teaching in a digital age: guidelines for designing teaching and learning for a digital age*. Tony Bates Associates Ltd: London. Retrieved March 04, 2022
- Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: a critical review of the evidence. *British Journal of Educaton and Technology*, 39(5), 775–786. Retrieved March 04, 2022
- Black, P., & Wiliam, D. (2006). *Inside the black box: raising standards through classroom assessment*. Northumberland: Granada Learning. Retrieved March 05, 2022
- Blizak, D., Blizak, S., Bouchenak, O., & Yahiaoui, K. (2020). Students' Perceptions Regarding the Abrupt Transition to Online Learning During the COVID-19 Pandemic: Case of Faculty of Chemistry and Hydrocarbons at the University of Boumerdes - Algeria. *Journal of Chemical Education*, 91, 2466–2471. doi:https://doi.org/10.1021/acs.jchemed.0c00668
- Bradford, P., Porciello, M., Balkon, N., & Backus, D. (2006-2007). The Blackboard learning system: The be all and end all in educational instruction? *Journal of Educational Technology Systems*, 35(3), 301-314. Retrieved March 07, 2022

- Burnett, C. (2016). Exploring the difference in participants' factual knowledge between online and in-person survey modes. *Research and Politics*, 1–7.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zhang, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. Retrieved February 28, 2022
- Carolan, C., Davies, C. L., Crookes, P., McGhee, S., & Rox-Burgh, M. (2020). COVID 19: disruptive impacts and transformative opportunities in undergraduate nurse education. *Nurse Education in Practice*, 1-2. Retrieved March 07, 2022
- Choudhury, S., & Pattnaik, S. (2020). Emerging themes in e-learning: a review from the stakeholders' perspective. *Comput Educ*14, 1–20. Retrieved February 14, 2022
- Chung, E., Subramaniam, G., & Dass, L. C. (2020). Online learning readiness among university students in Malaysia amidst COVID-19. *Asian Journal of University Education*, 16(2), 46–58. Retrieved February 15, 2022
- Colace, F., De Santo, M., & Pietrosanto, A. (2006). Evaluation Models for e-Learning Platform: An AHP Approach. Frontiers in Education Conference. *Institute of Electrical and Electronics Engineers*, (pp. 1–6). San Diego. Retrieved March 07, 2022
- Coskun, K. (2020). A new explanation for the conflict between constructivist and objectivist grounded theory.. *International Journal of Qualitative Methods*, 19, 160. Retrieved March 06, 2022
- Costa, K. (2020). The Cause of Panic at the Outbreak of COVID-19 in South Africa – A Comparative Analysis with Similar Outbreak in China and New York. *SSRN*, 1-29. Retrieved March 10, 2022
- Costa, K., & Tumagole, B. (2020). A Pragmatic Inquiry into Employee's Lived Experiences in relation to Covid-19 Lockdown in South Africa. *AfricArxiv m8jg4*, Center for Open Science, DOI: 10.31219/osf.io/m8jg4. Retrieved March 10, 2022
- Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. Teachers College Press. Retrieved February 8, 2022
- Cullinan, J., Flannery, D., Harold, J., Lyons, S., & Palcic, D. (2021). The disconnected: COVID-19 and disparities in access to quality broadband for higher education students. *International Journal of Educational Technology in Higher Education*, 18(26). doi:<https://doi.org/10.1186/s41239-021-00262-1>
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22. Retrieved February 12, 2022
- Downes, S. (2012). *Connectivism and connective knowledge. Essays on meaning and learning*. networks. My eBooks. Retrieved from <http://www.downes.ca/me/mybooks.htm>. Retrieved March 17, 2022
- Driscoll, M. (2005). *Psychology of learning for instruction*. Needham Heights, MA: Allyn & Bacon. Retrieved March 9, 2022
- Duffy, B., & Smith, K. (2005). Comparing data from online and face-to-face surveys. *International Journal of Market Research*, 47(6). Retrieved February 3, 2022
- Dwivedi, Y., Hughes, L., Coombs, C., Constantiou, I., Duan, Y., & Edwards, J. (2020). Impact of COVID-19 pandemic on information management research and practice:

Transforming education, work and life. *International Journal of Information Management*, 55. doi:<https://doi.org/10.1016/j.ijinfomgt.2020.102211>.

- Ellis, R. A., Ginns, P., & Piggott, L. (2009). E-learning in higher education: Some key aspects and their relationship to approaches to study. *Higher Education Research and Development*, 28(3), 303-318. Retrieved February 5, 2022
- Evans, R., Burnett, D., Kendrick, O., Macrina, D., Snyder, S., Roy, J., & Stephens, B. (2009). Developing Valid and Reliable Online Survey Instruments Using Commercial Software Programs. *Journal of Consumer Health on the Internet*, 13(1), 42-52. doi:<https://doi.org/10.1080/15398280802674743>
- Gonzales, A. L., McCrory, C. J., & Lynch, T. (2018). Technology problems and student achievement gaps: A validation and extension of the technology maintenance construct. *Communication Research*, 47(5), 750–770. Retrieved March 17, 2022
- Govindarajan, V., & Srivastava, A. (2020, March 31). *What the Shift to Virtual Learning Could Mean for the Future of Higher Ed*. Retrieved March 20, 2022, from Harvard Business Review: <https://hbr.org/2020/03/what-the-shift-to-virtual-learning-could-mean-for-the-future-of-higher-ed>
- Graham, C. (2006). *Blended learning systems. The handbook of blended learning: global perspectives, local designs*. San Fransisco: Wiley imprint. Retrieved February 12, 2022
- Gregory, M. S.-J., & Lodge, J. M. (2015). Academic workload: the silent barrier to the implementation of technology-enhanced learning strategies in higher education. *Distance Education*, 36, 210–230. doi:[doi:10.1080/01587919.2015.1055056](https://doi.org/10.1080/01587919.2015.1055056)
- Hebebcı, M. T., Bertiz, Y., & Alan, S. (2020). Investigation of views of students and teachers on distance education practices during the coronavirus (COVID-19) pandemic. *International Journal of Technology in Education and Science*, 4(4), 267–282. Retrieved May 13, 2022
- Huber, G., & Huber, A. (2007). Structuring group interaction to promote thinking and learning during small group discussion in high school settings. *Computer-Supported Collaborative Learning*, 8, 110-131). Retrieved March 12, 2022
- Jandrić, P. (2020). Postdigital research in the time of Covid-19. *Postdigital Science and Education*, 2, 233–238. doi:<https://doi.org/10.1007/s42438-020-00113-8>.
- Jansen, J. (2004). *Changes and continuities in South Africa's higher education system, 1994 to 2004. Changing class: education and social change in post apartheid South Africa*. Cape town: Oxford University Press Southern Africa. Retrieved March 6, 2022
- Kaur, N., Dwivedi, D., Arora, J., & Gandhi, A. (2020). Study of the effectiveness of e-learning to conventional teaching in medical undergraduates amid COVID-19 pandemic. *National Journal of Physiology, Pharmacy and Pharmacology*, 10(7), 1-5. Retrieved January 29, 2022
- Khoza, S. (2019). *Lecturers' reflections on curricular spider web concepts transtransformation strategies. Transformation of higher education institutions in post-apartheid South Africa*. New York: Routledge. Retrieved March 11, 2022

- Korkmaz, G., & Toraman, C. (2020). Are we ready for the post-COVID-19 educational practice? An investigation into what educators think as to online learning. *International Journal of Technology in Education and Science*, 4(4), 293–309.
- Krishnamurthy, S. (2020). The future of business education: a commentary in the shadow of the Covid-19 pandemic. *Journal of Business Research*, 117, 1–5. doi: 10.1016/j.jbusres.2020.05.034. Retrieved January 30, 2022
- Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioural intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers and Education*, 51, 864-873. Retrieved March 16, 2022
- Liu, C., & Long, F. (2014). The discussion of traditional teaching and multimedia teaching approach in college English teaching. Paper presented at the 2014 International Conference on Management, Education and Social Science. ICMESS 2014. Retrieved April 1, 2022
- Marinoni, G., Van't Land, H., & Jensen, T. (2020). *The Impact of Covid-19 on Higher Education Around the World - IAU Global Survey Report*. International Association of Universities. Retrieved February 11, 2022
- Mathera, M., & Sarkans, A. (2018). Student Perceptions of Online and Face-to-Face Learning. *International Journal of Curriculum and Instruction*, 10(2), 61–76. Retrieved February 13, 2022
- Mazwell, J. (2019). Evidence for what? How mixed methods expands the evidence for causation in educational research. *American Educational Research Association* (pp. 1-10). Toronto: AERA. Retrieved January 30, 2022
- Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Education Research*, 1-8. doi:doi: 10.1016/j.ijedro.2020.100012
- Mnguni, L. (2021). Strategies for the Development and Application of Research Frameworks in Sciences Education Research.. *Journal of Educational and Social Research*, 11(1), 1. Retrieved February 11, 2022
- Mok, K., Xiong, W., & Rahman, H. (2021). COVID-19 pandemic's disruption on university teaching and learning and competence cultivation: Student evaluation of online learning experiences in Hong Kong. *International Journal of Chinese Education*, 1-20. doi:https://doi.org/10.1177/22125868211007011
- Mpungose, C. (2020). Emergent transition from face-to-face to online learning in a South African University in the context of the Coronavirus pandemic. *Humanities and Social Sciences Communications*, 7(113), 1-9. https://doi.org/10.1057/s41599-020-00603-x. Retrieved March 3, 2022
- Munir, S., Erlinda, R., & Afrinursalim, H. (2021). Students' Views on the Use of WhatsApp during Covid-19 Pandemic: A Study at IAIN Batusangkar. *Indonesian Journal of English Language Teaching and Applied Linguistics*, 5(2), 323-334. Retrieved February 8, 2022, from https://files.eric.ed.gov/fulltext/EJ1297663.pdf
- Nikoubakht, A., & Kiamanesh, A. (2019). The comparison of the effectiveness of computer-based education and traditional education on the numerical memory in students with mathematics disorder. *Journal of Psychol Sci*, 18(73), 55–65. Retrieved February 18, 2022

- Oomen-Early, J., & Murphy, L. (2009). Self-actualization and e-learning: a qualitative investigation of university faculty's perceived barriers to effective online instruction. *International Journal of Learning and Education*, 8, 223–240. Retrieved February 19, 2022
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543–578. Retrieved March 12, 2022
- Pakdaman, M., Moghadam, M., Dehghan, H., Dehghani, D., & Namayandeh, M. (2019). Evaluation of the Cost-Effectiveness of Virtual and Traditional Education Models in Higher Education: A Systematic Review. *Health Tech Asmnt Act*, 1. Retrieved February 25, 2022
- Prensky, M. (2001). Digital natives, digital immigrants part 1. On Horizon. *On the Horizon*, 9(5), 1–6. Retrieved February 19, 2022
- Rapanta, C. B., & Koole, M. (2020). Online University Teaching During and After the Covid-19 Crisis: Refocusing Teacher Presence and Learning Activity. *Postdigital Science and Education*, 2, 923–945. Retrieved February 16, 2022
- Roddy, C., Amiet, D., Chung, J., Holt, C., Shaw, L., McKenzie, S., . . . Mundy, M. (2017). Applying Best Practice Online Learning, Teaching, and Support to Intensive Online Environments: An Integrative Review. *Frontiers in Education*, 2(59), 1-10. doi:DOI=10.3389/educ.2017.00059
- Rodrigues, H., Almeida, F., Figueiredo, V., & Lopes, S. (2019). Tracking e-learning through published papers: a systematic review. *Computer Education*, 136, 87–98. Retrieved February 4, 2022
- Roschelle, J., & Teasley, S. (1995). The construction of shared knowledge in collaborative problem solving. In C. O'Malley, *Computer supported collaborative learning* (pp. 69-97). Heilderbeg: Springer.
- Rosen, L. (2010). *Rewired: Understanding the iGeneration and the Way They Learn*. New York: Palgrave Macmillan. Retrieved March 3, 2022
- Roth, G. (1997). *Das Gehirn und seine Wirklichkeit*. Frankfurt: Suhrkamp. Retrieved March 9, 2022
- Sahidillah, M. W., & Miftahurrisqi, P. (2019). Whatsapp sebagai Media Literasi Digital Siswa. *Jurnal Varidika*, 3(1), 52–57. Retrieved February 23, 2022
- Schleicher, A. (2020). *The impact of COVID-19 on education - Insights from Education at a Glance 2020*. Paris: OECD. Retrieved February 5, 2022
- Siemens, G. (2004). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*. Retrieved February 4, 2022
- Silva, S., Badasyan, N., & Busby, M. (2018). Diversity and digital divide: Using the national broadband map to identify the non-adopters of broadband. *Telecommunications Policy*, 42(5), 361–373. Retrieved March 11, 2022
- Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *Am J Distance Educ.* 2019;33(4):. *American Journal of Distance Education*, 33(4), 289–306. Retrieved March 8, 2022

- Sutiah, S., Slamet, S., Shafqat, A., & Supriyono, S. (2020). Implementation of distance learning during the COVID-19 in Faculty of Education and Teacher Training. *Cypriot Journal of Educational Sciences*, 15(1), 1204–1214. Retrieved March 8, 2022, from <https://www.un-pub.eu/ojs/index.php/cjes/article/view/5151>
- Tarnoki, C., & Puentes, K. (2019). Something for everyone: A review of Qualitative inquiry and research design: Choosing among five approaches. *The Qualitative Report*, 24(12), 3122-3124. Retrieved February 27, 2022
- Waclawski, E. (2012). How I Use It: Survey Monkey. *Occupational Medicine, Volume 62*, 62, 477. doi:doi:10.1093/occmed/kqs075.
- Waghid, F. (2018). Action research and educational technology: cultivating disruptive learning. *South African Journal of Higher Education*, 32(4), 1–11. Retrieved March 18, 2022
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 5, 1729. Retrieved February 13, 2022
- Xiong, W., Jiang, J., & Mok, K. H. (2020). *Hong Kong university students' online learning experiences under the COVID-19 pandemic*. Higher Education Policy Institut.
- Zur, O., & Zur, A. (2011). On Digital Immigrants and Digital Natives: How the Digital Divide Affects Families, Educational Institutions, and the Workplace. *Zur Institute - Online Publication*, 1-13. Retrieved February 13, 2022