

**IMPACT ANALYSIS ON STUDENTS' ONLINE
LEARNING IN HIGHER EDUCATION
INSTITUTIONS DURING THE COVID-19
PANDEMIC**

SARI NASHIKIM BINTI RADIN ISKANDAR

**MASTER OF SCIENCE
(COMPUTER SCIENCE)**

**UNIVERSITI PERTAHANAN NASIONAL
MALAYSIA**

2023

**IMPACT ANALYSIS ON STUDENTS' ONLINE LEARNING IN
HIGHER EDUCATION INSTITUTIONS DURING
THE COVID-19 PANDEMIC**

SARI NASHIKIM BINTI RADIN ISKANDAR

Thesis submitted to the Centre for Graduate Studies, Universiti Pertahanan Nasional
Malaysia, in fulfilment of the requirements for Master of Science (Computer
Science)

2023

ABSTRACT

The COVID-19 pandemic led to the closure of numerous educational institutions, such as schools and universities, as part of the containment measures. Consequently, the traditional mode of in-person teaching shifted to online distance learning to mitigate the spread of infections while ensuring the continuity of education. However, concerns have arisen regarding the effectiveness of online learning and its implications for key stakeholders in education, specifically students and educators. This research aims to analyze the impact of online learning on students at the National Defense University of Malaysia (NDUM) during the COVID-19 pandemic. Data gathered from students via a closed and open-ended questionnaires underwent meticulous respondent selection employing random sampling methods. A total of 445 student responses were acquired for analysis. Descriptive analysis and multivariate exploratory statistical analyses of the data were performed using the statistical software, SPSS. The descriptive analysis assessed student learning and expectations on online learning, meanwhile the multivariate exploratory data analysis, Principal Component Analysis (PCA) was used to examine how online learning affects students' learning experiences. The findings indicated that students faced challenges during the lockdown related to technical difficulties, time management, limited social interactions, and issues associated with their home environment. Conversely, students displayed a strong inclination toward acquiring new technological skills and expressed a preference for reviewing recorded lectures and class materials. These insights into the impacts of online learning on students are particularly significant in light of technological advancements in education, not only within Malaysia but also in other countries worldwide.

ABSTRAK

Pandemik COVID-19 menyebabkan penutupan banyak institusi pendidikan, seperti sekolah dan universiti, sebagai sebahagian daripada langkah pembendungan. Akibatnya, mod pengajaran secara bersemuka tradisional beralih kepada pembelajaran jarak jauh dalam talian untuk mengurangkan penularan jangkitan sambil memastikan kesinambungan pendidikan. Walau bagaimanapun, wujud kebimbangan mengenai keberkesanan pembelajaran dalam talian dan implikasinya terhadap pihak berkepentingan utama dalam pendidikan, khususnya pelajar dan pendidik. Tujuan penyelidikan ini adalah untuk menganalisis impak pembelajaran dalam talian terhadap pelajar di Universiti Pertahanan Nasional Malaysia (UPNM) semasa pandemik COVID-19. Data yang dikumpul daripada pelajar melalui soal selidik tertutup dan terbuka menjalani pemilihan responden yang teliti menggunakan kaedah persampelan rawak. Sebanyak 445 jawapan pelajar telah diperolehi untuk dianalisis. Analisis deskriptif dan analisis statistik penerokaan multivariat bagi data telah dijalankan menggunakan perisian statistik, SPSS. Analisis deskriptif menilai pembelajaran dan jangkaan pelajar terhadap pembelajaran dalam talian, manakala analisis data penerokaan multivariat, *Principal Component Analysis (PCA)* digunakan untuk mengkaji bagaimana pembelajaran dalam talian mempengaruhi pengalaman pembelajaran pelajar. Berdasarkan analisis, semasa tempoh penutupan, pelajar menghadapi isu yang melibatkan teknikal, pengurusan masa, interaksi secara sosial dan isu persekitaran di rumah. Walau bagaimanapun, pelajar juga berminat untuk mempelajari kemahiran teknologi baharu dan memihak kepada keupayaan untuk memainkan semula rakaman kuliah dan bahan kelas. Pandangan tentang impak pembelajaran dalam talian terhadap pelajar adalah penting berikutan kemajuan teknologi dalam pendidikan, bukan sahaja di Malaysia malah di seantero dunia.

ACKNOWLEDGEMENTS

First and foremost, Alhamdulillah praises and thanks Allah S.W.T for endless blessings and for granting me the chance to study at the National Defence University of Malaysia (NDUM). This thesis would not have been possible without the support of many people.

I want to express my deep and sincere gratitude to my research supervisor, Dr. Mohammad Adib bin Khairuddin, for allowing me to do research under his supervision and providing invaluable guidance throughout this research. I am extending my heartfelt thanks to Assoc. Prof. Dr. Mohd Rizal bin Mohd Isa who has been an ideal co-supervisor, mentor, and exceptionally good friend, offering advice and endless encouragement with a perfect blend of insight and humour. Thank you, Dr. Sharifah Aishah binti Syed Ali; your encouraging words and thoughtful, detailed feedback have been invaluable to me. This work would not have been possible without the constant support, guidance, and assistance from all of them. I will forever strive to emulate your exceptional patience, profound knowledge, and remarkable ingenuity.

I express immense gratitude to my beloved husband, Nor Helmy Firdaus bin Zulkifli, for his unwavering love, prayers, understanding, unwavering support, and constant motivation, as he stood by my side during challenging moments. I am incredibly thankful to my family and friends for their unwavering, unconditional, and affectionate support. Lastly, I extend my heartfelt appreciation to all those who contributed to the success of this study.

APPROVAL

The Examination Committee has met on **14 September 2023** to conduct the final examination of **Sari Nashikim binti Radin Iskandar** on his master thesis entitled **AN IMPACT ANALYSIS ON STUDENTS' ONLINE LEARNING IN HIGHER EDUCATION INSTITUTIONS DURING THE COVID-19 PANDEMIC**. The committee recommends that the student be awarded the Master of Computer Science.

Members of the Examination Committee were as follows.

Prof. Madya Ts. Dr. Noor Afiza binti Mat Razali

Faculty of Defence Science and Technology
Universiti Pertahanan Nasional Malaysia
(Chairman)

Ts. Dr. Mohd Sidek Fadhil bin Mohd Yunus

Faculty of Defence Science and Technology
Universiti Pertahanan Nasional Malaysia
(Internal Examiner)

Dr. Nazhatul Sahima binti Mohd Yusoff

Computer Science and Mathematics Faculty
Universiti Teknologi Mara Kelantan
(External Examiner)

APPROVAL

This thesis was submitted to the Senate of Universiti Pertahanan Nasional Malaysia and has been accepted to fulfil the requirements for the degree of **Master of Computer Science**. The members of the Supervisory Committee were as follows.

Dr. Mohammad Adib bin Khairuddin

Faculty of Defence Science and Technology
Universiti Pertahanan Nasional Malaysia
(Main Supervisor)

Assoc. Prof. Dr. Mohd Rizal bin Mohd Isa

Faculty of Defence Science and Technology
Universiti Pertahanan Nasional Malaysia
(Co-Supervisor)

Dr. Sharifah Aishah binti Syed Ali

Faculty of Defence Science and Technology
Universiti Pertahanan Nasional Malaysia
(Co-Supervisor)

UNIVERSITI PERTAHANAN NASIONAL MALAYSIA

DECLARATION OF THESIS

Student's full name : Sari Nashikim binti Radin Iskandar
Date of birth : 12th June 1979
Title : Impact Analysis on Students' Online Learning in Higher Education Institutions During the COVID-19 Pandemic
Academic session : 2019/2020

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

I further declare that this thesis is classified as:

☐ **CONFIDENTIAL** (Contains confidential information under the official Secret Act 1972) *

☐ **RESTRICTED** (Contains restricted information as specified by the organisation where research was done) *

☐ **OPEN ACCESS** I agree that my thesis to be published as online open access (full text)

I acknowledge that Universiti Pertahanan Nasional Malaysia reserves the right as follows.

1. The thesis is the property of Universiti Pertahanan Nasional Malaysia.
2. The library of Universiti Pertahanan Nasional Malaysia has the right to make copies for the purpose of research only.
3. The library has the right to make copies of the thesis for academic exchange.

Signature

Signature of Main Supervisor/Dean of CGS

IC/Passport No.

Name of Main Supervisor/Dean of CGS

Date:

Date:

Note: *If the thesis is CONFIDENTIAL OR RESTRICTED, please attach the letter from the organization stating the period and reasons for confidentiality and restriction.

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ABSTRAK	iii
ACKNOWLEDGEMENTS	iv
APPROVAL	vi
DECLARATION	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF ABBREVIATIONS	xv
CHAPTER 1 INTRODUCTION	1
1.1 Background of the Research	1
1.2 Problem Statement	2
1.3 Research Questions	4
1.4 Research Objectives	4
1.5 Research Scope and Limitation	4
1.6 Significance of Study	5
1.7 Organization of Thesis	6
CHAPTER 2 LITERATURE REVIEW	7
2.1 Online Learning	7
2.2 Types of Online Learning	7

2.2.1 Fully Online	7
2.2.2 Mixed Mode (Blended or Hybrid Learning)	8
2.2.3 Web-Assisted	9
2.3 Forms of Online Learning	10
2.3.1 Synchronous Learning	10
2.3.2 Asynchronous Learning	13
2.4 Previous Research on Benefits and Critical Challenges of Online Learning	15
2.5 Current Research on the Effect of Online Learning Towards Students' Learning Experiences	17
2.5.1 Well-Being	18
2.5.2 Technology Infrastructure and Internet Access	19
2.5.3 Adaptation to the Online Learning Platform	20
2.5.4 Communication	21
2.5.5 Other Factors	22
2.6 Summary	24
CHAPTER 3 RESEARCH METHODOLOGY	25
3.1 Introduction	25
3.2 Research Design	26
3.2.1 Research Philosophy – Pragmatism	27
3.2.2 Research Approach – Deductive Approach	28
3.2.3 Research Method – Quantitative Method	29
3.2.4 Research Strategy – Questionnaire Survey	30
3.2.5 Research Time Horizon – Cross-Sectional	31
3.3 Data Collection and Data Analysis Methods	32

3.3.1 Data Collection Methods	32
3.3.2 Data Analysis Methods	41
3.4 Summary	49
CHAPTER 4 RESULTS AND DISCUSSION	50
4.1 Introduction	50
4.2 Demographic Profile of Respondents	50
4.3 Descriptive Analysis	56
4.3.1 Descriptive Analysis of Students' Perceptions Towards Online Learning Platforms	56
4.3.2 Descriptive Analysis of the Benefits and Critical Challenges Facing the Student's Learning Through Online Platforms at Home During the COVID-19 Pandemic	63
4.4 Multivariate Exploratory Data Analysis of the Effects of Online Learning on Students' Learning Experiences	72
4.5 Summary	81
CHAPTER 5 RESEARCH CONTRIBUTION AND FUTURE WORK	82
5.1 Conclusion of the Research	82
5.2 Research Contribution	82
5.3 Limitations and Future Works	88
5.4 Summary	89
REFERENCES/BIBLIOGRAPHY	90
LIST OF PUBLICATIONS	101
APPENDIX	102

LIST OF TABLES

TABLE NO.	TITLE	PAGE
Table 2.1	The various tools of digital media utilised in in synchronous learning	14
Table 2.2	The various tools of digital media used in asynchronous learning	17
Table 3.1	The questionnaire details for this study	37
Table 3.2	Assumption of KMO	46
Table 4.1	Demographic characteristics of the respondents ($N = 445$)	53
Table 4.2	The students' views on online learning platforms ($N = 445$)	59
Table 4.3	Online tools and platforms usage ($N = 445$)	62
Table 4.4	Usefulness of online platforms ($N = 445$)	64
Table 4.5	Classification of key factors based on respondents' views	71
Table 4.6	KMO and Bartlett's Test	75
Table 4.7	Rotated component matrix – PCA	80
Table 4.8	Rotated component matrix ^a	81

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
Figure 2.1	The critical challenges and benefits of an online learning platform (Abramenka, 2015)	19
Figure 2.2	Conceptual framework for this study (Monzon, 2020)	25
Figure 3.1	Representation of the research design (Adapted from Sounder et al. (2012))	29
Figure 3.2	The Krejcie and Morgan Table	36
Figure 3.3	Steps in PCA (Adopted from (Mazlan et al., 2020)	48
Figure 4.1	Benefits of students' online learning ($N = 445$)	65
Figure 4.2	Students' online learning challenges ($N = 445$)	67
Figure 4.3	Key factors affecting students' online learning experiences ($N = 10$)	73
Figure 4.4	Scree plot of main components	79

LIST OF ABBREVIATIONS

COVID-19	Coronavirus Disease of 2019
EFA	Exploratory Factor Analysis
HEI	Higher Education Institutions
ICA	Independent Component Analysis
ICT	Information Communication Technology
KMO	Kaiser Meyer-Olkin
LDA	Linear Discriminant Analysis
MCO	Movement Control Order
MoE	Ministry of Education
NDUM	National Defense University of Malaysia
ODL	Online Distance Learning
OLP	Online Learning Platform
PCA	Principal Component Analysis
SPSS	Statistical Package for the Social Sciences
VOIP	Voice Over Internet Protocol

CHAPTER I

INTRODUCTION

1.1 Background of the Research

The emergence of the novel coronavirus (COVID-19) in Wuhan, China, has led to a highly contagious disease that swiftly disseminated throughout the nation's healthcare system, exacerbated by measures such as shelter-in-place. With mandatory social isolation measures in effect, a significant demand for information and communication technology (ICT) has prompted universities to adapt their research methodologies to an online environment (Sánchez et al., 2020). The closure of schools and colleges due to the pandemic has profoundly impacted education, affecting approximately 72.4 per cent of all enrolled students (UNESCO, 2020).

In order to safeguard the well-being of the teaching community and students, opting for teaching in a simulated environment is the most secure decision to make (Economic Commission for Latin America and the Caribbean [ECLAC], 2020). However, this approach has brought about unforeseen challenges. Despite the existence of virtual schooling since the latter half of the twentieth century, many

educational programs worldwide are not adequately equipped to meet the demand for online classes.

At the onset of 2020, Malaysia reported its first confirmed case of COVID-19, and the number of cases steadily increased throughout the year. To curb the transmission of the virus within the nation, the Malaysian government enforced a Movement Control Order (MCO), commonly known as a partial lockdown. This key measure had far-reaching consequences for higher education, as universities were compelled to shut down and countries implemented border restrictions under the government's directives, all in response to the global spread of the COVID-19 pandemic.

The closure of educational institutions creates a significant demand for students and educators to adapt to the prevailing norms and assist in implementing online learning platforms. Allam et al. (2020) define distance learning as an educational approach where students undertake their studies online instead of attending in-person lectures. This means that students engage in reading, taking exams, and completing their enrolled courses through online platforms without the need for physical access to lecture halls, computer labs, libraries, or traditional classrooms. Unlike traditional schools, distance learning does not require teachers and students to be physically present in the exact location simultaneously.

1.2 Problem Statement

Gaining insights from the educational systems and experiences of other countries facing similar circumstances can provide valuable guidance. Numerous reviews and projections regarding the potential impact of COVID-19 on higher

education have already been published (DAAD, 2020; El Said, 2021; Hussin, Awang & Mohd Fatzel, 2020). Organizations such as QS, Educations.com, and Studyportals (StudyPortals, 2020) are presently conducting three global surveys targeting university staff, students, and prospective students to assess the consequences of COVID-19 on their research or mobility plans (DAAD, 2020). The survey results are being summarized through online presentations and blog posts. Nevertheless, limited scholarly research has been conducted on this topic to comprehensively understand the performance of online learning during the COVID-19 lockdown and its influence on the academic activities of higher education institutions (HEI).

To date, limited research has been conducted on the strategies employed by universities worldwide to navigate the challenges posed by the COVID-19 pandemic. Furthermore, existing studies primarily focus on comparing student performance in online platforms versus traditional face-to-face classes (Arias et al., 2018; Kenny, 2010; Suprabha et al., 2017) rather than exploring the underlying factors contributing to the impact of online learning. Therefore, there is a need for further investigation to support higher education institutions (HEI) in effectively addressing the ongoing lockdown, which is anticipated to extend until 2022 and 2023. Specifically, research should provide guidelines for lecturers to enhance online learning platforms (Coman et al., 2020) to overcome the challenges posed by the current situation. Furthermore, this research holds significant importance in the context of long-term strategic planning with the objective of developing education systems that possess sustainability and adaptability. Additionally, it enables the identification of specific areas that require supplementary academic support. Moreover, this study has the capability to offer

valuable insights necessary for the development of resilient frameworks that are capable of enduring extended periods of disruptions.

1.3 Research Questions

The questions of this research are as follows:

RQ1. What are the students' perceptions regarding using online learning platforms?

RQ2. What specific benefits and challenges have students experienced while engaging in online learning from home during the COVID-19 pandemic?

RQ3. How does online learning affect students' learning experiences?

1.4 Research Objectives

The objectives of this research are as follows:

RO1. To explore students' perceptions of the use of online learning platforms.

RO2. To identify the online learning benefits and challenges students face at home during the COVID-19 pandemic.

RO3. To evaluate the effects of online learning on students' learning experience.

1.5 Research Scope and Limitation

This research's primary purpose is to examine the impacts of online learning on students during the COVID-19 pandemic. The study includes participants from the

National Defence University of Malaysia (NDUM) who possess a wide range of characteristics, including diverse backgrounds in terms of race, religion, age, faculties, programs, years of study, and locations of residence within the period of May 2020 to May 2021. In order to achieve the research objectives, the quantitative method with the suitable number of respondents is measured using descriptive statistical analysis, which included computations for frequency, mean, and standard deviation, as well as multivariate exploratory data analysis. The students were selected using random sampling, where WhatsApp applications and email were the media for circulating the survey questions.

1.6 Significance of Study

The findings can provide insights into the challenges and potential advantages posed by online platforms. This facilitates educators in adapting their instructional approaches to effectively align with the virtual environment, thereby ensuring that students are provided with a comprehensive and captivating educational experience. Moreover, the anticipated results and recommendations of this research would help educators improve the delivery of online learning platforms for students. Furthermore, these research findings may help top management in HEI and educators improve the holistic learning experience and ensure education's accessibility, efficacy, and adaptability to unexpected challenges. Future research areas could include adopting the proposed recommendation and extending the sample and evaluation scope to include more schools and colleges.

1.7 Organization of Thesis

Chapter 1: Introduction – This thesis starts with the background of the study, which includes describing the problem statement, defining the research objectives, underlining the research scope, and presenting the significance of the research.

Chapter 2: Literature Review – This chapter contains the literature survey on the online learning platform, emphasizing the current research on the impact of online learning for HEI students' during COVID-19.

Chapter 3: Methodology – This chapter describes the research methodology used in this study. Quantitative surveys will be distributed and compiled to selected focus groups (NDUM students), and the results will be measured using statistical analysis tools. The measurement used includes descriptive statistical analysis and multivariate exploratory data analysis.

Chapter 4: Results and Discussion – This chapter highlights the results from the measurements and analysis of the data. Furthermore, this chapter also includes a discussion on the meaning of the results.

Chapter 5: Main contribution and Future Work – This thesis concludes by discussing this research's contributions and future works. Moreover, the presented recommendations would guide educators in creating a conducive online learning platform for students.

CHAPTER 2

LITERATURE REVIEW

2.1 Online Learning

Online learning is also known as web-based learning or learning over the Internet. It is a subcategory of online education. E-learning is a subcategory of education that also includes instructor-led and text-based instruction. A difference will be made between online learning and e-learning in this study, and most of the information will concentrate on online learning and online distance learning (ODL).

2.2 Types of Online Learning

Researchers have classified online learning into three main categories: entirely online, mixed mode (also referred to as blended or hybrid learning), and web-assisted approaches (Anastasiades & Retalis, 2001 as cited in Inampudi, Khemshetty, & Parvathi, 2023).

2.2.1 Fully online

Furthermore, researchers have identified three distinct forms of online learning: entirely online, mixed mode (blended or hybrid learning), and web-assisted approaches (Anastasiades & Retalis, 2001 as cited in Inampudi, Khemshetty, &

Parvathi, 2023). In fully online learning, there is no physical interaction between students and lecturers, and all activities occur exclusively through Internet connectivity, unlike traditional learning, which allows for face-to-face contact between students and lecturers. All course materials, assignments, and teaching and learning processes are conducted online (Young, 2008 as cited in Inchaouh & Tchaïcha, 2020).

Moreover, unlike instructor-led face-to-face learning that revolves around the instructor's expertise, fully online learning emphasizes self-study and offers flexibility in terms of time management. With self-study as a core component, fully online learning accommodates individual requirements, interests, study habits, creativity, and student aspirations (Buzzetto-More, 2013 as cited in Obichukwu, Nwangwu, & Onah, 2019). Asynchronous communication and support tools are employed in fully online learning, which will be explored in greater detail in subsequent sections of Chapter 2.

2.2.2 Mixed Mode (Blended or Hybrid Learning)

In contrast to fully online learning, blended learning combines face-to-face interactions and online learning elements (Allen & Seaman, 2003 as cited in Eltahir, Alsalhi, Torrisi-Steele, & Al-Qatawneh, 2023). This approach entails integrating online and in-person components in teaching and learning. For instance, while lectures and tests are conducted in person, assignments and presentations are completed online. Blended learning is considered a promising direction for education, and it is anticipated to bring about a paradigm shift in higher education in the coming years. Approximately 80% to 90% of courses are projected to be delivered through hybrid learning (Allen & Seaman, 2003 as cited in Eltahir, Alsalhi, Torrisi-Steele, & Al-

Qatawneh, 2023; Lorenzetti, 2005 as cited in Muin, 2021; Young, 2002 as cited in Bender, 2023). Advocates of blended learning argue that its implementation can complement face-to-face instruction and facilitate the inclusion of practical exposure in the curriculum.

2.2.3 Web-Assisted

The final category of online learning is the web-assisted mode, which falls under synchronous learning and employs course websites and tools to facilitate teaching and learning. Web-assisted learning shares similarities with online instruction as it incorporates online discussions and interactions between lecturers and students. Synchronous learning tools enable real-time lectures and interactions between lecturers and students, resembling a traditional classroom setting, except these interactions occur online instead of in person (Buzzetto-More, 2015). The main distinction between fully online and web-assisted learning lies in using synchronous technologies in web-assisted learning, allowing for live interaction, whereas fully online learning is asynchronous and lacks live contact. Additionally, while web-assisted and blended learning enables interaction between participants and instructors, blended learning includes physical presence, whereas web-assisted learning does not.

Blended learning (mixed mode) stands out as a superior approach among the various forms of online learning (Torrison & Davis, 2000 as cited in Aziz, Safiai, Wahat, Hamzah, Ahrari, & Mahadi, 2023) because it combines elements of fully online or web-assisted learning with traditional classroom instruction (Rubenstein, 2003; Ward & LaBranche, 2003 as cited in Srivastava, Siddiqui, Kaurav, Narula, & Baber, 2023).

Furthermore, blended learning allows students to access and review course materials online before attending in-person sessions, enabling a solid grasp of the topics covered during class (Smart & Cappel, 2006 as cited in Andries & Lengkoan, 2023). Despite the ongoing debates surrounding e-learning and its diverse manifestations, one aspect remains constant: using the internet and technological tools for teaching and learning with minimal face-to-face interaction.

2.3 Forms of Online Learning

Online learning can take many forms, including synchronous and/or asynchronous delivery.

2.3.1 Synchronous Learning

Synchronous communication is immediate, live communication. For example, a voice call illustrates this—both callers in a phone conversation are simultaneously present in their separate locations.

This type of learning occurs in real-time, where a lecturer conducts live discussions and lectures with students. Students participating in these classes can be located anywhere in the world. They join the class at a predetermined time and actively interact with the lecturer and their classmates (Kalpana, 2010 as cited in Loi & Ang, 2022). Synchronous learning is facilitated by digital media, enabling the simultaneous participation of individuals from different locations. However, one notable drawback of synchronous learning is the requirement for simultaneous involvement, which can

present challenges due to varying time zones and conflicting schedules (Obasa, 2010 as cited in Loi & Ang, 2022). To overcome the time zone issue, participants must be familiar with and stay updated on time differences to meet deadlines and "attend" classes.

The following digital media are accessible in synchronous learning and provide participants with a complete, rich learning experience and a feeling of community (Obasa et al., 2013 as cited in Laily, Suparno, & Ngadiso, 2023; McGreal & Elliott, 2004 as cited in Singh & Meena, 2023). Table 2.1 presents the various tools of digital media utilised in synchronous learning.

Table 2.1 The various tools of digital media utilised in in synchronous learning

Digital Media	Description
Audio Conferencing	Audio conferencing enables real-time online interaction between students and lectures, eliminating expensive phone call costs. Platforms like Skype, other VoIP services, and even instant messaging apps like WhatsApp support this feature. It replicates the one-on-one communication experience of a traditional classroom.
Chat	Chat services allow immediate exchange of text and graphics, enabling students to ask questions and receive instant answers. This immediate feedback eliminates the wait time of email responses, mirroring the immediacy of a traditional classroom setting.
Instant Messaging	Electronics exchanges enable direct messaging between participants and instructors. Those online can respond immediately, while offline individuals can review past messages and provide feedback when they log in.
Video Conferencing	Video conferencing allows instructors and students to interact in real time, mirroring a physical classroom experience. This real-time interaction promotes a feeling of academic community and belonging.