

Multimodality: A panacea during the COVID-19 mayhem

T.J. Ntshingila ^{a*}, D.R. Nzima ^a, L.O. Makhonza ^a

^a University of Zululand, Faculty of Education, South Africa.

Suggested citation: Ntshingila, T.J., Nzima, D.R., & Makhonza, L.O. (2024). Multimodality: A panacea during the COVID-19 mayhem, *Journal of Online Learning Studies*, 3(1), 1-11.

Highlights

- The study highlights how multimodality in teaching and learning facilitated continuity during the COVID-19 pandemic, particularly in under-resourced rural institutions.
- Findings reveal that tools such as WhatsApp and Moodle played pivotal roles in maintaining interaction and engagement between students and academics, despite connectivity challenges.
- The research underscores the critical need for robust ICT infrastructure and multimodal strategies to support diverse learners in higher education during crises.

Abstract

This paper explores best practices for presenting multimodal teaching and learning strategies to assist students in higher education institutions during the COVID-19 pandemic. The inclusion of multimodality in programmes of study would enhance diversity of teaching and learning processes and provides higher education institutions with valuable opportunities for the innovative use of different educational technologies in interactive learning environments. The effectiveness of online teaching and learning requires proper information and communication technologies infrastructure. — a shift to an online mode of teaching and learning will assist students develop a multimodal digital literacy. The COVID-19 mayhem prompted the researcher to conduct a study concerning multimodality. The focus of this paper is located within the qualitative research approach using the purposeful sampling technique. The respondents were academics and students from a university in KwaZulu-Natal, South Africa. The intention was to obtain online teaching and learning strategies and discuss online methodologies of academics and students. A focus-group interview was conducted with academics and six students from second year students across faculties. A case study approach was applied and analysed using a thematic analysis process. The findings obtained in this study revealed that, as much as there were challenges during COVID-19, both students and academics were able to continue with their teaching and learning activities due to the application of multimedia resources, such as Moodle and WhatsApp. However, various media platforms have played significant roles during lockdown, acting as tools for teaching and learning to continue, even accommodating students from remote areas.

Keywords: COVID-19, Multimodality, higher education institutions, Panacea, Pandemic

1. Introduction

For teaching and learning to be effective, it is important to deliver lessons using different teaching modes. Hence, the application of multimodal approaches, such as online learning and other material to bring robust learning opportunities, will be examined in this study. Bayar (2014) stated that teaching and learning are key components for conducting educational programmes. In the interest of delivering quality education in higher education institutions (HEIs), seemingly, the application of a multimodal teaching and learning strategy may be a suitable mode to enhance students' capability in universities. According to

* Corresponding Author. Educational Psychology and Special Education, Faculty of Education, University of Zululand, South Africa.
e-mail addresses: NtshingilaT@unizulu.ac.za, NzimaD@unizulu.ac.za, MakhonzaL@unizulu.ac.za

Doi: <http://doi.org/10.5281/zenodo.14672201>

Received 3 Apr 2024; Accepted 30 Dec 2024

ISSN: 3023-4190. This is an open Access article under the CC BY license.



Kress (as cited in Öman and Sofkova Hashemi, 2015), multimodality concentrates on all the different resources offered by available ICT as part of classroom interaction. This may bring a positive contribution to students' learning and their studies in general. This study explored alternative teaching and learning strategies that may have assisted students in HEIs during the COVID-19 pandemic. As the coronavirus outbreak continued to spread, it affected educational systems worldwide and disrupted teaching and learning, leading to the near-total closures of educational institutions (Schleicher, 2020). Dagur and Dhakar (2020) explained that the seriousness of the coronavirus epidemic led to it being declared a pandemic by the World Health Organization (WHO). Avoiding virus contagion caused drastic changes in teaching and learning in HEIs, particularly universities, causing a transition from face-to-face programmes to online classes.

This research piece presents a case study of how a selected HEI in KwaZulu-Natal (KZN) uses technology-mediated instruction in supporting students during the COVID-19 pandemic. According to Raju (2021), the COVID-19 pandemic caused lockdown procedures, such as social distancing, to contain the spread of the pandemic, which negatively impacted the education system for both students and academic staff. The efforts to halt the unfolding of the pandemic in universities and alternative instructional establishments led to tutorial programmes shifting from face-to-face to online delivery, and many countries moved quickly to transition educational courses (Mncube et al., 2021).

To continue teaching, educational institutions depended on distance and online learning as the sole means to keep the doors of learning open. Nobody was ready to address the unexpected learning crisis (Commonwealth of Learning [COL], 2020) and, as a result, multimodal teaching and learning strategies, which were the culmination of reflection, discussion, and consultation on the crisis, were implemented to assist students in HEIs [COL], 2020).

2. Literature

The theoretical framework of this study is anchored in Manuel Castells, a well-known Spanish sociologist's, theory — the space of flows. Manuel Castells is the single most powerful social scientist alive nowadays. Castells' theory posits that the key transformations of recent technologies had a social impact on time and space, by transforming humans and technologies jointly, through networking.

A theoretical framework is regarded as the foundation for a study and acts as a guide to the literature review. A theory could be a scientific postulation that explains a few explicit developments, or it could be outlined as a group of logically reticular ideas, definitions, and propositions that are advanced to elucidate and predict facts. A theory can be explained or defined by the framework of assumptions and concepts in which it is embedded (Castells, 1999, 2020; Kumar, as cited in Mngomezulu, 2018).

The space of flows theory is one of the most elaborate theories of the "Information Age" suggested by Castells in 1999, and later revised and published in 2013. According to Castells, our historical time is outlined essentially by the transformation of our geographic space. This transformation of space is regarded as an essential component of the multi-layered social and technological transformation that heralded the so-called Information Age. Castells steered the construct of the area of flows to describe such spatial transformation. The model accepts the validity and impact of the transformation without embracing the oversimplified views of futurologists embracing the death of the effect of distance and, therefore, the end of a requirement for cities. Experimental and observed evidence still shows that new ICT can be seen as a pattern of flexible production and network organisation. This view allows both the centralisation and decentralisation of activities, and population settlements as separate locations can be reunited from a functional point of view by making use of the new technologies. This ability is made possible by intelligent communication equipment and predictable and effective transportation systems servicing dispatching nodes and hubs.

Concerning the theory of space of flows, it implies that the fabric preparations allow the timing of social practices to be uncoupled from territorial proximity. It is not a virtuous electronic space or a 'cyberspace', though computer networks are part of the area of flows. First, it emerges from a combination of the technological infrastructure of knowledge systems, telecommunications, and transportation lines. The adaptability and attributes of this infrastructure, and the geographic position of the elements confirm the functions of the area of flows, and its correlation to various geographic spreads and associated processes. The space of flows also consists of networks of interaction, and the objectives and activities of each network determine specific geographies to accommodate the flows. The space of flows can be modelled with nodes and hubs. Also, the space of flows accommodates the individuals that manage the networks, either through spaces adjacent to the nodes, secure spaces of consumption, or dedicated corridors across geographies using social segregation to separate these corridors from the adjacent locales worldwide. Finally, the flows also comprise of electronic spaces, such as information systems supporting websites, interaction or one-directional communication, whether interactive or not. Web-based activity, creating compelling interactive websites and structuring their operation and content, are responsible for a growing share of the activities. It is becoming an essential frame for decision making, the creation and dissemination of information making, and communication.

The space of flows theory is underpinned by exploring the coupling between electronic space and physical spaces through networks of flows. This model increasingly represents the space in which most essential activities in our societies operate. Interactions imply a connection. It is confirmed by empirical enquiry that strategic and essential activities are almost exclusively operated through the space of flows and that privileged groups leverage the model to maintain their domination by excluding poorly connected localities (Castells, 2020).

In the online setting, we observe a great utilisation of multimedia to deliver various types of content, however, multimedia is intertwined with multimodality, whereas multimodality refers to 'multiple' modes of representation, with combined elements of print, visual images and design. Therefore, this shift from paper-based education to multimodal education involves rethinking the way in which teaching, and learning are designed, approached and practiced. This promotes the way in which pedagogies, content and technology are designed and used, to enable multimodality to take place in a variety of contexts and social relationships (Hassett & Curwood, 2009).

To conduct and create online classes, various tools are being used by educational facilities. Bloomberg (2021) indicated that working in the online educational environment provides access to a variety of tools and resources. Montebello et al. (2018) discussed that professors frequently encourage and value the use of a variety of media in student work, as learners design their knowledge representations using rich, multimodal sources and embedding multiple types of complementary media, such as photographs, diagrams, tables, data visualisations, videos, and raw datasets. The pedagogical and cognitive benefits of shifting meaning representation across a range of integrated modalities enriches their understanding.

The prospects and the benefits of ICT in advancing the significance of education has made ICT the foremost tool for building knowledge societies and a way to rethink and redesign educational systems. Digital education offers important applications, such as Zoom, WebEx, Microsoft Team, and Skype, enabling students to attend online classes. While Kaur et al. (2020), emphasised that HEIs have adopted various innovative techniques, and used different software applications, such as Google Classroom and Google Docs, to take classes online. Even medical colleges have implemented numerous creative strategies to combat the crisis, using Google Classroom, Zoom, and Microsoft Teams to offer online courses (Kaur et al., 2020).

Brenton (2008) said that the great majority of institutions have a virtual learning environment of some kind. Brenton defined virtual learning environments as web-based software that allows the running of all or part of a course or module online. It gives a menu-based or point-and-click interface for constructing

an online course area without the need for specialist web development skills. E-learning tools have played a crucial role during the pandemic, helping universities facilitate student learning during the closure of universities and schools (Subedi et al., 2020). Some of the online platforms used so far include unified communication and collaboration platforms, such as Microsoft Teams, Google Classroom, Canvas and Blackboard, which allow lecturers to create educational courses, training, and skill development programmes (Petrie, 2020).

Pokhrel and Chhetri (2021) supported that the virtual classroom platforms, such as videoconferencing (Google Hangouts Meet, Zoom, Slack, Cisco, WebEx) and customisable cloud-based learning management platforms, such as Elias, Moodle, BigBlueButton and Skype, are increasingly being used. Parsons et al. (2015) highlighted that videoconferencing is considered as a tool for improving communication quality between students and teachers, and can be used as a starting point for designing a standard lecture into the conversation. The videos and pictures are used as tools for prompting verbal responses. Koomar and Jull (2020) proposed mainly synchronous video conferencing lessons for their students, using Zoom or something similar, but not all students were able to access these lessons.

The adoption of different resources could also be intended to have a rhetorical, graphic or inspiring effect (Montebello et al, 2018). However, research has shown that conventional classes provide an efficient way to transfer knowledge, but during the pandemic, institutions adopted digital media platforms in making teaching easier and more convenient for the students (Kaur et al.,2020). Learning resources need curation, categorisation and integration with the curriculum, as well as a strategy of multi-model delivery via the most appropriate channel – radio, TV, mobile and online (EGFSN, 2013). Video telephony and online chat services connect students and teachers via the internet (Ali & Al-Dmour, 2021). It has been noted that multimedia learning systems offer a potential venue for improving students' interest, understanding and learning efficiency (Juan & Yahaya, 2019). Han and Shin (2016) agreed that the introduction of various learning technologies, which include Moodle, has improved students' quest for learning, especially in HEIs. The development of Moodle as a learning software has eased curriculum delivery.

Rapid developments in technology have made distance education easy (McBrien et al., 2009). Cojocariu et al. (2014) stated that:

Most of the terms (online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning, for ex.) have in common the ability to use a computer connected to a network, that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means.

Multiple modes of representation include the combinations of oral and written language, visual, gestural, tactile, and spatial representations (Cope & Kalantzis, 2009). This transitional shift from print-based education to multimodal education indicates the need to rethink how teaching and learning is conceived, approached, and practiced. Multimedia resources and tools in these environments may include interactive videos and images, recorded lecture presentations, online quizzes, discussion forums (synchronous and asynchronous), and visual representations of student data to depict progress on what the student is doing to learn (Sharples, et al., 2016).

Montebello et al (2018) stated that the use of multimedia and multimodal resources is commonly associated with teaching aids and presentation support materials to accompany, complement, and enrich the delivery of content. The increasing use of multimedia in teaching has provided many opportunities to present multiple representations of content (text, video, audio, images, interactive elements) to cater more effectively to the different learning styles of an increasingly diverse student body (Sankey et al., 2010).

As the level of development in teaching and learning using multimedia advances, studies have revealed that virtual laboratories can give students the opportunity to design, conduct and learn from experiments, rather than just learning about them (Schleicher, 2020). Johnson et al. (2020) suggested that teachers should use multiple strategies for coaching and learning, increasing student engagement and evaluation, focused on learning in a virtual environment during a crisis. To address different access to technology, multiple learning modalities are required, and it is important to raise awareness of the learning programmes being rolled out and how to access them (UNICEF, 2020). Using multimedia technology to teach does not only requires tutors to have skilful teaching competence, but it also requires tutors to be experts in ICT (Juan & Yahaya, 2019). Goldstein et al. (2021) pointed out that, putting the pandemic aside, the use of such technologies opened new questions for the future, as to whether their use will persist and change the way things were done before. Borne out of necessity, the widespread adoption of Zoom and related video-communication technologies are likely to affect how education programmes will be conducted going forward.

Despite their constraints and challenges, multimedia resources do have great potential for learning. In general, the potential of using multimedia during the COVID-19 crisis has been realised. According to Dai and Fan (2012), one of the advantages of multimedia teaching method is that it creates a rich, relaxed learning environment for students. It brings out the echoism of the content, the diversified expression to stimulate the sensory of students in many ways and situational teaching method, thus creating a pleasant, vivid atmosphere for students to study. Some lecturers think that to promote the modernisation of education and reform of teaching, computer-assisted instruction is an obligatory tool. Students who are given access to multimedia courseware, whether as individuals or in groups, can take control of their own learning, construct knowledge at their own pace and in a direction that suits their needs and desires (De Sousa et al., 2017).

3. Methodology

The paper is guided by the overarching research question: How will multimodal teaching and learning strategies assist students in the higher education sector during the COVID-19 pandemic? In this paper, a sequential qualitative research method was used, and a constructivism paradigm was adopted; consequently, this paper follows a case study research design. With this research piece, the researcher intended to find the different strategies and modes of teaching and learning that were adopted during lockdown. Ahmad et al. (2019) claimed that:

qualitative research as a process of naturalistic inquiry that seeks in-depth understanding of social phenomena within their natural setting. It focuses on the, “why” rather than the “what” of social phenomena and relies on the direct experiences of human being as meaning-making agents in their everyday lives.

3.1. Research Model/Design

This paper was based on a case study design involving the university situated in rural areas in the KwaZulu-Natal province. The purpose of the research design is to ensure that the evidence solicited from the participants enables the researcher to answer the research questions as truthfully as possible. A research design involves research planning and focuses attention on how data are collected. This study examines the suitable online teaching and learning methods that were used to assist students to continue with their programmes while the universities were closed.

3.2. Data Collecting Tools

A data collection method, which involved both lecturers and students, was adopted from semi structured interviews and focus groups. It helped to establish the diverse information on the feasibility of online

/virtual teaching for the first time. Microsoft Teams was used to record interviews, which were then transcribed.

3.3. Sampling or Study Group

This study identified the global practices which were used internationally, and which seemed to be applicable in assisting both students and academics to continue their tuition during the pandemic. The target population comprised of a diverse group of participants, of which there were three set of respondents: academics, students, and university officials. The potential research participants were identified, and a convenient sample was selected. Their responses were based on their experiences and this study found them as the most suitable sample for this study. The participants were six academic lecturers and 12 students, who were in their first year in year 2020 when the pandemic commenced, from a university situated in KwaZulu-Natal, South Africa. The reason for this mix was to gauge and weigh the impact obtained from using different modes and to gain level of understanding from both lecturers and students' perspectives on teaching and learning during lockdown in response to the research question.

3.4. Data Analysis

The study was mainly qualitative in nature, and the researcher analysed the data using thematic analysis. According to Braun and Clarke (2006), thematic analysis is commonly used in qualitative research and is suitable for novice researchers. Data that was gathered by the researcher were categorised under different headings, and as this process continued, common patterns were identified. Mouton (2005) stated that analysis entails breaking up manageable themes, patterns, trends, and relationships. The recorded information from the interviews was transcribed and analysed. The similar topics were grouped into categories, which were used to code each interview and themes and sub-themes were developed, after which the next step was to report the findings.

3.5. Appropriateness and Trustworthiness

For one to consider as to whether the research instruments are appropriate, the research findings must be trustworthy. It is of a vital significance for researchers to assess the appropriateness and trustworthiness of their studies. For this study in particular the research findings reflect exactly what was gathered from participants, it depicts what was happening during the COVID-19 pandemic all the unprecedented activities that took place including the emergency shift to online learning as well experienced network challenges were discussed by participants.

In qualitative research validity means "appropriateness" of the tools, processes, and data. With reference to this study, the focus group interview as well as semi-structured interviews tools were therefore designed to measure the extent to which strategies employed that can assist students during the pandemic and what can be done to addressing experiences and challenges affected our education system during that period. Academics and student's responses were addressing the main research question. This provided information expressed by participants in an accurate recorded form. Validity was achieved through seeking to understand information from the perspective of the participants in their contexts. Interpretations were verified through member checks, the information obtained was through the participant's perspective.

3.6. Research Procedures

A consent form was issued to the participating institution, informing them concerning the procedure and the description of the entire process. It was duly signed as an indication that they agreed to participate in the study. Also, the participants were requested to consent to participation in the research. The purpose and confidentiality of the outcomes were explained.

4. Findings and Discussions

Learning Management Systems

The findings of this research indicate that the various teaching systems using multimedia resources that have been introduced have had a significant impact on teaching and learning. The integration of multimedia and internet technologies could transform and elevate conventional teaching and learning during and after the pandemic period. The data gathered from the respondents indicate that, as the world progresses to the globalised digital era, the application of multimedia in teaching and learning is a necessity.

It is evident that there was effort from the side of the lecturers in terms of trying to apply different modes of teaching, using various categories of teaching methods. However, very few presented lessons making voice recording over slides, which students seemed to like it.

The success of remote teaching and learning also hinges on the ability to use a learning management system (Songca et al., 2021). According to Gamede et al. (2018), the use of Moodle, as an effective learning management system, provides teachers or facilitators of learning with the opportunity to design, manage, organise and present learning materials for online access by students. The lecturers stated:

Nolwazy: *What I did was that during the lockdown, umm, I continued to upload PowerPoint notes on Moodle.*

Nana: *I would send my slides through Moodle.*

Seemingly, Moodle platform was commonly used by all institutions in education sector, but it has been said that some of these modalities pose a challenge in terms of assessment.

Social Media Platforms (WhatsApp)

The findings showed that WhatsApp was the most used application by students due to a numerous reasons, such as that it is easily accessible and data bundles were not that expensive compared to other platforms. Virtual classes pertaining to the various study levels were created through WhatsApp groups (Enyama et al., 2021) and, at some point, the institution provided or supplied data bundles to all students. With WhatsApp students can type and engage using voice notes. Hodges et al. (2020) asserted that the creative use of WhatsApp groups helped provides ongoing communication between students and academics by sharing of audio and video sessions. Furthermore, Gorgen and McAleavy (2020) supported the idea to develop engaging and interactive activities on WhatsApp. However, as much as WhatsApp was commonly used, there were challenges related to the implementation of distance learning using WhatsApp caused by poor network access (Latif et al., 2019).

Schleicher (2020) stated that digital technology allows us to find entirely new answers to what people learn, how people learn, where people learn and when they learn. The lecturers described their WhatsApp use:

Nana: *Do a lot of voice notes for the students on WhatsApp, because WhatsApp was found to be accessible to many of them. So, they preferred that we used the WhatsApp route.*

Nolawzy: *And also interacting with my students on WhatsApp.*

Trump: *So everything, my lectures and my PowerPoints I put them on WhatsApp.*

For academics to interact with their students during COVID-19, they found WhatsApp group discussions were the best pedagogical approach and, hence, students were excited to work together as teams. Even though WhatsApp was not the only mode of teaching and learning that was used, it was one of the best, at that time, to reach out to students easily, because it was cheaper for the students and easily accessible

by all students, even those who did not have computers. As much as WhatsApp was easily accessible, it was also found to be disruptive in case where WhatsApp texts popped up while students were having group discussions.

Media Modality (Videos/Audios)

The deliberations and views in this document are based on the manner HEIs coped with the disruptive impact caused by COVID-19 crisis on higher education, which galvanised HEIs into digital technologies. The participants outlined that a variety of software applications, such as Zoom, Microsoft Team, voice recording over the slides, and Bigbluebutton, were used for students to access online classes. The application of media within video lectures allows learners to process information received through both visual and auditory channels. This should ideally lead to greater schema construction and, ultimately, a clearer understanding of the content (Mayer, 2014).

Surprisingly, even medical colleges have implemented numerous creative strategies to combat the COVID-19 crisis, using various software applications, such as Google Classroom, Zoom, and Microsoft Teams, to take online courses (Kaur et al., 2020). As much as online learning modalities software applications were a solution during pandemic, students reported that they were unable to do practicals or experiential learning.

Multimedia refers to the integrated use of texts, graphics, animations, video and audio in an way that assists the delivery of structured and diversely presented meaning (Montebello et al., 2018). The students and lecturers said:

- Mihla:** *I liked videos the most. Actually, I prefer them because after the lesson you have an opportunity to replay and listen to them over and over.*
- Tukzin:** *I support the idea of learning through videos, because you can save them and watch them at your own time, can replay it seven times until knowledge is gained and videos are more interesting.*
- Nana:** *But after that, do a lot of voice notes for the students, because WhatsApp was found to be accessible to many of them.*
- Sihle:** *What I did was to download slides with data I had saved. Unlike a class to attend it need one to have lot of data, bust with slides you will keep on revisiting the slides with audio.*
- Zolile:** *The voice recording over the slides seemed to be useful because I will replay it at any time until I understand what was taught however, not all lectures used that. Also, the unfortunate part was that not all lectures used videos, in fact very few modules that uploaded videos.*

It does look as if there was an effort from most of the lecturers to try applying different modes of teaching and learning. However, one could see that not all lecturers were doing that, as mentioned by Zolile. The students indicated their preferences as to which method of teaching they preferred during lockdown; this is supported by Mardiana (2020), who stated that research from the Scottish Government in 2015 indicated that technological change integrates new teaching methodologies in the form of online teaching and has been introduced to students to use in the learning process.

5. Conclusion and Suggestions

These findings obtained cannot be generalised because institution have different resources depending on the funding they receive. Some rural institutions are under resourced. Using a case study as a research approach, the aim of the study was realised, which was to examine the application of different multimodal approaches to assist HEIs in KwaZulu-Natal during the COVID-19 pandemic. It is evident that, through the

application of different modes of teaching and learning, lecturers were able to reach out to students and learning continued taking place.

References

- Ahmad, I. F. (2020). Alternative assessment in distance learning in emergencies spread of coronavirus disease (Covid-19) in Indonesia. *Jurnal Pedagogik*, 7(01), 195-222.
- Ali, L., & Al-Dmour, N. (2021). The shift to online assessment due to covid-19: An empirical study of university students, behaviour and performance, in the region of UAE. *International Journal of Information and Education Technology*, 11(5), 220–228.
- Bayar, A. (2014). The Components of Effective Professional Development Activities in Terms of Teachers' Perspective. *Online Submission*, 6(2), 319–327.
- Bloomberg, L. D. (2021). *Designing and Delivering Effective Online Instruction: How to Engage Adult Learners*. Teachers College Press.
- Brenton, S. (2008). E-learning—an introduction. In H. Fry, S. Ketteridge & S. Marshall (eds.), *A handbook for teaching and learning in higher education* (pp. 103–116). Routledge.
- Castells, M. (1999). *Grassrooting the space of flows*, *Urban Geography*, 20(4), 294–302. <https://doi.org/10.2747/0272-3638.20.4.294>
- Castells, M. (2020). Space of flows, space of places: Materials for a theory of urbanism in the information age. In R. T. LeGates & F. Stout (Eds.), *The city reader* (pp. 263–274). Routledge.
- Cojocariu, V.-M., Lazar, I., Nedeff, V., & Lazar, G. (2014). SWOT analysis of e-learning educational services from the perspective of their beneficiaries. *Procedia-Social and Behavioral Sciences*, 116, 1999–2003.
- Commonwealth of Learning (COL) (2020). *Guidelines on Distance Education during COVID-19*. COL
- Cope, B., & Kalantzis, M., 2009. New media, new learning. In D. R. Cole & D. L. Pullen (Eds.), *Multiliteracies in motion: Current theory and practice* (pp. 99–116). Routledge.
- Dagur, H. S., & Dhakar, S. S. (2020). Genome organization of Covid-19 and emerging severe acute respiratory syndrome Covid-19 outbreak: a pandemic. *EJMO*, 4(2), 107–115.
- Dai, W., & Fan, L. (2012). Discussion about the pros and cons and recommendations for multimedia teaching in local vocational schools. *Physics Procedia*, 33, 1144–1148.
- De Sousa, L., Richter, B., & Nel, C. (2017). The effect of multimedia use on the teaching and learning of Social Sciences at tertiary level: A case study. *Yesterday and Today*, 17, 1–22.
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of educational technology systems*, 49(1), 5–22.
- Enyama, D., Balti, E. V., Simeni Njonnou, S. R., Ngongang Ouankou, C., Kemta Lekpa, F., Noukeu Njinkui, D., ... & Choukem, S. P. (2021). Use of WhatsApp®, for distance teaching during COVID-19 pandemic: Experience and perception from a sub-Saharan African setting. *BMC medical education*, 21(1), 1–9.
- Gamede, B. T., Ajani, O. A., & Afolabi, O. S. (2022). Exploring the Adoption and Usage of Learning Management System as Alternative for Curriculum Delivery in South African Higher Education Institutions during Covid-19 Lockdown. *International Journal of Higher Education*, 11(1).
- Goldstein, I., Koijen, R. S., & Mueller, H. M. (2021). COVID-19 and Its Impact on Financial Markets and the Real Economy. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8385830/>

- Gorgen, K., & McAleavy, T. (2020). Report for EdTech Hub. <https://doi.org/10.5281/zenodo.4705039>
- Han, I., & Shin, W. S. (2016). The use of a mobile learning management system and the academic achievement of online students. *Computers & Education*, 102, 79–89. <https://doi.org/10.1016/j.compedu.2016.07.003>
- Hassett, D. D., & Curwood, J. S. (2009). Theories and practices of multimodal education: The instructional dynamics of picture books and primary classrooms. *The Reading Teacher*, 63(4), 270–282.
- Hodges, C., Moore, S., Lockee, B., Trust, T. & Bond, M. (2020, April 27). The difference between emergency remote teaching and online learning. *Educause Review*. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- Johnson, N., Veletsianos, G., & Seaman, J. (2020). U.S. faculty and administrators' experiences and approaches in the early weeks of the COVID-19 pandemic. *Online Learning Journal*, 24(2), 6–21. <https://doi.org/http://dx.doi.org/10.24059/olj.v24i2.2285>.
- Juan, L., & Yahaya, N. B. (2019). The Problems and Countermeasures of Applying Multimedia Technology in College English Teaching. *International Journal of Engineering and Advanced Technology (IJEAT)*, 8, 1512–1516.
- 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), 563–567.
- Koomar, S., & Jull, S. (2020). Open Educational Resources in Africa: A Curated Resource List (EdTech Hub Helpdesk Response No. 20). <https://zenodo.org/record/3906041/export/csl>
- Kumar, R. (2014). *Research methodology: A step-by step guide for beginners* (4th ed.). SAGE
- Latif, M. Z., Hussain, I., Saeed, R., Qureshi, M. A., & Maqsood, U. (2019). Use of smart phones and social media in medical education: trends, advantages, challenges and barriers. *Acta informatica medica*, 27(2), 133.
- Mardiana, H. (2020). Lecturers' adaptability to technological change and its impact on the teaching process. *JPI (Jurnal Pendidikan Indonesia)*, 9(2), 275–289.
- Mayer, R. E. (2014). Multimedia instruction. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (eds.), *Handbook of research on educational communications and technology* (pp. 385–399). Springer.
- McBrien, J. L., Cheng, R., & Jones, P. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *The International Review of Research in Open and Distributed Learning*, 10(3), 1–17. pedagogy. <https://files.eric.ed.gov/fulltext/EJ847763.pdf>
- Mncube, V., Mutongoza, B.H., & Olawale, E., 2021. Managing higher education institutions in the context of COVID-19 stringency: Experiences of stakeholders at a rural South African university. *Perspectives in Education*, 39(1), 390–409.
- Mngomezulu, T. P. (2018). *The prevalence and effects of abuse against men in the three tribal authorities in INgwavuma District in KwaZulu-Natal* [Doctoral dissertation, University of Zululand, KwaZulu-Natal]. <http://uzspace.unizulu.ac.za/handle/10530/1679>
- Mouton, J. (2011). *How to succeed in your master's and doctoral studies: A South African guide and resource book*. Van Schaik Publishers.

- Montebello, M., Cope, W., Kalantzis, M., Searsmith, D., Amina, T., Tzirides, A. O., ... & Haniya, S. (2018). Multimodal mastery learning. In *Proceedings of the 2nd International Conference on Education & Distance Learning*. ICEDL.
- Öman, A., Sofkova Hashemi, S. (2015). Design and redesign of a multimodal classroom task – Implications for teaching and learning. *Journal of Information Technology Education: Research*, 14, 139–159. <http://www.jite.org/documents/Vol14/JITEv14ResearchP139-159Oman0743.pdf>
- Parsons, S., Guldborg, K., Porayska-Pomsta, K., & Lee, R. (2015). Digital stories as a method for evidence-based practice and knowledge co-creation in technology-enhanced learning for children with autism. *International Journal of Research & Method in Education*, 38(3), 247–271.
- Petrie, C. (2020). *Spotlight: Quality education for all during COVID-19 crisis* (HundrED Research Report #01). United Nations. <https://hundred.org/en/collections/qualityeducation-for-all-during-coronavirus>
- Pokhrel, S., & Chhetri, R. (2021). A literature review on impact of COVID-19 pandemic on teaching and learning. *Higher Education for the Future*, 8(1), 133–141.
- Raju, S. (2021). Application of technology in education. *The opportunities of uncertainties: flexibility and adaptation needed in current climate Volume I (Social Science and ICT)*, 265.
- Schleicher, A. (2020). *The Impact of COVID-19 on Education: Insights from Education at a Glance 2020*. OECD Publishing.
- Sharples, M. (2016). *Innovating Pedagogy 2016: Open University Innovation Report 5*. Open University.
- Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education*, 33(4), 289–306
- Songca, R. N., Ndebele, C., & Mbodila, M. (2021). Mitigating the Implications of Covid-19 on the Academic Project at Walter Sisulu University in South Africa: A Proposed Framework for Emergency Remote Teaching and Learning. *Journal of Student Affairs in Africa*, 9(1), 41–60.
- Subedi, S., Nayaju, S., Subedi, S., Shah, S. K., & Shah, J. M. (2020). Impact of e-learning during COVID-19 pandemic among nursing students and teachers of Nepal. *International Journal of Science and Healthcare Research*, 5(3), 9.
- UNICEF. (2020). *Guidance on Distance Learning Modalities to Reach All Children and Youth During School Closures—Focusing on low- and no-tech modalities to reach the most marginalized*. UNICEF.
- EGFSN. 2013. *Addressing Future Demand for High-Level ICT Skills*. https://www.skillsireland.ie/media/04112013-addressing_ict_skills-publication.pdf