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Awareness and Attitudes Towards Open Access Predatory Publications Among the Academic Staff Members of Faculty of Management Studies and Commerce, University of Jaffna, Sri Lanka

T.Janen¹

Abstract

The scholarly community is now dealing with a serious issue with predatory journals. It might be difficult for authors to identify predatory publications apart from reputable ones. The purpose of this study is to investigate the academic staff members of the Faculty of Management Studies and Commerce, University of Jaffna, Sri Lanka on awareness of predatory publications and open access. The research methodology used in this study to gauge participants' knowledge of "open access" and "predatory publishing" was a questionnaire survey. Data collection involved the use of a pretested questionnaire. The permanent academic staff members affiliated with the Faculty of Management Studies and Commerce, university of Jaffna comprised the study's population. A link to an online survey was shared with every one of the faculty's fifty-two academic staff members. The response rate of the study was 67.30 %. MS Excel was used for the data analysis to describe the data in frequencies, percentages and rank orders of responses.

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Socio demographic details shows that, highest number of respondents are female (57.14%), completed master/MPhil (51.42%), senior lecturer (57.14%) and interested in marketing (28.57%) as their research discipline. Respondents expressed their priority order for the factors considered to select journal to submit manuscript for publications, journal indexing is the highest priority. All the respondents have an idea about the open access publishing system. Respondents are expected to publish in open access journals because of high visibility, increasing citation number, prestigious journals and fast publication process in a frequency order. The result of the survey shows that, 97.15% of the respondents are knowledgeable about predatory publishing. Majority of the respondents are characterized, the predatory journals are, no insufficient peer review process, and Beall's list of predatory journals used by the high number of respondents to differentiate legitimate journals from predatory journals. More than half of the respondents are satisfied with the services provided by the library to avoid publishing in predatory journals. Responses are summarized for each of the 8 statements about the impact of publishing in predatory journals. Almost all the statements are agreed by the respondents other than the statement of "Articles published in predatory journals are poor in quality". Highest agreement found for the statement 3 which is "Predatory publications are not considered for any academic reward" in which 14 out of 35 were strongly agreed and followed by the statement 2 "many researchers published articles due to lack of awareness about predatory publication" (13 out of 35). Finally respondents are suggested to organize more awareness session on open access publishing and journal selection to avoid predatory publishing.

Keywords: Predatory journals, Open access publishing, Open access journals, Awareness of predatory journals, Publication ethics.

Introduction

More than ten years ago, Jeffrey Beall claimed to be the creator of the term "predatory journal." It has grown in importance among the academic community. Many articles were presented regarding the issues caused by predatory journals, the impact of improperly evaluated manuscripts, and how to lessen them. An increase in predatory journals coincides with the expansion of the open access publishing paradigm. Rather than encouraging high-quality research or information dissemination, these predatory publishers prioritize their bottom line over peer review, often operating with little to none at all. Academic evaluation of research publications becomes crucial and is also a fundamental component. Publication in peer-reviewed scientific journals is the benchmark for academic excellence and the most important way to share research findings.

Choosing a journal with appropriate subject coverage and scope, building reputation among fellow researchers in the field, having the work included in a reliable database, and making the work available to readers for dissemination among researchers are the main components of publishing. Publications that are open-access have greatly increased in quantity and range. In order to encourage authors to submit their work promptly and with unrestricted access, open access journals have used marketing strategies for the past 20 years ([Richtig et al., 2019](#)). But since 2010, there have also been unethical articles that have appeared alongside open access journals. Article processing charges (APCs) were used as a cost model by certain individuals and organizations to publish articles in low-quality journals without subjecting them to the required peer review procedure ([Gasparyan et al., 2013](#)).

These publications are generally referred to as predatory journals, and their publishers are predatory as well. A high likelihood of unethical acts, like

as falsification, fabrication, plagiarism, and guest or ghostwriting, can be found in published articles due to the absence of peer review ([Hebrang Grgić & Guskić, 2019](#)). Predatory publishers were also given an opportunity in the open access publishing model's expansion. Majority of the open access journals are authentic, which are published by very reputed publishers, professional bodies and research institutions. But some of the journals are questionable in the quality ([Teixeira da Silva et al., 2019](#)).

Open access publishing model started with the intention of equal chance for all the researchers to access the scholarly publications. Open access publications are freely available online journals which have no cost and with limited restrictions in terms of reuse. It makes the research information freely, immediately and online accessible for the readers. Mainly there are two types of open access models popular among the scholarly community, which are gold open access and green open access ([Gasparyan et al., 2013](#)).

Immediately upon publication, the final version of an article is permanently and freely accessible through gold open access. The benefit of rapid availability for authors is that it garners high publicity and influences the frequency of citations and distribution of the article. Gold open access allows to retain the copyright with the author. On the other hand Green open access retained to as self-archiving, which allows to deposit an author's manuscript in repository, also there are some restriction on, how the work can be reuse ([Manca et al., 2017](#)).

Recently Sri Lankan universities have started to evaluate the authenticity of the research publications during their promotions, rewards and funding. Individual universities have started to adopt their system to regularize publication authentication. The awareness level of predatory publishing among academic staff varies among the universities, widely based on factors

such as discipline, institutional policies, and the efforts made by the university to educate its faculty. University of Jaffna took an initiative to regularize the predatory publication by introducing an internal circular on “Publication Ethics”. It propose a set of processes to address this challenge within the University of Jaffna by raising awareness and creating appropriate mechanisms. University of Jaffna persistently promote its academic staff to publish in journals that belong to the following categories such as,

1. Journals which are members of the Committee on Publication Ethics (COPE),
2. Journals which are members of the Open Access Scholarly Publishers Association (OASPA),
3. Journals which are included in the Directory of Open Access Journals (DOAJ)
4. Journals published by nationally and internationally acclaimed, established academic institutions, research centers and professional bodies.

It also mentioned as “In evaluating publication included in application for academic positions or promotions, only those publications that belong to one or more of the following categories shall be considered legitimate and publications that do not fall under any of the following categories shall be deemed illegitimate and therefore won’t considered for rewards”.

According to a study on publications completed by academics from all Sri Lankan universities across a range of subject areas, University of Ruhuna has produced a report. A letter alerting academic staff members to predatory publication has been distributed to vice chancellors of all universities, based on the findings of this investigation. All faculty deans have received a copy of this letter in 2019 ([University of Ruhuna, 2021](#)). Every publication claimed

for appointment or promotion should not have been published in a predatory journal or by a predatory publisher, according to the UGC promotion circular Commission Circular 11/2019, which is issued for promotions to the post of Professor or Associate Professor. The evidence indicates that the universities in Sri Lanka must endeavor to control the scholarly publication ([Sarvananthan, 2022](#)).

We can identify the predatory journals and publishers by evaluating their features and performance. Predatory publishers started widespread in the publishing market in 2013. The principles of transparency and best practices in scholarly publishing is a major factor to get the membership with the organizations like, Committee on Publication Ethics (COPE), Open Access Scholarly Publishing Association (OASPA) and Directory of Open Access Journals (DOAJ). The Committee on Publication Ethics (COPE) plays a crucial role in addressing predatory publishing and promoting ethical publishing practices in the academic and research community. COPE is a global organization that provides guidance, resources, and support to publishers, editors, and researchers to maintain the highest standards of publication ethics. Open Access Scholarly Publishing Association (OASPA) is an intentional community for open access publishing. It engaged and enable the access for the scholarly output. Membership in OASPA will enable effective development in the open access publishing ([Open Access Scholarly Publishers Association, n.d.](#)).

Authors must thoroughly check the authenticity of journals and publishers before submitting their manuscripts. A majority of authors lack proper awareness about open access publishing and predatory publishing. This study aims to investigate the awareness level of open access predatory

publications among the academic staff members of the Faculty of Management Studies and Commerce at the University of Jaffna, Sri Lanka.

Objectives

This study aims to investigate the knowledge of academic staff members at the Faculty of Management Studies and Commerce, University of Jaffna, Sri Lanka on predatory publications that are available as open access. Furthermore, the study intends to comprehend how academic staff members at the Faculty of Management Studies and Commerce, university of Jaffna see predatory journals and open access publishing.

Literature

The growth of open access publishing model allowed a path for the predatory publishers also. Majority of the open access journals are authentic, which are published by very reputed publishers, professional bodies and research institutions. But some of the journals are questionable in the quality. The appraisal of research publication is a major criteria considered for the academic promotions. Awareness about the predatory journals is very important for the researchers and academics to select suitable journals for their publication. A study was conducted among the young academics in Sri Lankan university sector using structured questionnaire, and concluded that only 15% of the respondents were aware about predatory journals. It shows that, there is a need to create awareness among academics about predatory journals ([Marika, 2020](#)). Fake journals are becoming popular among Sri Lankan scholars”, it emphasize that, the pressure on university young academics to publish more articles which are used as a criteria for evaluating for promotion. Under the merit promotion scheme in Sri Lankan universities, higher marks are given for an article published in a peer-reviewed journal. Author also have highlighted the problems related to increasing number of articles being

published in “fake journals”. Also most of the journals published by the universities in Sri Lanka are not indexed, and visibility of articles published in those are very poor ([de Silva, 2014](#)).

Number of studies have been conducted to find the awareness level of predatory journals and open access publishing, few of them were reviewed for this study to develop questionnaire to assess the awareness level among the academic staff ([Beshyah et al., 2018](#); [Cobey et al., 2019](#); [Kisely, 2019](#); [Kumari & Subaveerapandiyam, 2021](#); [Sharma et al., 2023](#)).

Methodology

This study selected quantitative method as methodological choice. Research strategy followed Survey method and purposive sampling method used as sampling technique. The population of the study is permanent academic staff members attached to the Faculty of Management studies and Commerce, University of Jaffna. Samples are academic staff attached to the Faculty of Management Studies and Commerce, University of Jaffna. Data collected using structured questionnaire to assess the awareness of "Open access", and "predatory publishing". An online survey link was circulated among all the academic staff members (n=52) of the faculty. The response rate of the study was 67%. Data analyzed using MS Excel to describe the data in frequencies, percentages and rank orders of responses.

Results

Publication practice of the researchers

Table 1 illustrated the socio-demographic details of the respondents. Highest number of respondents are female (57.14%), 51.42% of respondents are completed Master/MPhil, 42.85% are completed PhD, 57.14% of them are

Senior lecturer, 11.42% are Professors and 28.57% are interested in marketing as their research discipline.

Table 1

Socio – Demographic Details

Gender	
Respondents	
Male	15 (42.85%)
Female	20 (57.14%)
Highest Educational Qualification	
Respondents	
PhD	15 (42.85%)
Master/MPhil	18 (51.42%)
Bachelor	02 (5.71%)
Academic Designation	
Respondents	
Professor	04 (11.42%)
Senior Lecturer	20 (57.14%)
Lecturer	11 (31.42%)
Research Discipline	
Respondents	
Accounting	07 (20.00%)
Commerce	04 (11.42%)
Financial Management	08 (22.85%)
Human Resource Management	06 (17.14)
Marketing	10 (28.57%)

Table 2 shows that, 40% of the respondent's authored 10-20 publications, among them 28.57% are professors, 57.14% are senior lecturers and 14.28% are lecturers. Among the respondents 11.42% are authored more than 20 publications.

Table 2

Number of journal articles authored as the first author/co-author

Number of Publications	Respondents
<5	11 (31.42%)
5-10	06 (17.14%)
10-20	14 (40.00%)
>20	04 (11.42%)

Criteria to consider before submitting an article and the open access publishing

Table 3

Factors consider to select journal to submit manuscript for publication

Factors	Priority Order						
	1st	2nd	3rd	4th	5th	6th	7th
Duration of publication process	4 (28)*	4 (24)	11 (55)	8 (32)	3 (9)	4 (8)	1 (1)
Impact Factor	8 (56)	13 (78)	3 (15)	4 (16)	2 (6)	3 (6)	2 (2)
Peer review process	5 (35)	9 (54)	11 (55)	2 (8)	3 (9)	2 (4)	3 (3)
Quality of the Editorial Board	7 (49)	9 (54)	5 (25)	3 (12)	4 (12)	1 (2)	6 (6)
Publication Cost	7 (49)	5 (30)	9 (45)	5 (20)	0 (0)	4 (8)	5 (5)
Editorial Support	4 (28)	5 (30)	7 (35)	4 (16)	8 (24)	1 (2)	6 (6)
Indexed journals (Web of Science, Scopus, etc)	16 (112)	5 (30)	6 (30)	1 (4)	0 (0)	2 (4)	5 (5)

*Calculated based on the weighted factor (7,6,5,4,3,2 and 1)

Table 3 reveals the most important factors considered for publication of scientific work in a preferential order. Authors are advised to go through the journal profile and evaluate its performance and good practices before submitting manuscripts (Beall, 2016). Journal indexing (112) is the highest first priority for the respondent and it was followed by, the impact factor of the journal (56), publication cost (49) and quality of editorial board (49) in

journal selection. Less priority was given for the duration of publication process.

Table 4

Awareness level of Open Access publishing

Are you aware of “Open Access System”?	Respondents
Fully Knowledgeable	09 (25.71%)
Knowledgeable	13 (37.14%)
Somewhat Knowledgeable	09 (25.71%)
Slightly Knowledgeable	04 (11.42%)
No idea	00
If yes, did you publish anything in an Open Access Journal yet?	Respondents
Yes	23 (65.71%)
No	12 (34.28%)
Reasons for publishing your scholarly work in an open access journals	Frequency
High visibility	19
Increasing citation number	14
Prestigious Journals	11
Fast publication process	09
Promotion of the result over social media	04
Less restricted peer review process	02
Easy to publish without significant result	01

How much would you be willing to pay for a publication in an open access journals?	
Amount	Respondents
LKR Zero/ Nothing	14 (40.00%)
< LKR 10,000	10 (25.57%)
LKR 10,000- 20,000	07 (20.00%)
LKR 20,000- 50,000	04 (11.42%)

Scientific research shows that publishing in open access, because of the worldwide visibility without barriers, demonstrably leads to more citations and more impact. It makes the research information freely, immediately and online accessibility for the readers ([Christopher & Young, 2015](#)). Table 4 discuss about the open access publishing. In this, 37.14% of academics are knowledgeable about the open access publishing and 25.71% of them are fully knowledgeable. All the respondents are have an idea about the open access publishing system.

Among them 65.71% are published their manuscripts in open access journals and 34.28%are not yet published in the open access journals. Respondents were allowed to select more than one option regarding the reasons for publishing the scholarly work in an open access journals. Reason to publish in an open access journal were (1) High visibility (19), (2) increasing citation number (14), (3) prestigious journals (11), and (4) fast publication process (9). It shows the 25.57% of the participants indicated to be willing to pay less than LKR10,000 and 40% of the respondents are not willing to pay any fee or article processing charges to publish in open access journals.

Awareness of Predatory publications

Table 5

Awareness about predatory publications

Are you aware to identify the potentially “predatory journals”	
	Frequency
Fully Knowledgeable	10 (28.57%)
Knowledgeable	15 (42.85%)
Somewhat Knowledgeable	05 (14.28%)
Slightly Knowledgeable	04 (11.42%)
No idea	01 (02.85%)
How would you characterize a “Predatory Journal”?	
	Percentage
Open access to all articles	05.12%
Low quality of the published articles	17.94%
No or insufficient peer review	20.51%
No editorial board or no qualified persons in the editorial board	08.54%
Unprofessional journal layout	14.53%
High professional fees	06.83%
Fast publication	19.54%
Easy/ No review process	07.73%
Are you aware about the following?	
Database	Frequency
DOAJ	20
COPE	18

OASPA	10
Beall’s List	23
Cabell’s List	6
If aware about the above, which one you use to check if an unknown journal is a predatory?	
DOAJ	23.52%
COPE	15.68%
OASPA	7.84%
Beall’s list	43.16%
Cabell’s list	9.80%
Do you receive excessive spam mails from unknown publishers to submit manuscripts or serve as editorial members?	
Yes	30 (85.71%)
No	5 (14.28%)
Identifying predatory journals from legitimate open access journals is	
Very easy	4 (11.42%)
Easy	4 (11.42%)
Can identify	17 (48.57%)
Difficult	10 (28.57%)
Very difficult	0
Your level of satisfaction provided by the library with regard to avoid predatory publications?	
Highly satisfied	7 (20.00%)

Satisfied	14 (40.00%)
Neither satisfied or Dissatisfied	8 (22.85%)
Dissatisfied	4 (11.42%)
Highly dissatisfied	2 (5.71%)

Table 5 discuss about the predatory publishing and it is impact. Predatory journals have recently become a significant problem within scholarly literature. Though there is no single defined definition of predatory journals, they may be considered as journals that claim to maintain scholarly publishing standards while neglecting to meet those standards. Awareness on predatory publication is important for the researchers and academics to avoid publishing in those journals. Among the respondents 28.57% of them are fully knowledge about the predatory journals, followed by 42.85% are knowledgeable, and 14.28% are somewhat knowledgeable. Only 2.85% are not having any idea about the predatory journals. This survey shows nearly 97% of the respondents had prior knowledge of predatory journals. Predatory journals and publishers could be identified by evaluating their features and performance. High number of respondents are characterized predatory journals as no or insufficient peer review process (20.51%), followed by low quality of published articles (17.94%) and unprofessional journal layout (14.53%). Peer review is a key feature of predatory journals, according to 90% of respondents who were fully knowledgeable and knowledgeable. The majority of responders said they were aware of possible predatory journals. The majority of responders indicated that they were aware of potential predatory journal identification.

A key component of becoming a member of organizations such as the Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishing Association (OASPA), and Committee on Publication Ethics (COPE) is adhering to the best practices and transparency in scholarly publishing. Authentic journals and publishers can be distinguished from predatory journals and publishers by holding memberships in these societies. Most responders are aware of DOAJ and Beall's list of predatory journals. To determine if an unknown journal was a predatory journal or not, nearly half of the respondents (43.16%) consulted Beall's list of predatory journals.

In the context of academia, researchers often receive spam emails from predatory journals, conferences, and publishers. These emails are typically characterized by aggressive marketing and a lack of personalization. They may use enticing subject lines, such as invitations to publish in prestigious-sounding journals or present at high-profile conferences. In this survey, 85.71% of the respondents were received excessive spam mails from unknown publishers to submit manuscripts or serve as editorial members.

Identifying predatory journals from legitimate open access journals can be challenging, as predatory journals often copy the appearance of legitimate ones. However, there are certain signs and criteria that can help you to differentiate between the two, such as, peer review process, editorial board, journal website, indexing and impact factor, checking with authentic databases ([Li et al., 2019](#)). Majority of the respondent are able to differentiate the legitimate journals from the predatory journals and only 28.57% of them said, it is difficult. Libraries play a crucial role in supporting researchers to identify predatory journals and guiding them toward legitimate sources. Libraries can empower researchers to make informed decisions about where to publish their work and help safeguard the integrity of scholarly communication. Academics

attached to the faculty of management were ask to put the level of satisfaction regarding the support given by the library to avoid predatory publications, 20% of them were highly satisfied, 40% were satisfied and 5.71% were highly dissatisfied.

Table 6

Impact of publishing in predatory journals

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Knowledge of predatory journals is inevitable in the electronic information world	10	9	7	5	4	0
Many researchers published articles due to lack of awareness about predatory publication	13	9	5	4	1	3
Predatory publications are not considered for any	14	9	5	3	4	0

academic reward						
Predatory publications do not receive any valid citations.	9	6	7	7	4	2
It is unfair to remove the predatory publications when considering for academic rewards without making proper awareness among the members.	7	12	7	6	3	0
Articles published in predatory journals are poor in quality.	7	5	12	7	4	0
Publishing articles in predatory	10	8	8	5	4	0

journals reduce the reputation of the researcher.						
Predatory publishing leads to a distortion of the published scientific literature.	12	5	4	7	2	5

In table 6, Responses are summarized for each of the 8 statements about the impact of publishing in predatory journals. Almost all the statements are agreed by the respondents other than the statement of “Articles published in predatory journals are poor in quality”. Highest agreement is found for the statement 3 “Predatory publications are not considered for any academic reward” in which is 14 out of 35 were strongly agreed and followed by the statement 2 “many researchers published articles due to lack of awareness about predatory publication” (13 out of 35). Highest number of disagreement is found for the statement 8 “Predatory publishing leads to a distortion of the published scientific literature” in which 25.71% respondents are disagreed and strongly disagreed. Highest proportion of “don’t know” responses (5 out of 35, 14.28%) is for the statement “Predatory publishing leads to a distortion of the published scientific literature”, which address the consequences of predatory publishing for the literature of respective disciplines.

Discussion and Conclusion

Open access journals and publishers are increased over the last decades it ensure the availability of scientific knowledge for researchers freely. Unauthentic journals and publishers took the advantage from the burden on researcher to publish more number of articles for their academic promotions ([Lutz & Rudiger, 2013](#)). The inadequate peer review process practiced by the predatory journals become severe problem for scientific literature ([Kumari & Subaveerapandiyana, 2021](#)). Researchers and academic need to analyses the impact of publishing in predatory journals and most of the predatory publications are from the researchers who are not aware about those journals.

The result of this study revealed that, majority of them are Master/MPhil qualified, and also senior lecturer and above involved in marketing related research. Among the respondents nearly half of them are published 10-20 articles during their research career. Indeed majority of participants in this study indicated Journal selection is an important factor, which influence on their research visibility, while journal indexing was the highest first priority. More than half of the respondents are knowledgeable about the open access publishing and published in open access journals. Moreover majority of the respondents are able to identify the potential predatory journals by using Beall's list to identify predatory publishers and journals. Studies proved that, number of predatory journals were indexed in popular indexing systems ([Manca et al., 2017](#)). However, differentiate the predatory journals from the authentic journals become challenging for researchers. Libraries are playing major role in educating the authors on journal selection and more than half of them are satisfied with the services provided by the library. Finally respondents are suggested to organize more awareness session on open access publishing and journal selection to avoid

predatory publishing particularly they mentioned as “Awareness program on predatory publication is essential for researchers, it should be avoided in future by creating proper awareness, researchers should be given proper awareness from library etc”.

In conclusion, the present study among the academic staff attached to the Faculty of Management Studies and Commerce, University of Jaffna, the majority of the respondents were aware about the concept of open access publishing, predatory publications and the negative impact of predatory journals on scholarly community publishing quality and integrity. However, identification of predatory journals and particularly differentiate the authentic journals from predatory are not well known. Respondents are highlighted the necessity of awareness programs regarding the challenges of predatory journal publishing and it’s problem among the scholarly community.

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Students Satisfaction with Online Learning during the COVID-19 pandemic: A first-round analysis of Diploma Program in Library and Information Science

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Abstract

The Sri Lanka Library Association (SLLA) has transitioned from conventional teaching-learning to online education. However, no further research has been conducted to assess the successfulness of this online learning from the students' perspective. Addressing this issue, the objectives of the study were to measure the satisfaction, successfulness and challenges faced by diploma students with online learning at SLLA during the pandemic. The survey was conducted using Google Forms and WhatsApp, with approximately 225 students approached and 194 (88.5%) responding. Data analysis was performed using SPSS software, and statistical tests were applied using the Wilcoxon signed-rank test and Rosenthal r value. Results regarding students' successfulness indicated that more than 70% agreed with online education during the lockdown. Additionally, students expressed that the online mode was more secure for their health 152(73%) and for transportation 129(66.49%) compared to face-to-face classes and distance mode classes. Concerning satisfaction, 97(50%) students were either highly satisfied or satisfied with online teaching, Regarding the devices used, majority of students (78.9%) used smartphones; whereas the use of laptops, desktops, and tablets was less commonly used (17.5%).

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Challenges identified were recorded as, clearly hearing the lectures 88(45.4%), expensive equipment requirements 85(43.8%), poor internet connection and difficulty in logging on in a timely manner 84(43.3%) each, and a feeling of isolation while attending class 82(42.3%). Overall, the majority of students were satisfied with online learning and they are moving towards the health security, transportation convenience, and ability to attend classes from home, despite the challenges faced. It is recommended to enhance student interaction and improve the practical effectiveness of the online course. Additionally, action should be taken to address the challenges faced by the students, redesign the online course to improve practical effectiveness, and implement best practices in online education.

Keywords: Online Learning, Diploma, Library & Information Science, Satisfaction, Association, Sri Lanka

Introduction

The COVID-19 pandemic has had a radical impact on nearly all countries. Though the pandemic has reshaped many of the entrenched habits, behaviors and approaches life, education sector has been the most severely affected by this pandemic situation. Consequently, numerous students have been compelled to discontinue their educational programs and institutions. The massive disruption in education involved the abandonment of face-to-face (F2F) teaching and the implementation of physical distancing measures to prevent the transmission of the virus ([Hettiarachchi et al., 2021](#); [Verma et al., 2021](#); [Riyath et al., 2022](#); and [Abuhmaid & Jarrah, 2022](#)).

In response to the severity of the COVID-19 pandemic, UNESCO recommended adopting online teaching and learning through new technologies for the higher education sector ([UNESCO Report, 2020](#)). During this period crisis period, lecturers and students transitioned to online teaching and learning from early 2020 to mid-2021. This approach, also known by terms such as e-learning, blended learning, online education, web-based education, web-based instruction, and online courses, has proven to be a vital resources, regard as the ideal solution for maintaining continuous and uninterrupted education ([Bao, 2020](#); [Hettiarachchi et al., 2021](#); [Urme & Barua, 2023](#)). This transition presented challenges compared to conventional face-to-face teaching, including for the Sri Lanka Library Association (SLLA). The shift to online learning posed significant challenge for both students and lecturers at the SLLA. During this exceptional time, the education committee of the SLLA had to explore various novel and unconventional educational and teaching methods. As a result, substantial efforts were made to develop effective online teaching methods that are both affordable and satisfactory for the SLLA students.

Statement of the problem

The rapid spread of the COVID-19 pandemic has significantly disrupted traditional learning methods, affecting students' education worldwide. Its impact has been affected by all students in education worldwide. Many higher education institutes and universities conducted surveys to assess the effectiveness of online teaching and learning platforms during the COVID-19 pandemic. Like most universities, the Sri Lanka Library Association (SLLA) also heavily invested in developing online teaching capabilities during this pandemic period. Despite the fact that, the Sri Lanka Library Association has transitioned from conventional teaching-learning to online education, no research has yet been conducted to evaluate the effectiveness of this online learning from the students' perspective. Therefore, this study aims to provide a comprehensive overview of the students enrolled to the Diploma course at SLLA for the academic year 2021/2022 who were compelled to switch to online classes due to the pandemic.

Objectives

In this environment the following objectives have been set for the study;

- To investigate the students' successfulness with various teaching methods
- To measure the level of satisfaction with online education
- To gather information on the challenges encountered by students in online education

Contextual Background

The Sri Lanka Library Association was established in 1960 as the Ceylon Library Association. In 1961, SLLA began offering library education ([Lankage, 1989](#)). In 2021, SLLA celebrated its 60th year of providing

education, with significant improvements in the library science courses offered by the Library Association. SLLA is the only national body in Sri Lanka that provides education for public librarians and library assistants, and the government recognizes these professional qualifications for relevant recruitments. Though the diploma courses are conducted by using two teaching methods; face-to-face and distance learning, with lecture notes provided to distance students- the global pandemic necessitated a shift in the education program to suit an online environment by adopting ZOOM. Awareness programs were conducted to familiarize student with Zoom and online education. While SLLA had previously conducted both face-to-face and distance education programs, e-learning has become the primary solution during this global pandemic, despite the challenges it poses to both educators and students.

Literature Review

Online learning, adopted by all kinds of institutes, was perceived as the only safe and viable choice to continue teaching and learning during the lockdown ([Abuhmaid & Jarrah, 2022](#), [Verma et al., 2021](#)). With the emergence of the pandemic in April 2020, 90% of the world's student population was affected ([UNESCO, 2021](#)). In this crisis, online learning become the lifeline and was considered the best option to ensure uninterrupted education. Consequently, the government and the Ministry of Education and Higher Education in Sri Lanka introduced alternative teaching-learning opportunities as online solutions.

Online learning during the pandemic

Various researchers and scholars have provided different definitions for the term “Online learning”. The Commonwealth of Learning defined e-

learning in 2015, emphasizing its foundation in digital technology. [Maddison et al. \(2017\)](#) defined *Online learning* as “instruction that is delivered electronically through various multimedia and Internet platforms and applications”. This term often used interchangeably with others such as *web-based learning*, *e-learning*, *computer-assisted instruction*, and *Internet-based learning*. With these definitions in mind, this review aims to assess the success of online education as indicated in research articles. For instance, [Riyath et al. \(2022\)](#) suggest in their study that students with a positive perception of Zoom have a strong intention to use it for their online classes.

Student Satisfaction

Whether learning occurs online or in a face-to-face classroom, one measure of educational effectiveness is student satisfaction. Many researchers have identified student satisfaction with online learning in various ways. Some have assessed the tools and facilities used for online learning. For instance, [Gamage & Zaber \(2021\)](#) conducted a survey among teachers in Sri Lanka and Bangladesh and found that 90% of teachers in Sri Lanka used WhatsApp technology, while teachers in Bangladesh, particularly those from schools with better facilities, tended to use a variety of more advanced products. A survey conducted at the South Eastern University of Sri Lanka ([Nafrees et al., 2020](#)), revealed that more than 50% of the students were satisfied with online education during the lockdown period. The reason for this satisfaction included the ability to continue academic work safely despite limited experience and conveniences of accessing course materials at any time. This suggests that undergraduates prefer to use the online education system ([Selvaras, 2020](#)).

A study conducted on online learning in Sri Lanka’s Higher Education Institutions during the COVID-19 pandemic indicated that nearly 90% of

students were highly or moderately satisfied with online education. According to [Hayashi et al. \(2020\)](#), there were no significant differences in the adoption of online learning by gender or between state and non-state institutions. The study also reported that while a large number of students owned smartphones, access to laptops and desktops with video cameras was insufficient. Specifically, around 90% of students reported owning a smartphone, but only 55% of students in state institutions and 66% in non-state higher education institutions owned a laptop. An African study on medical students' perception of e-learning during the COVID-19 pandemic revealed that only 32.1 % of subjects had laptops, while 88.5% had smartphones, which they used to access the internet. A noteworthy finding from this study, consisted with [Hayashi et al. \(2020\)](#), was that there were no significant differences in perceptions of the educational impact or effectiveness of online learning based on their sex, academic ranking, or position.

Problems/ Challenges

Many researchers have identified several factors that affect access to online education. According to a study conducted by [Hayashi et al. \(2020\)](#) in Sri Lanka, 70% of students faced challenges due to poor internet connectivity during their online learning. [Riyath et al. \(2022\)](#) suggested that students' negative attitude toward Zoom led to poor attendance in Zoom classes. This negativity often stems from a lack of self-efficacy in using computer/digital devices and applications, as well as a lack of awareness, unfamiliarity, and difficulty in understanding Zoom. However, various challenges remain including insufficient infrastructure, a shortage of well-trained instructors, limited financial support, government policies, and low student readiness ([Oliveira et al., 2020](#)). Another significant issue is the lack of resources, such as unstable internet connections, technical issues, and limited internet access.

[Madhubhashini \(2021\)](#) found that these issues—such as technical difficulties, ethical concerns, unstable coverage, background noises, limited face-to-face interactions, and high internet charges—affected students across different specializations. Specific issues for students outside Colombo and adult learners included the unavailability of laptops, mobile phones, or internet connections as well as limited IT knowledge and English barriers. [Rameez \(2020\)](#) also notes that a lack of online teaching and learning skills among both staff and students was a critical factor that disrupted the smooth functioning of the teaching and learning process in many of the state universities in Sri Lanka during the COVID-19 pandemic.

Materials and Methods

The study specifically analyzed first-year Diploma in Library and Information Science (DLIS) students because they were the first cohort to face the immediate and sudden transmission to online lectures. To reach the target population, Google form and WhatsApp groups were the only solutions used to distribute the questionnaire. A total of 219 new students were registered in the group ([Annual Report 2020/2021](#)). As a result, the entire student population was considered for the survey, and 194 students participated, resulting in a response rate of 88.5%. The data were imported into SPSS V. 23 analysis software for further examination. The categorical data were analysed using SPSS to provide a descriptive summary of the data according to the objectives.

In addition to the categorical data, the ordinal data were analysed using one-sample nonparametric test, specifically the Wilcoxon Signed-Rank test, and Rosenthal's correlation interpretation was applied for further analysis. This test was used to analyse median differences in the paired data to determine whether the observed differences between paired groups were

statistically significant. Rosenthal's test results provided the effect size (r value) related to specific comparisons, offering insights into the practical significance of any observed effects in the data set.

Significance of the study

The results of the study will enhance the blended approach in the Diploma and Higher Diploma programs. Furthermore, by examining students' perceptions, the study can identify the challenges in online teaching and learning for the course, as well as any practical difficulties that may arise. This information could help to mitigate such problems in future teaching and learning of the courses at SLLA. During the coronavirus-19 pandemic, no research was published on students' use of Zoom for online classes within the context of the Sri Lankan Library Association, which adds to the originality value of the study.

Results and Discussion

Demographic characteristics

The demographic profile of the 194 students who participated in the study is presented in Table 1. As the table indicates, the majority of the survey participants were female, comprising 171 (88.3%), while male participants made up only 23 (11.7%). This reflects the gender distribution among students in the Diploma in Library and Information Sciences course conducted by the SLLA in 2022. Regarding age, participants ranged from 20 to 40 years, with nearly 30% falling within the 26 - 30 age range. The second largest age groups were 21–25 and 31 – 35, each making 29.3% of the sample. The GCE (A/L) (General Certificate of Education (Advanced Level)) examination determines students' eligibility for the Diploma program at the Sri Lanka Library Association. Table 1 indicates that most of the students came from the Arts

stream, with 145 (74.7%) applicants, followed by the Commerce stream with 34 (17.5%) applicants.

Table 1

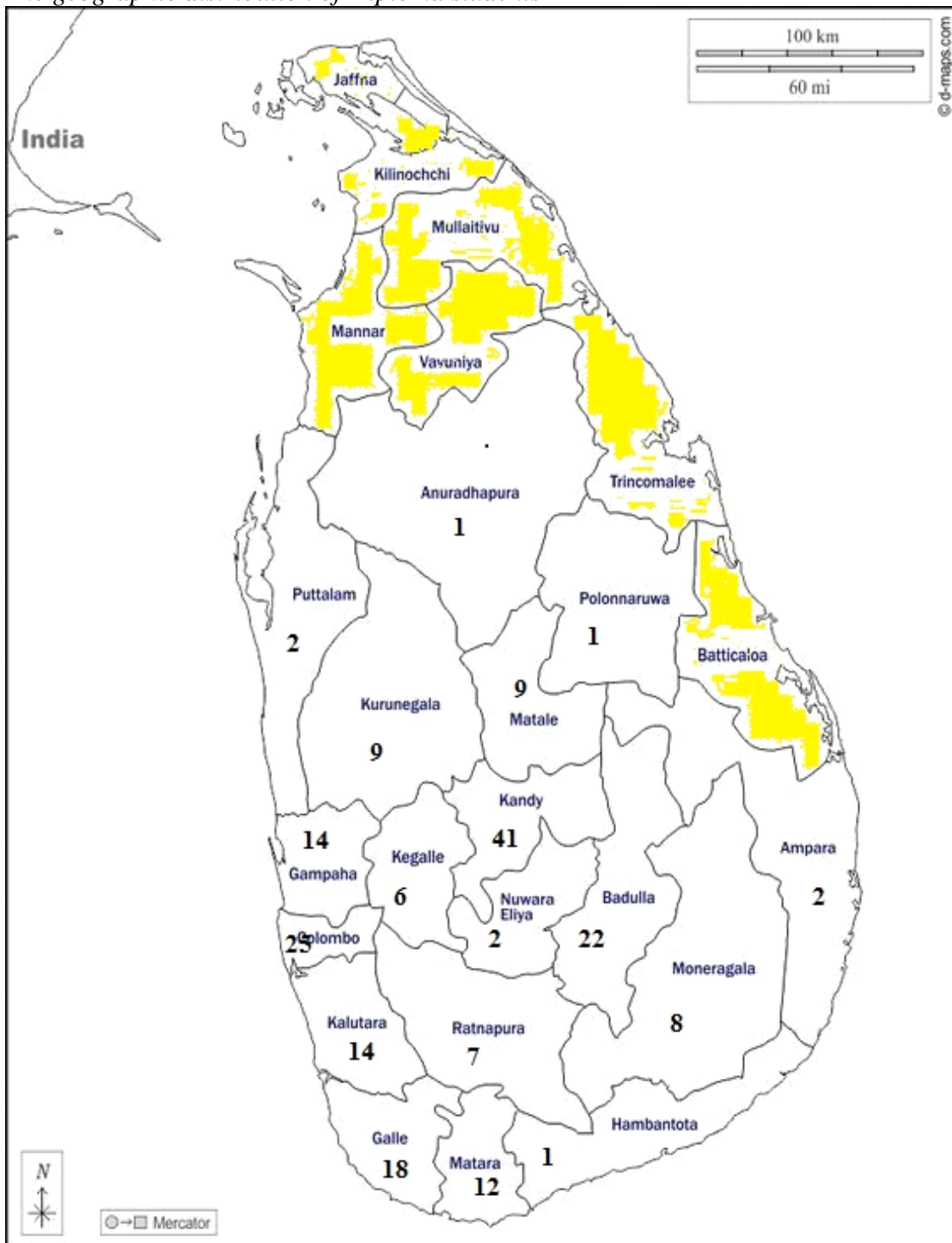
Demographic Profile

Characteristics	Attribute	Frequency	Percentage
Gender	Female	171	88.3%
	Male	23	11.7%
	Total	194	100
Age	21 – 25	57	29.3%
	26 – 30	58	30%
	31 - 35	57	29.3%
	40>	22	11.3%
	Total	194	100
GCE (A/L) Subject Stream of the students	Arts	145	74.7%
	Commerce	34	17.5%
	Science	11	5.7%
	Mathematics	-	-
	Technology	3	1.5%
	Agriculture	1	0.5%
	Total	194	100
Registered Method	Face-to-Face	123	63.40%
	Distance	71	36.59%
	Total	194	100
Learning Mode	Face-to-Face	129	66.49%
	Distance	65	33.50%
	Total	194	100
Employed candidates	Public Librarian	26	13.4%
	Loc. Govt. Library	23	11.8%
	School Assistant	18	9.2%
	Academic Library	13	6.7%
	Special Library	7	3.7%
	University Library	2	0.6%
	Other	23	11.85%
	Not Employed	82	42.26%
	Total	194	100

In terms of the learning mode, most first-year students showed a strong preference for Face-to-face learning with 123 (63.40%) initially registering for this mode, while the remaining 71 (36.59%) students chose distance learning. However, this preference slightly shifted as the course progressed. Consequently, 129 (66.49%) students participated in Face-to-face classes, while 65 (33.50%) students followed the distance learning course for the Diploma in Library and Information Sciences at the SLLA. The geographic distribution of the survey participants is depicted in Figure 1. As shown in the map, the participants are registered in various regions of the country, excluding the Northern and Northern Easter regions for the diploma course. Further, from the study sample of 194 candidates, it was found that only 112 (57.7%) students were employed in various positions, while 82 (42.26%) students were not employed.

Figure 1.

The geographic distribution of Diploma students



Students’ successfulness regarding various modes of teaching methods

The SLLA Diploma course was delivered using various teaching methods, including Zoom, face-to-face and distance learning. The study aimed to assess the student success in relation to these different teaching modes employed by SLLA during the pandemic lockdown. To achieve this objective, the questionnaire included three sets of Likert scale questions related to the three modes of lecture delivery; Zoom, face-to-face and distance learning. A significant number of students indicated satisfaction with the zoom lecturing mode, as reflected in their responses on the five-point Likert scale. Table 2 shows the levels of happiness and satisfaction regarding the online delivery mode.

Table 2

Successfulness of participating of online classes

Successfulness of the participation of Online Classes	Agree	Neutral	Disagree	P value	R value
1. All students can learn through one zoom class	136 (70.10%)	15 (7.7%)	43 (22.16%)	0.576 NS	NS
2. Lecture and the presentation is clear	104 (53.61%)	47 (23.9%)	43 (22.16%)	0.229 NS	NS
3. Can discuss the problems with the lecturer	112 (57.73%)	38 (22.3%)	44 (22.68%)	0.189 NS	NS
4. Ability of take part from home	139 (71.65%)	13 (8.5%)	42 (21.64%)	0.000 S	0.253
5. Totally secure than Face-to-Face mode	152 (78.35%)	01 (1.1%)	41 (21.13%)	0.033 S	-0.153
6. No expenses for transport and food etc	129 (66.49%)	21 (12.4%)	44 (22.68%)	0.001 S	0.228

NS= Not Significant S=Significant

According to Table 2, more than 70% of the students agreed to engage in online education during this lockdown, indicating a preference for this mode of learning. This finding supports the results obtained by [Nafrees et al. \(2020\)](#) and [Gismalla et al. \(2021\)](#). Additionally, 78.35% students reported that online learning was safer for their health during the pandemic lockdown compared to face-to-face classes, while only 22.13% disagreed with this statement. In contrast, [Fernando & Bandara \(2021\)](#) reported that online learning is not as effective as face-to-face learning. Furthermore, almost all students had only one-year of experience with online learning. On the other hand, the results also indicate that students are proficient in handling online platforms, with very few falling into the category of not-responding.

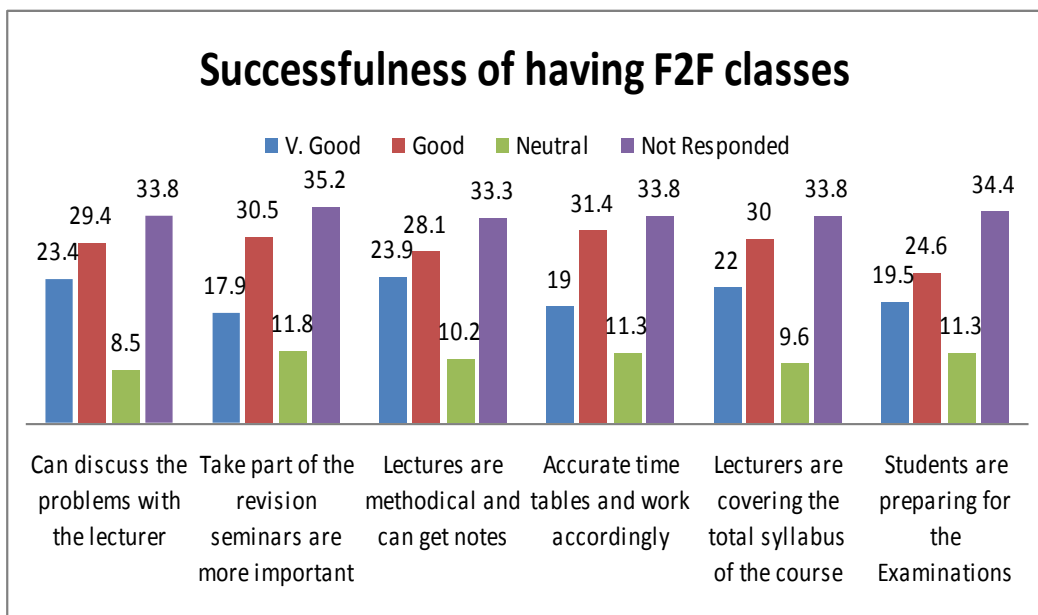
A one-sample Wilcoxon Signed-Rank test was conducted (see Table 2), using a hypothesized median of 3 (the value assigned for neutral). The medians for statements 4, 5, and 6 in Table 2 were significantly different ($p=0.000, 0.033$ and 0.001) with very low effect size ($r=0.25, -0.15$ and 0.22). This indicates that the majority of respondents significantly learned towards “agree” side. This further confirms that students were concerned about the mode of delivery, their health security and transportation during the pandemic, and that they adapted to the Zoom delivery mode. However, there were no significant differences for statements 1, 2, and 3 in Table 2.

Furthermore, the author analyzed the successfulness of Diploma students in both face-to-face and distance mode classes. Due to the pandemic lockdown, students were required to attend online classes and could not participate in face-to-face or distance mode lectures for their diploma course. Consequently, for the 5 point Likert scale questions, the options for ‘Strongly Agree’ and ‘Agree’ level were less prevalent as they many students lacked experience during this crisis period. Nevertheless, the survey result indicated that students were less responsive to the questions, with a higher ‘not

responded’ rate compared to Table 2 of above. Figure 2 shows the questions and the frequency of responses related to Face-to-face classes.

Figure 2

Successfulness of having F2F classes during pandemic lockdown



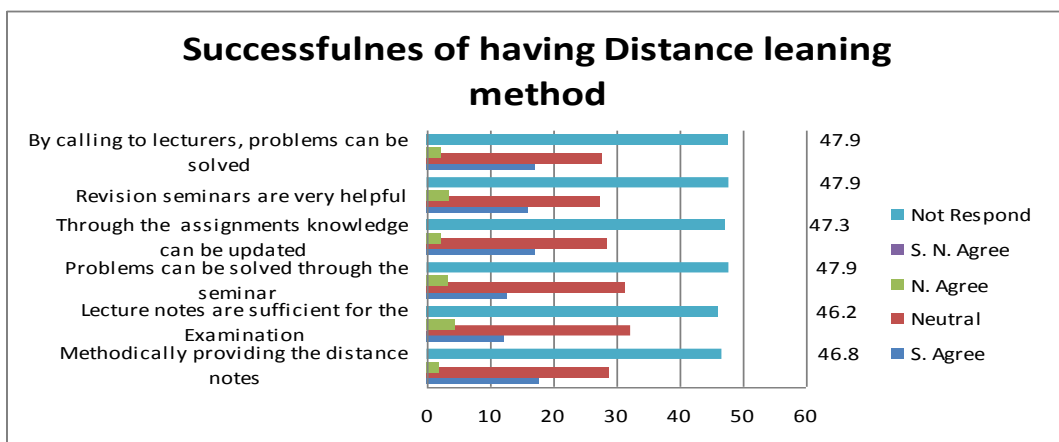
Specifically, the distance mode classes were also converted to online classes due to the absence of course-related workshops where students could discuss problems and subject matters. The responses were as follows; the ‘Not Responded’ rate was higher than the ‘Responded’ rate for these questions (see Figure 3). This further indicates that students attended online classes and were satisfied with this mode of education.

In the analysis of the successfulness of online education, it is evident that the majority of students-136 (70 %)- ‘Strongly agreed’ or ‘Agreed’ that physical lectures would help control the spread of the COVID-19 infection

(see Figure 3). They perceived that e-learning was the best solution during the COVID-19 lockdown. These findings are supported by previous research as well ([Gismalla, 2021](#); [Hayashi et al., 2020](#); [Selvaras, 2020](#); and [Abuhmaid & Jarrah, 2022](#)).

Figure 3

Successfulness of having distance classes during pandemic lockdown



The level of satisfaction with having online education

The satisfaction level of online education also needs to be measured as this change has occurred worldwide, and its impact on Sri Lankan education needs to be assessed. Therefore, the question was paused using the Likert scale method, and the results of the students are presented in Table 3.

The results of the study shown in Table 3, indicate that 97(50%) of the students are satisfied with online teaching, corroborating the findings of [Hayashi \(2020\)](#). [Nafreez et al. \(2020\)](#) reported that a study conducted at South Eastern University revealed that more than 50% of students were happy with online education during the lockdown. This study similarly yielded the results which achieved by [Nafrees et al. \(2020\)](#) indicating that 50% of students satisfied with online education, while only 10% expressed dissatisfaction,

indicating they were either not satisfied or highly not satisfied. Additionally, all of these students had less than 1-year of experience with this online-learning process, which further demonstrates that they are becoming familiar with online learning.

Table 3

The level of satisfaction

Satisfaction level of Online Teaching	Frequency	%
Satisfied	97	50
Neutral	71	36.60
Not Satisfied	22	11.34
Not Replied	4	2.0
Total	194	100

Data relating to the devices used by the students, as presented in Table 4, reveal the online survey results regarding the devices available for accessing the internet. The majority of students (78.9%) used smartphones for online education, while the usage of other devices such desktops, laptops, and tablets was not much utilized (19%) for online learning. This result is consistent with the percentages reported by [Arachchige et al. \(2021\)](#), who found that students favored laptops, desktops, and smartphones but not tablets. Additionally, in line with [Hayashi \(2020\)](#), a higher percentage of students used smartphones and laptops for online learning, a finding also supported by [Nafreez et al. \(2020\)](#).

When the students were unable to access the lectures through the aforementioned devices, alternative methods that they used to follow the course were identified. The analysis of these results is presented in Table 5.

Table 4

Devices used by students

Devices used by students for online learning	Frequency	%
Smart Phones	153	78.9
Laptops	29	14.9
Desktops	5	2.6
Tabs	2	1.0
Other	1	0.5
Not Respond	4	2.1
Total	194	100

Table 5

Alternative methods used to follow lessons

Method of following lessons without devices	Frequency	%
Getting notes	81	41.8
Ask from friends	46	23.7
Exchanging recordings	37	19.1
Other	12	6.2
Not Responded	18	9.3
Total	194	100

The students who could not attend the lecturers used alternative methods to access the course materials. In that process, 41.8% made an effort to find notes through the web page and WhatsApp groups since all the lecturers uploaded their lectures to the SLLA website or WhatsApp groups. Consequently, 23.7% of students sought help from friends to cover the course

materials. Even through this method, they showed enthusiasm for learning and were very supportive.

Difficulties encountered by students in having online education

Students faced several challenges when transition to online education. Teaching remotely is still a relatively new concept and it can be particularly challenging for those who have not experienced it before. The study identified the problems encountered by the diploma students during online classes, and Table 6 explains the challenges faced in Zoom classes.

According to Table 6, almost all students either ‘Strongly Agree’ or ‘Agree’ with the responses to questions addressing the challenges of online learning. The highest problem reported was the technical difficulties in learning such as; difficulty hearing the lecture (indicated 88 - 45.4%), and the expense of equipment (85 - 43.8%). Additionally, 43.3% of students reported issues related to ‘poor internet connection’ and ‘cannot timely log on’ similar to the statements provided due to the signal issues by [Arachchige et al. \(2021\)](#); [Hayashi et al. \(2020\)](#); [Fernando & Bandara \(2021\)](#); [Hettiarachchi et al., \(2021\)](#); and [Yan et al. \(2021\)](#). Another challenge faced was the cost of data and mobile phones, reported by 85(43.8%) students. Isolation or loneliness during participation in lectures was also problematic for 82(42.3%) students. This may be attributed to their first-time experience with online education as noted by [Hettiarachchi et al. \(2021\)](#). [Nafreez et al. \(2020\)](#) supports this statement by indicating a low percentage (12.6%) for the statement of Interaction among students.

Additionally, another problem identified by students was the lack of attention from online lecturers, which was seen as a barrier to e-learning 77(39.7%). [Fernando & Bandara \(2021\)](#) argued that online learning promotes more self-paced learning and can be more effective than face-to-face learning.

Table 6

Challenges face by Online Class Students

Problems related if participated to Zoom Classes	Strongly Agree	Agree	Neutral	Not Agree	Strongly Not Agree	P value	R value
Poor Internet connection	84 (43.3%)	47 (24.2%)	12 (6.2%)	33 (17.0%)	18 (9.2%)	0.000 S	0.316
Cannot timely log on	84 (43.3%)	49 (25.3%)	13 (6.7%)	33 (17.0%)	15 (7.7%)	0.000 S	0.283
Not Clearly hear the lecture	88 (45.4%)	61 (31.4%)	6 (3.1%)	25 (12.9%)	14 (7.2%)	0.001 S	0.243
No smart mobile phone	2 (1.0%)	11 (5.7%)	49 (25.3%)	90 (46.4%)	42 (21.6%)	0.019 S	0.168
Not easy than participate for F-2-F Classes	71 (36.6%)	56 (28.9%)	17 (8.8%)	23 (11.9%)	27 (13.9%)	0.000 S	0.291
Feeling alone (isolation)	82 (42.3%)	37 (19.1%)	22 (11.3%)	38 (19.6%)	15 (7.7%)	0.000 S	0.592
Have to go for another place for signals	58 (29.9%)	72 (37.1%)	9 (4.6%)	20 (10.3%)	35 (18.0%)	0.002 S	0.218
Difficult to learn practical subjects	64 (33.0%)	35 (18.0%)	26 (13.4%)	58 (29.9%)	11 (5.6%)	0.16 S	0.173
More expensive equipment	85 (43.8%)	60 (30.9%)	6 (3.1%)	15 (7.7%)	28 (14.4%)	0.000 S	0.341
Not Attention to the lecture	77 (39.7%)	48 (24.7%)	12 (6.2%)	43 (22.2%)	14 (7.2%)	0.002 S	0.227

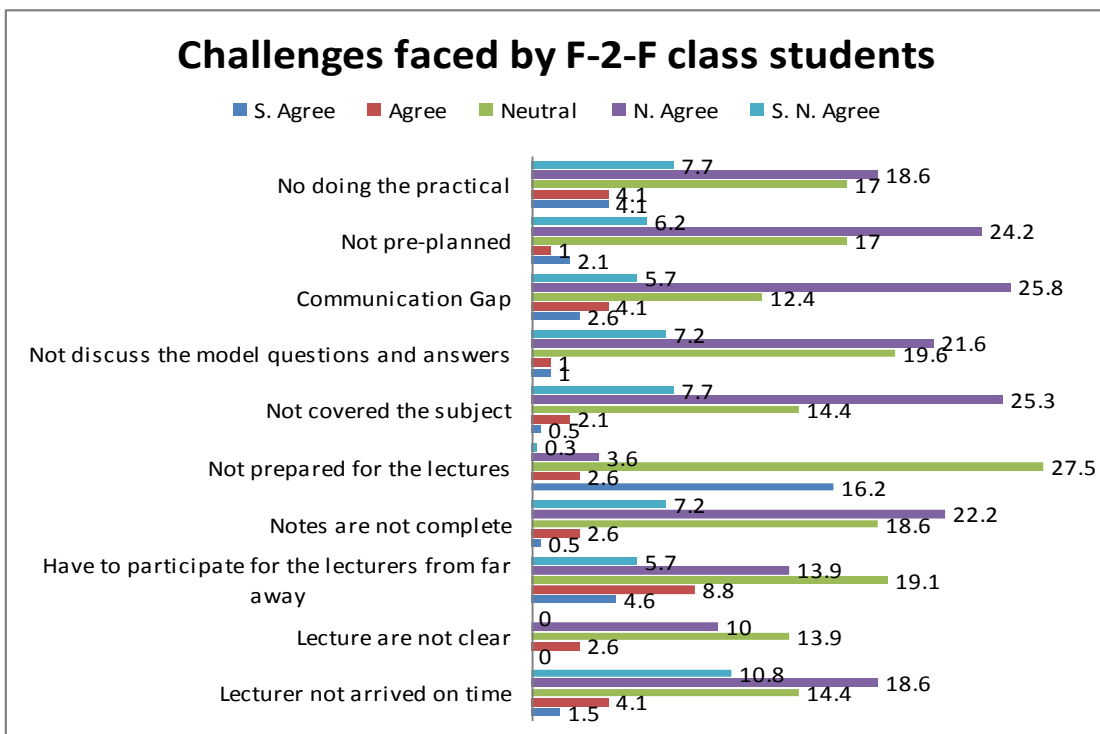
NS= Not Significant S=Significant

One sample Wilcoxon Signed-Rank test was run (Table 6), taking 3 (value assigned for neutral) as hypothesized median. The median of the statements of 1 - 10 of the Table 6 were significantly different from ($p = 0.000 - 0.598$). Among that a very low effect size ($r = 0.16$ and 0.17) indicated in items 4 and 8 of Table 6. A low effect size ($r = 0.32, 0.28, 0.24, 0.29, 0.21, 0.34$ and 0.22) indicate in the items of 1, 2, 3, 5, 7, 9, and 10th of Table 6. A moderate effect size ($r = .59$) indicate in item 6 of Table 6. As such all the responses are significantly moved towards strongly agree and agree side.

The research also examined the challenges of the f-2-f classes, and the statements prepared were for these classes were different from those prepared for online classes, depending on the requirements and facilities provided by the SLLA for Diploma students. As depicted in Figure 4, the students expressed a sustained level of 'Neutral' and 'Not Agree' level as same as the Table 6. Although the students are unfamiliar with the F-2-F classes, they did not indicate any difficulties with the physical classes conducted at SLLA.

Figure 4

Challenges faced by Face-to-face students



Due to the ongoing pandemic situation, the distance mode classes were conducted by the SLLA provided students with the opportunity to participate in online learning classes to receive clearer lectures. This was necessary, as it was not possible to hold workshops, which are typically conducted after each session of distance mode students. Table 7 indicated that distance students also expressed fluctuations between ‘Neutral’ and ‘Not Agree’ levels similar to the pattern observed in online and f-2-f classes.

Table 7

Challenges faced by Distance students

Problems related if participated to distance Classes	S. Agree	Agree	Neutral	N. Agree	S. N. Agree	Not Respond
Not explain the subject	3 (1.0%)	14(7.2%)	33(17.0%)	23(11.9%)	3 (1.5%)	119(61.3%)
Not organized well	6 (3.1%)	14(7.2%)	32(16.5%)	19 (9.8%)	5 (2.6%)	118(60.8%)
Not received notes	6 (3.1%)	6 (3.1%)	39(20.1%)	22(11.3%)	4 (2.1%)	117(60.3%)
Not discuss the model questions and answers	4 (2.1%)	15(7.7%)	32 (16.5%)	19 (9.8%)	5 (2.6%)	119(61.3%)
Have to go to a library	2 (1.0%)	6 (3.1%)	32(16.5%)	27(13.9%)	8 (4.1%)	119(61.5%)
Not enough workshops for the subjects	9 (4.6%)	25(12.9%)	22(11.3%)	13 (6.7%)	8 (4.1%)	117(60.3%)
Communication Gap	10(5.2%)	16 (8.2%)	30(15.5%)	15 (7.7%)	6 (3.1%)	114(58.8%)
Have to do Assignments	6 (3.1%)	12 (6.2%)	28(14.4%)	15 (7.7%)	12(6.2%)	121(62.4%)
Notes are not updated and not clear	4 (2.1%)	15 (7.7%)	26(13.4%)	22(11.3%)	10(5.2%)	117(60.3%)

Conclusions and Recommendations

The preliminary analysis of data on students’ satisfaction with online education during the COVID-19 pandemic revealed varying opinions regarding Zoom, face-to-face, and distance learning modes.

The Sri Lanka Library Association made a remarkable and swift transition to online tertiary education after all educational institutions were

forced to close due to the COVID-19 pandemic. The first objective of the study was to investigate the students' successfulness with various teaching methods. During the pandemic lockdown, diploma students engaged in online learning, and survey clearly indicates that more than 50% of students participated in online education. They agreed to attend online lectures despite the barriers they faced during the lockdown period. Moreover, the students were able to transition to online learning for the first time in the Sri Lanka Library Association and managed their classes using their own equipment. They were particularly concerned about 'public and individual safety', 'the security of participating in online classes', and 'the expenses incurred for transport and food'. These concerns were significantly reflected in the 'strongly agree' and 'agree' responses of the study. Based on these findings, it can be concluded that the students successfully attended online classes. In contrast, the analysis conducted of face-to-face and distance learning modes indicated that these were not successful.

The study also aimed to measure the level of satisfaction with online education as its second objective. After an extensive analysis of student satisfaction, the study revealed that nearly 50% of students were satisfied with online education. This is a positive sign that indicates that students were willing to engage in this e-learning method. Despite their limited experience, many students preferred online education to postponing their studies, as it allowed them to continue their academic work while staying safe. Moreover, they were equipped with the necessary tools to participate in online lectures, with 93.8% using smartphones and laptops.

Further analysis showed that 164 (86.4%) students mentioned that if they couldn't attend classes; they used alternative methods to catch up, such as obtaining notes, asking friends, or getting notes from others. This demonstrated their enthusiasm for the diploma course and their satisfaction

with being able to access course materials even when they were unable to attend classes. Overall, a positive of the online learning experience was observed among students.

As reported in the literature on online learning, the third objective of this study identified that student demonization was linked to poor Internet connectivity, difficulty in hearing lectures clearly, feelings of loneliness, higher costs associated with data packages, less learner-friendly environments, and challenges in learning the practical subjects. However all the statements indicated in Table 6 showed a significant and positive trend towards ‘strongly agree’ and ‘agree options’.

As mentioned earlier, this was the first experience in delivering online education during the COVID-19 pandemic. Therefore, it is recommended to conduct multi-group analyses, (MGA) based on levels and modes of study for future research. This study contributes only to the preliminary level analysis of first-year Diploma-level students who had no prior experience with face-to-face and distance-mode education at the SLLA. Hence, a comparative study could be conducted in the future to assess the same objectives with higher levels of education in the higher diploma program at SLLA.

The study recommends that more interaction be maintained, considering the levels of student dissatisfaction with online learning. The findings indicate that, despite a few positive aspects, there have been many barriers to online learning. Therefore, this research recommends a thorough evaluation of the challenges faced by students while studying through more effective online learning techniques. Re-designing online courses using constructive alignment would enhance the practical effectiveness. Special attention should be given to creating a good learning environment with minimal barriers considering the students’ online learning methods. This will help promote students’ professional success. Moreover, exploring the factors

that influence students' successfulness and satisfaction with online-learning is vital for improving the quality of online education. It is also imperative to continue studying best practices in online learning for students of different ages and socioeconomic statuses.

Limitations of the study

The study has several limitations. The small sample size, limited to diploma students, restricts the generalizability of the results, and the data should be interpreted with caution. Additionally, the sample may not be representative of all diploma students. In this study, data were collected at only one point in time (cross-sectional design), and the researcher could not manipulate the variables. Therefore, longitudinal research is required to enhance the understanding of correlations and interrelationships among other levels of higher diploma students at SLLA.

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Practices Pertaining to Sustainable Development Goals in University Libraries of Sri Lanka: An Exploratory Study

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Abstract

Sustainable development, embodied in the Sustainable Development Goals (SDGs), is a global obligation. University libraries are crucial in advancing these goals by disseminating knowledge, fostering sustainability, and promoting inclusive practices. This study uses a survey conducted through interviews to explore the practices, strategies, and challenges faced by university libraries in Sri Lanka in aligning with the SDGs. It surveyed SDG practices under five key themes. Sri Lankan university libraries strongly commit to the SDGs through their initiatives in these areas. However, compared to global practices such as seed libraries, zero-waste initiatives recycling projects, sustainable landscaping, rainwater harvesting and financial literacy programs, the scale of their activities remains more localized. Financial constraints, limited resources, and lack of awareness pose common barriers. The study demonstrates that Sri Lankan libraries are good at translating global SDG goals into actionable local initiatives, emphasizing the importance of the context. These libraries provide invaluable insights for other institutions. Future directions include expanding collaborations, enhancing public engagement, and embracing emerging technologies to further the SDG agenda.

Keywords: University libraries, Sri Lanka, Sustainable Development Goals

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Introduction

Sustainable development, emphasizing holistic growth while ensuring the well-being of our planet and its inhabitants, is a global imperative. The Sustainable Development Goals (SDGs) characterize this notion, offering a roadmap for addressing the planet's most pressing challenges by 2030. Consisting of 17 goals and 169 targets (See Table 1), the SDGs encompass a wide array of issues, from eradicating poverty to fostering sustainable cities. Yet, the realization of these goals depends on the collective efforts of various sectors across the globe.

Table 1

List of SDG Goals

SDG Numbers	Goals
SDG 1	No poverty
SDG 2	Zero hunger
SDG 3	Good health and well-being
SDG 4	Quality education
SDG 5	Gender equality
SDG 6	Clean water and sanitation
SDG 7	Affordable and clean energy
SDG 8	Decent work and economic growth
SDG 9	Industry, innovation and infrastructure
SDG 10	Reduced inequalities
SDG 11	Sustainable cities and communities
SDG 12	Responsible consumption and production
SDG 13	Climate action
SDG 14	Life below water
SDG 15	Life on land
SDG 16	Peace, justice, and strong institutions
SDG 17	Partnerships for the goals

(Source: <https://sdgs.un.org>)

University libraries, respected as hubs of knowledge dissemination and academic exploration, hold a significant position in this journey. Beyond being

mere repositories of information, they are uniquely poised to endorse, inspire, and elaborate sustainable practices. Their influence extends not just to students and faculty but flows out to the larger community through academic discourse, resources, and outreach.

A noteworthy development in Sri Lanka's pursuit of the SDGs is the establishment of the Sustainable Development Council of Sri Lanka (SDCSL). SDCSL plays a pivotal role in coordinating national efforts towards achieving the SDGs. Furthermore, the signing of a Memorandum of Understanding (MoU) between the SDCSL and the Sri Lanka Library Association (SLLA) marks a significant step in fostering collaboration and aligning library services with the national sustainable development agenda ([Sri Lanka Library Association, 2022](#)). This partnership underscores the critical role that libraries can play in supporting and advancing the SDGs through strategic initiatives and community engagement.

Despite the universality of SDGs, the manner and extent of their implementation vary significantly across regions and institutions. While global trends provide valuable insights, understanding the unique challenges and strategies of specific regions is crucial for tailored interventions and best practices. In this context, Sri Lanka, a nation with a rich academic tradition, yet struggling with its own challenges, presents a powerful case for study. Particularly, the adoption and integration of SDG by Sri Lankan university libraries remain under-researched, demanding a deeper exploration.

This paper narrows its focus to explain the current practices related to the SDGs adopted by University libraries in Sri Lanka. By offering a comprehensive look into these practices, the study aims to shed light on the innovative steps and contributions of these libraries in the broader context of SDGs. The findings from this research will not only deepen the academic

conversation surrounding SDGs but also emphasize the essential role of university libraries in driving these global goals on a regional scale.

Aims and Objectives

The study aims to explore and reveal how University libraries in Sri Lanka align their practices with the SDGs, emphasizing their innovative strategies and challenges, in advancing these global objectives locally.

To achieve this, the following objectives were selected.

1. To explore the practices adopted by University libraries in Sri Lanka in alignment with the SDGs.
2. To identify the innovative strategies employed by these libraries in their approach to the SDGs.
3. To compare the SDGs practices in Sri Lankan university libraries with the global practices.
4. To understand the extent to which these libraries have been successful in translating global SDG objectives to a local context.
5. To identify the challenges faced by Sri Lankan University libraries in integrating and promoting SDGs within their operations and services.

Review of Literature

Role of University Libraries in Promoting SDGs

Introduced in September 2015, SDGs have been rapidly integrated into various sectors, including the library environment. Libraries, especially university libraries, have emerged as pivotal players in advocating these goals, given their inherent roles in education, information dissemination, and community engagement ([IFLA, 2022](#)).

University libraries have aligned their services and projects with these goals, as demonstrated by the contributions of the University of Southern Queensland Library ([Aytac, 2019](#); [Thorpe & Gunton, 2019](#)). Their significant role, particularly in open-access information dissemination, is evident from studies conducted in the Asia and Oceania region ([Mamtora & Pandey, 2018](#))

In essence, academic libraries are instrumental in driving community awareness, outreach, and education related to SDGs. Frameworks such as the one by [Pinto & Ochoa \(2017\)](#) help libraries further their contributions to sustainable development, enhancing their value and impact in society.

The researchers previously identified five core themes under which SDGs can be categorized (See Table 2).

Table 2

Core Themes and Their Corresponding SDGs

Themes	SDGs Included
Capacity Building and Partnerships	SDG 4, SDG 8, SDG 17
Access and Inclusion	SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 10, SDG 11, SDG 16
Environmental Responsibility and Resource Management	SDG 6, SDG 7, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15
Innovation and Collaboration	SDG 4, SDG 8, SDG 9, SDG 11, SDG 17
Ethics and Accountability	SDG 4, SDG 16, SDG 17

(Source: [Krishanthy & Gamage, 2023](#))

These themes show a strategic alignment of SDGs with specific areas of focus, illustrating how capacity building and partnerships, access and inclusion, environmental responsibility, innovation, and ethics are interwoven with a broad range of SDGs, thereby emphasizing the comprehensive approach required to achieve sustainable development goals.

In the context of Sri Lanka, university libraries hold the promise of being catalysts for SDG realization, but the spectrum of adoption varies. [Warnasooriya \(2018\)](#) highlights the limited success in certain libraries' efforts towards SDGs, whereas studies by [Gunasekera & Samarakoon \(2020\)](#) and [Mashroofa \(2022\)](#) indicate successful integration in others. Nonetheless, awareness and effective implementation remain challenges for many libraries ([Gunasekera et al., 2022](#)).

Translating Global Goals into Local Action

The SDGs hold great potential when adapted and implemented locally, a transition that university libraries have been pivotal in facilitating. Globally, these libraries customize resources and programs to make SDGs pertinent at the grassroots. For instance, Australian libraries support health and environmental initiatives ([Gorelik, 2019](#)), Spanish libraries align their services with SDGs ([Gómez-Pérez et al., 2019](#)), US libraries emphasize community outreach ([Bertot et al., 2018](#)), and South African libraries engage with underserved communities ([Manda, 2018](#)).

Challenges and strategies for overcoming them

Implementing SDGs is not devoid of challenges. [Aina & Oyewole \(2021\)](#), [Alqahtani \(2020\)](#), and others highlight issues such as lack of awareness among library staff, financial constraints, inadequate technology, and the need for appropriate indicators.

Several studies, including those by [Abdellatif & Abdullah \(2021\)](#) and [Adeniran & Akinyede \(2019\)](#), propose strategies for better integration of SDGs in library practices. These encompass creating awareness, fostering a culture of innovation, leveraging technology, and promoting partnerships.

Methodology

This study employed a qualitative approach to investigate SDG practices in Sri Lankan university libraries governed by the University Grants Commission (UGC). The study utilized survey research methodology, collecting data through semi-structured in-depth interviews. The research population consisted of Chief Librarians or their nominees from each of the 17 universities. The interviews were conducted from November 2022 to February 2023. The transcribed data from the interviews were then subjected to content analysis.

Based on the themes in Table 2 and the practices identified in [Krishanthy & Gamage \(2023\)](#), a checklist and an interview protocol were developed to guide data collection and to ensure comprehensive coverage of relevant topics during interviews.

To ensure the privacy and anonymity of the participating institutions, they have been assigned identifiers ranging from 'University 1' to 'University 17' (abbreviated as 'UNI1' to 'UNI17') throughout this paper. The order of these identifiers is random, and does not reflect the sequence in which the interviews were conducted or any other characteristic of the institutions. This anonymized naming convention was maintained to preserve the integrity and ethical considerations of the research.

The relevant practices by the universities in Sri Lanka were mapped to the themes and the corresponding SDGs. Challenges related to SDG implementation in university libraries were also identified through the interview process.

A comparative analysis was conducted to compare the SDG practices identified in Sri Lankan university libraries with those documented in the global review ([Krishanthy & Gamage, 2023](#)). It provided insights into

similarities, differences, and potential areas for improvement. This comprehensive methodology ensured a rigorous and systematic approach to investigating SDG practices in Sri Lankan university libraries, contributing to the existing body of knowledge on sustainable development in higher education institutions.

Results and Discussion

This study explores the strategies of Sri Lankan university libraries in aligning with the SDGs, highlighting their innovative approaches and comparing them with global practices. Moreover, the local adaptation of global SDG objectives and challenges faced in actualizing SDGs are also studied. The analysis categorizes the initiatives of these libraries into routine activities, programs and proactive actions, and promotion and outreach programs. The results highlight the diverse strategies of Sri Lankan university libraries in aligning with SDGs through the five themes.

Implementation of SDGs in Sri Lankan University Libraries Access and Inclusion

Access and inclusion were found to be actively incorporated in the routine activities of Sri Lankan university libraries.

Table 3

SDG Practices on Access and Inclusion Implemented by the University Libraries in Sri Lanka

Library	Routine Activities	Programs and Proactive Actions	Promotion and Outreach Programs
UNI 1	Braille/audio books, Document delivery, Multilingual services & e-resources	Human Library	Donating to school libraries, Employment awareness, Museum with ola manuscripts

UNI 4	Multilingual services, e-resources, Braille collections, special facilities	Information literacy program	Historical document corner
UNI 5	Equitable access, multilingual services, Special facilities for disabled individuals	Seminars and workshops on gender equality	N/A
UNI 6	Remote-access e-resources	Information literacy workshops	N/A
UNI 7	Multilingual services, e-resources, Braille collections	Information literacy workshops	Museum and rare collections
UNI 8	Multilingual services, e-resources, scanning, Braille & audio books collection	Visually impaired student center, Info literacy workshops, Human library	Rare collection and Sri Lankan collections
UNI 9	Remote-access electronic resources, Special facilities & collections for special needs	Information literacy workshops, Cultivation encouragement, Human library	Museum with rare collections, Children's reading rooms at railway stations, Community and farmer libraries
UNI 10	Remote-access e-resources, Disability accessibility	Info. Literacy workshops	N/A
UNI 11	Remote-access e-resources, Disability-special collections	Info. Literacy workshops Human library	N/A
UNI 12	Special equipment and resources for disabilities	Counseling, Info. Literacy workshops,	Learning Commons promoting mental health
UNI 13	E-resources with remote access	Info. literacy workshops	Women empowerment, Audiovisual facilities
UNI 15	Community counseling sessions	Human library	N/A
UNI 16	Special paths & software for disabilities	N/A	N/A
UNI 17	Counseling	Human library	Workshops on reading

The data summarized in Table 3 indicates a strong emphasis on multilingual services, information literacy workshops, and facilities for differently-abled individuals across universities. Their initiatives tackle challenges such as poverty, hunger, health, education, gender equality, reduced inequalities, sustainable cities and communities, and peace, justice,

and strong institutions, thereby addressing issues related to SDGs 1, 2, 3, 4, 5, 10, 11, and 16.

Table 3 highlights that, many universities engage in routine activities such as providing Braille/audio books, multilingual services, and remote-access e-resources. They also implement proactive programs like human libraries and information literacy workshops.

However, a notable gap exists in promotion and outreach programs, with only a few universities engaging in community-focused initiatives such as museum collections and women's empowerment workshops. This disparity suggests that while universities are proactive in offering inclusive services, there is a need for more robust promotion and outreach efforts to enhance community engagement and awareness.

Comparing these findings with global practices reveals a difference in scope, while adopting the SDGs in the theme of access and inclusion. Globally, libraries adopt a comprehensive approach going beyond routine activities, and actively focusing on areas like health information provision, digital literacy for underserved communities, financial literacy programs, and open access publishing with active incorporation of promoting activities ([Krishanthi & Gamage, 2023](#)).

Capacity Building and Partnership

Capacity building and partnership are crucial aspects of university libraries' efforts to advance the SDGs. The majority of the university libraries in Sri Lanka demonstrated strong engagement in capacity building and partnerships which could promote the SDGs.

Table 4

SDG Practices on Capacity Building and Partnership Implemented at University Libraries in Sri Lanka (N/A - No special practices were reported)

Library	Routine Activities	Programs and Proactive Actions	Promotion and Outreach Programs
UNI 1	Computer literacy for staff, Collaboration with SDG initiatives, Job info, Career guidance	N/A	Distribute info via library networks, SDG information provision, Local history/culture exhibitions
UNI 3	N/A	Workshops for the public library staff and school librarians	N/A
UNI 4	Continuous staff development, Partnering with faculties for information literacy integration	Preservation partnership, Resource acquisition, Personal development workshop	N/A
UNI 5	N/A	Partnerships with National library	N/A
UNI 6	N/A	Collaborate with teacher librarians	N/A
UNI 8	Contribute to the university committee	Collaborate with international libraries, Human library	Collaborative engagement with organizations implementing SDGs.
UNI 9	Continuous training programs for staff and community members	Capacity building collaboration, Bookbinding training	Success story sharing, SDG implementation committee
UNI 10	Career development seminars	Human library	N/A
UNI 11	Career development seminars	Human library and lecture series	N/A
UNI 15	Contributions to the Public Library through community services	Collaboration with Asia Foundation for Digital Library Project	N/A
UNI 16	Collaboration with public libraries through resource sharing	N/A	N/A

As evident in Table 4, the Sri Lankan university libraries forge collaborative partnerships with stakeholders, conduct advocacy and awareness campaigns, foster knowledge sharing and exchange, and provide mentoring and support programs. For example, UNI 1, 4, and 8 have undertaken

proactive actions and outreach initiatives under this theme, such as job and career guidance and partnerships with national libraries.

As these libraries have established a solid foundation for sustainable development aligned with quality education, decent work and economic growth, industry, innovation, and partnerships through the identified practices ([Krishanthi & Gamage, 2023](#)), they address SDGs 4, 8, 9, and 17.

Table 4 shows that many Sri Lankan university libraries engage in routine activities such as career development seminars. They also implement proactive programs like human libraries. However, there is a noticeable gap in promotion and outreach programs, with only a few libraries participating in initiatives such as local history exhibitions and collaborative engagements with organizations implementing SDGs. This indicates a need for increased efforts in promotion and outreach to fully leverage their capacity-building and partnership initiatives.

However, global libraries adopt broader and more innovative approaches. They engage in training for marginalized communities, collaborate with local governments, and advocate for gender equality ([Krishanthi & Gamage, 2023](#)). These global practices could provide a benchmark for Sri Lankan university libraries to expand their initiatives and impact.

Environmental Responsibility and Resource Management

Environmental Responsibility and Resource Management are key aspects of the practices adopted by university libraries in Sri Lanka. As summarized in Table 5, these libraries demonstrate a strong commitment to sustainability through various eco-friendly initiatives. As, they implement practices focusing minimizing their carbon footprint, efforts contribute

directly to the SDGs 6, 7, 11, 12, 13, 14 and 15, as they deal with water and sanitation, affordable and clean energy, sustainable cities and communities, responsible consumption and production, climate action, life below water, and life on land.

The practices in Table 5 indicate that while Sri Lankan university libraries demonstrate strong engagement in routine activities such as waste management and energy efficiency, there is a noticeable disparity in their programs and proactive actions and promotion and outreach programs. For instance, libraries like UNI 10 and UNI 11 have proactively implemented green infrastructure and library gardening. However, many others focus primarily on routine eco-friendly practices with limited efforts in promotion and outreach. This gap suggests that there is a need for more comprehensive promotion and outreach initiatives to enhance their impact on environmental responsibility and resource management.

Yet, differences in the scale of practice persist. Sri Lankan libraries prioritize foundational practices, whereas global libraries take a more expansive approach, covering broader aspects of sustainability through environmental initiatives such as seed libraries, green building practices, zero-waste initiatives including recycling projects, and sustainable landscaping including rainwater harvesting systems ([Krishanthi & Gamage, 2023](#)).

Table 5

SDG Practices on Environmental Responsibility and Resource Management at Sri Lankan University Libraries

Library	Routine Activities	Programs and Proactive Actions	Promotion and Outreach Programs
UNI 1	Library well-being, Reduced paper usage, Natural ventilation & lighting, Waste reduction & management, Energy-efficient practices	Cultivating crops	N/A
UNI 2	Waste management, Reduced paper usage, Energy efficiency	N/A	N/A
UNI 3	Energy-efficient practices, Reduced paper usage, Waste management, Natural ventilation & lighting maintenance	Library gardening	N/A
UNI 4	Natural ventilation & lighting maintenance	N/A	N/A
UNI 5	E-collection transition, Waste management	N/A	N/A
UNI 6	Polythene-free, Waste reduction & management, Energy-efficient practices, Smoking-free environment, Environmental assessments, Energy-efficient practices, Waste reduction & management	Green infrastructure and building design	N/A
UNI 7	Waste reduction & management, Water quality checking, Natural ventilation & lighting maintenance, Energy-efficient practices	Digitization of collections	N/A
UNI 8	Reduced paper usage, Waste reduction & management, Energy-efficient practices	Solar system installation, Library gardening, Green infrastructure & building design	N/A
UNI 9	Reduced paper usage, Waste reduction & management, Energy-efficient practices	Digitization, Green building design, Library gardening	N/A
UNI 10	Reduced paper usage, Waste reduction & management, Energy efficiency	Digitization of collections	School outreach: Marine life & water
UNI 11	Waste reduction, Paper usage reduction	Digitization, Green building design	N/A
UNI 12	Waste reduction, Paper reduction, Ventilation & lighting maintenance	Digitization, Green building design	Workshops with NARA: Life below water
UNI 13			
UNI 14			
UNI 15			
UNI 16			
UNI 17			

Innovation and Collaboration

In the realm of innovation and collaboration, academic libraries in Sri Lanka actively embrace technological advancements and digital initiatives to enhance their services. They engage in collaborative projects with other institutions, utilize data-driven decision-making, and foster cross-disciplinary collaborations. As they are dealing with quality education, decent work and economic growth, industry, innovation and infrastructure, sustainable cities and communities, and partnerships for the goals through the practices mentioned in the Table 6, they adopt SDGs 4, 8, 9, 11, and 17.

Table 6

SDG Practices on Innovation and Collaboration Implemented in University Libraries, Sri Lanka

Practice	Numbers of libraries adopted
Monitoring technological advancements and trends	12
Assessing user needs and preferences	16
Collaborative collection development and resource sharing	14
Integration of emerging technologies	3
Data-driven decision making	14
Promoting cross-disciplinary collaboration	12
Providing training on innovative technologies	13
Participating in consortia or partnerships	8
Cultivating a culture of innovation	8

Despite these efforts, there is a notable variance in the implementation of these practices as shown in Table 6. Many libraries excel in routine activities such as monitoring technological trends and assessing user needs, with 12 and 16 libraries respectively adopting these practices. However, engagement in proactive actions like integrating emerging technologies and promoting cross-disciplinary collaboration is less common, with only 3 and

12 libraries involved, respectively. Similarly, while eight libraries (UNI 1, 4, 5, 7, 8, 9, 10 and 12) organize research symposiums and six libraries (UNI 1, 8, 9, 11, 15 and 17) implement Human Libraries and webinars, these practices are not widespread. This indicates a need for broader and more systematic implementation of innovative practices and collaborative outreach to fully realize their potential in advancing SDGs.

While the practices identified under the theme innovation and collaboration reflect active efforts, global libraries seem to extend beyond these by promoting open access research, hosting events on global issues, establishing innovation hubs and maker spaces and integrating emerging technologies such as virtual and augmented reality for immersive learning environments ([Krishanthy & Gamage, 2023](#)).

Ethics and Accountability

University libraries in Sri Lanka prioritize ethics and accountability as fundamental principles guiding their actions. All 17 university libraries integrate ethics and accountability into their routine activities. However, none engage in specific programs or proactive actions or promotion and outreach. Ethical considerations are upheld in collection development and reporting, ensuring transparency and accountability. Libraries actively seek feedbacks and document library committee activities to maintain transparency. Additionally, user needs evaluation processes are implemented. These practices align with SDGs 4, 16, and 17, which focus on quality education, peace, justice, and strong institutions, and partnerships for the goals.

Comparing these practices with global standards reveals some noteworthy differences. Globally, libraries adopt a broader approach by integrating SDGs into library policies and conducting awareness programs.

They conduct workshops and discussions on social justice issues, emphasizing diversity, equity, and inclusion. ([Krishanthi & Gamage, 2023](#)).

Trends of adaptation of themes in Sri Lankan university libraries

Researchers analyzed the overall adaptation of SDG practices by university libraries in Sri Lanka under the five themes in cumulative tables (Tables 7 and 8).

Table 7 indicates that most Sri Lankan university libraries have integrated SDG practices into their routine activities, with a strong presence in environmental responsibility and innovation. However, there are notable variations in the adoption of access and inclusion, and capacity building, suggesting areas for further development and consistency across all libraries.

Table 8 reveals that Sri Lankan university libraries have limited engagement in promotion and outreach activities related to the SDGs, with few libraries demonstrating practices in access and inclusion, and even fewer in environmental responsibility.

Table 7

SDG Practices on Routine Activities and Programs and Proactive Actions Related to the Five Themes

Library	Access and Inclusion	Capacity Building and Partnership	Environmental Responsibility and Resource Management	Innovation and Collaboration	Ethics and Accountability
UNI 1	√	√	√	√	√
UNI 2	×	×	√	√	√
UNI 3	×	√	√	√	√
UNI 4	√	√	√	√	√
UNI 5	√	√	√	√	√
UNI 6	√	√	√	√	√
UNI 7	√	×	√	√	√
UNI 8	√	√	√	√	√
UNI 9	√	√	√	√	√
UNI 10	√	√	√	√	√
UNI 11	√	√	√	√	√
UNI 12	√	×	√	√	√
UNI 13	√	×	√	√	√
UNI 14	×	×	√	√	√
UNI 15	√	√	√	√	√
UNI 16	√	√	√	√	√
UNI 17	√	×	√	√	√

(√ denotes the presence of the practices and, × denotes the absence)

Table 8

SDG Practices on Promotion and Outreach Activities Related to the Five Themes

Library	Access and Inclusion	Capacity Building and Partnership	Environmental Responsibility and Resource Management	Innovation and Collaboration	Ethics and Accountability
UNI 1	√	√	×	×	×
UNI 2	×	×	×	×	×
UNI 3	×	×	×	×	×
UNI 4	√	×	×	×	×

UNI 5	×	×	×	×	×
UNI 6	×	×	×	×	×
UNI 7	√	×	×	×	×
UNI 8	√	√	×	×	×
UNI 9	√	√	×	×	×
UNI 10	×	×	×	×	×
UNI 11	×	×	×	×	×
UNI 12	√	×	√	×	×
UNI 13	√	×	×	×	×
UNI 14	×	×	×	×	×
UNI 15	×	×	×	×	×
UNI 16	×	×	×	×	×
UNI 17	√	×	√	×	×

(√ denotes the presence of the practices and, × denotes the absence)

Access and Inclusion

The data indicates that most Sri Lankan university libraries have incorporated access and inclusion into their routine activities. Specifically, 13 out of 17 libraries consistently implemented inclusive practices such as multilingual services, Braille collections, and remote-access e-resources.

However, only 7 libraries have extended these efforts to promotion and outreach programs. This disparity highlights the need for more robust community engagement initiatives to enhance accessibility and inclusion.

Capacity Building and Partnership

Regarding routine activities, a strong emphasis on capacity building and partnership is evident in 10 libraries which engage in continuous staff development, career guidance, and collaborations with other institutions.

Despite these efforts, only 3 libraries actively participated in promotion and outreach programs related to capacity building and partnership, such as distributing information via library networks and sharing success

stories. This suggests an area for improvement in extending the impact of these initiatives beyond the immediate library environment.

Environmental Responsibility and Resource Management

All 17 libraries have adopted routine eco-friendly practices, such as waste reduction, energy efficiency, and natural ventilation and lighting. Proactive actions are more limited, with specific initiatives like digitization and green building designs being implemented by only a few libraries.

Promotion and outreach efforts related to environmental responsibility are notably lacking, with only 2 libraries engaged in community-focused environmental initiatives. This gap indicates a potential area for expansion to better align with global environmental sustainability practices.

Innovation and Collaboration

Twelve libraries have incorporated routine activities related to innovation and collaboration, such as monitoring technological advancements and assessing user needs.

However, proactive actions like integrating emerging technologies such as implementing AI-powered chatbots to assist users, advanced data analysis such as employing data analytics to understand user behavior and preferences are less common, with only 3 libraries adopting such practices.

However, promotion and outreach activities related to innovation and collaboration are practiced by none of the libraries. This underscores the need for more systematic and widespread implementation of innovative practices to advance SDGs effectively.

Ethics and Accountability

All 17 libraries have embedded ethics and accountability into their routine activities, focusing on transparent reporting and stakeholder feedback mechanisms.

However, there is a noticeable absence of promotion and outreach programs under this theme, indicating that while ethical standards are upheld internally, there is a need for external advocacy and awareness initiatives to strengthen accountability and ethical practices within the broader community.

The trends reveal that while Sri Lankan university libraries are proactive in integrating SDG practices into their routine activities, there is a significant gap in the implementation of programs and proactive actions, as well as promotion and outreach programs. To bridge this gap, libraries could benefit from adopting more comprehensive and innovative approaches, similar to global practices.

Thus, comparing these findings with global practices reveals that libraries worldwide tend to adopt more expansive and proactive approaches, emphasizing outreach and community engagement. Adopting similar strategies could provide Sri Lankan university libraries with a pathway to amplify their contributions to sustainable development.

Translating Global Goals into Local Action

Global objectives such as SDGs, provide a universal framework. However, their real impact is felt when adapted and actualized at the grassroots. Sri Lankan university libraries exemplify this localization.

Under the theme Access and Inclusion, national efforts, exemplified by institutions like UNI 1 and 8, strategically prioritize services such as Braille books and multi-lingual resources. These initiatives underscore a commitment

to localized strategies, ensuring inclusive education and equitable information access.

Concerning Capacity Building and Partnership, UNI 1, seamlessly integrates local job information sessions and collaborations with SDG movements. This signifies a translation of global capacity-building goals into actionable and context-specific programs.

In terms of Environmental Responsibility, libraries, particularly UNI 1 and 8, actively embrace eco-initiatives, showcasing tangible actions at the community level. This reflects a concerted effort to transform global sustainability goals into localized and community-focused environmental actions.

Within the domain of Innovation and Collaboration, practices like webinars and the Human Library concept, observed in libraries like UNI 1 and 9, underscore the translation of global innovation goals into localized collaborative efforts. These initiatives highlight a dynamic approach to harnessing global ideas in a local context.

Regarding Ethics and Accountability, local libraries emphasize transparent reporting, and actively seek user feedback. This mirrors the global emphasis on transparency and accountability, showcasing a commitment to ethical practices at the local level.

Hence, while Sri Lankan university libraries have made commendable progress in aligning with global objectives, there exists an opportunity to bridge the gap between global aspirations and local actions. Drawing insights from international practices and tailoring them to Sri Lanka's unique context can enhance the impact and effectiveness of these initiatives.

The Challenges and Barriers in Adopting SDG Practices

The challenges and barriers encountered in the implementation of Sustainable Development Goals (SDGs) by university libraries were analyzed through semi-structured in-depth interviews as presented in Table 9. These challenges collectively emphasize the need for structured support and resources to amplify the libraries' potential and impact.

These difficulties encompass a range of challenges including lack of awareness & understanding, limited resources & funding, institutional culture & priorities, and collaboration & networking challenges. Addressing these difficulties is crucial for overcoming the barriers to effective implementation of SDGs by university libraries.

Table 9

Challenges Faced by Sri Lankan University Libraries in adopting SDGs

Challenge	Universities Affected
Financial constraints	UNI 1, UNI 2, UNI 3, UNI 4, UNI 5
Absence of library-focused strategies	UNI 2, UNI 4, UNI 10
Human resource limitations	UNI 1, UNI 6, UNI 7, UNI 9
Space constraints	UNI 8, UNI 9, UNI 13
Training needs	UNI 8, UNI 9, UNI 13
Institutional culture	UNI 8, UNI 9, UNI 13
Lack of collaboration/networking	UNI 12, UNI 15, UNI 17
Lack of awareness/understanding	UNI 13, UNI 14

In comparing challenges of Sri Lankan university libraries with global trends in SDG implementation, notable similarities arise. Globally and in Sri Lanka, there's a distinct lack of SDG awareness among library staff, mirroring global findings ([Abdellatif & Abdullah, 2021](#); [Adeniran & Akinyede, 2019](#)). Financial constraints, emphasized worldwide ([Alqahtani, 2020](#); [Alzahrani & Alshehri, 2021](#)), also hamper Sri Lankan libraries. Influences of institutional

cultures is a shared barrier ([Aina & Oyewole, 2021](#)), emphasizing the need for organizational cohesion. Furthermore, the challenge of promoting collaborations that is deemed vital for SDGs ([Al-Saggaf & Rahman, 2019](#); [Aina & Oyewole, 2021](#)), resonates in Sri Lanka. These parallels underscore the universal nature of SDG implementation barriers, which for a coordinated global response.

Conclusion

The call for sustainable development, epitomized by the Sustainable Development Goals (SDGs), requires concerted global efforts. The role of university libraries in this cause cannot be overstated. As knowledge hubs and academic nerve centers, these libraries possess the potential to disseminate, endorse, and amplify sustainable practices, thus advancing the global SDG agenda.

This exploratory study has explored deep into understanding the practices, strategies, and challenges associated with SDGs in Sri Lankan university libraries. The exploration highlights their foundational commitment to the SDGs. University libraries in Sri Lanka have fervently embraced the SDGs, transitioning from traditional knowledge repositories to dynamic hubs of sustainable development.

These libraries underscore capacity building and partnerships, aligning with key SDGs like 4, 8, 9, and 17. They're not just centers of learning but catalysts for collaborative growth. A pronounced focus on community anchors their initiatives, emphasizing access and inclusion. Their efforts address several SDGs, notably 1, 2, 3, 4, 5, 10, 11, and 16, reflecting their role in equitable information dissemination and empowerment.

Environmental conservation is integral to their ethos. With green practices, they champion SDGs 6, 7, 11, 12, 13, 14, and 15, emphasizing their commitment to sustainability. Their innovative spirit shines through in technology adoption and fostering collaborations, aiding the advancement of SDGs 4, 8, 9, 11, and 17. Moreover, their dedication to ethics and transparency resonates with SDGs 4, 16, and 17, marking them as principled and accountable pillars of knowledge in the community.

Trends in the adaptation of SDG themes by Sri Lankan university libraries shows a noticeable gap between routine activities and proactive promotion and outreach efforts. The promotion and outreach activities should be addressed to enhance the libraries' overall impact on sustainable development.

Building upon our exploration of university libraries in Sri Lanka, some inspiring perspectives emerge when compared with global best practices. While many foundational principles are similar, Sri Lankan libraries showcase distinctive adaptations tailored to their unique regional requirements. These localized strategies, while consistent with global SDG trends, underscore the pivotal role of context in effectively achieving sustainable objectives. This balance between local adaptations and global standards sets Sri Lankan libraries apart in their pursuit of sustainability.

To strengthen the alignment of Sri Lankan university libraries with global SDG practices, a comprehensive roadmap is proposed. This involves expanding services and programs by developing health information provision, digital literacy for underserved communities, and financial literacy programs to enhance access and inclusion. Strengthening partnerships is crucial, with a focus on extensive training for marginalized communities, collaboration with local governments, and advocacy for gender equality. Adopting innovative

environmental practices, such as implementing seed libraries, zero-waste initiatives, and sustainable landscaping projects, will enhance environmental responsibility and resource management. Furthermore, enhancing digital and collaborative initiatives by promoting open access research, hosting events on global issues, and leveraging data-driven decision-making can foster innovation and collaboration. Lastly, integrating broader ethical practices by incorporating SDGs into library policies, conducting social justice workshops, and supporting open access publishing will enhance ethics and accountability. This strategic roadmap aims to bridge the gap between local actions and global aspirations, driving Sri Lankan university libraries towards more comprehensive and impactful contributions to the SDGs.

However, the implementation of SDG practices is not without challenges. Key barriers identified include financial constraints, absence of library-focused strategies, human resource limitations, space constraints, and training needs. Additionally, institutional culture and a lack of collaboration and awareness further complicate the adoption of SDG practices. Addressing these challenges is essential for overcoming barriers and enhancing the libraries' effectiveness in contributing to the SDGs.

Based on the balance between local adaptations and global standards, it's clear that Sri Lankan university libraries play a transformative role in the broader SDG narrative. They have not only internalized the global SDG framework but have also skillfully converted it into actionable local initiatives. Such a fusion of global goals with tailored local solutions, championed by these libraries, sets a compelling precedent for institutions around the world.

In wrapping up our insights, Sri Lankan university libraries stand as a shining example of how academic institutions can dynamically contribute to achieving the SDGs. As the global community advances towards the 2030

SDG benchmark, the approach of the Sri Lankan university libraries progress with invaluable insights and inspiration.

Implications and Future Directions

While Sri Lankan university libraries have shown a commendable commitment to the SDGs, there is ample scope for deeper integration and broader outreach. Future strategies could focus on more extensive collaborations, increased public engagement, and leveraging emerging technologies to further the SDG agenda.

Limitations

The findings, although helpful, are based on self-reported practices, which could introduce potential biases. The study qualitatively identified the practices providing binary cumulative information, while these were not quantitatively weighted according to their impact. Further research is needed to gauge the direct impact and correlations of the Sri Lankan university library initiatives related to SDGs.

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Using Generative AI for Bibliographic Description: A Study with ChatGPT 4

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Abstract

This study explores the use of Generative Artificial Intelligence (GAI) in bibliographic description in university library catalogs. It focuses on GAI's potential in enhancing efficiency and maintaining consistency of bibliographic description while complying with cataloging standards such as MARC21, AACR2 and RDA. The study followed a qualitative methodology, examining 10 use cases in metadata extraction, RDA compliance of GAI generated catalog records, and error checking of existing catalog records. The study used OpenAI's ChatGPT 4 to execute the practical tests. The study concludes that GAI can significantly assist in improving cataloging efficiency. It was highly satisfactory in error correction of existing MARC21 records. GAI was also a prospective tool for educating novice librarians on the use of MARC21 and RDA standards. CATMELK, a custom GPT model created with ChatGPT 4 could effectively convert images from books' title, copyright and cover pages into RDA compliant MARC21 records. However, when the tests were conducted in January 2024, ChatGPT 4 faced difficulties in direct conversion of Sinhala and Tamil data from images to MARC2 1 records. Considering the rapid development of GAI technology and applications, it is recommended to repeat the tests on a continuing basis.

Keywords: AACR2, MARC21, RDA, Artificial Intelligence, ChatGPT

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Introduction

Library catalogs are not merely listings of library holdings; they are crucial for research, discovery, and learning. Maintaining a discoverable catalog requires bibliographic control and bibliographic description. Bibliographic control refers to the system used in the creation and maintenance of a library's bibliographic records ([Baldwin, 1976](#)). It involves maintaining consistency of record keeping, which helps achieve control of heading usage in catalogs. Bibliographic description is adding controlled metadata to represent a library material in the catalog. The aim of this study is to explore the capability of Generative AI (GAI) for efficient creation and management of catalog records.

Bibliographic description has traditionally been a balance between rule-based actions and expert decision-making. As such, a catalog record is a mix of structured data, based on established rules and subjective data shaped by the catalogers' expertise and experience. Therefore, adherence to bibliographic description standards is an essential element in improving discoverability ([Cabonero et al., 2021](#); [Chaplin, 1956](#); [Fell & Ou, 2022](#); [Neatrou & Hebron, 2023](#); [Thompson & Hoover, 2023](#); [Woolcott et al., 2021](#)).

Standards such as the Anglo-American Cataloging Rules (AACR2) ([Joint Steering Committee for Revision of AACR & American Library Association, 2002](#)), and Resource Description and Access (RDA) ([Joint Steering Committee for Development of RDA et al., 2015](#)) guide the cataloging processes. The MARC21 format ([MARC 21 Format for Bibliographic Data, 2023](#)), a format of electronic data exchange in libraries, enables catalog records to be shared and understood not only by catalogers but also by computers, thus facilitating seamless information exchange. The National Library of Sri Lanka (NLSL) introduced the Descriptive Bibliographic

Framework (DBIB) as a guideline for selecting essential MARC21 tags in bibliographic description of various formats such as books and monographs, serial publications, and theses and dissertations, within the Sri Lankan context ([Gamage et al., 2020, 2024](#)).

Research Problem

Catalogers face several challenges in bibliographic description including inconsistency of data sources ([Visser et al., 2021](#)), lack of competency in foreign languages ([Bailey & Shou, 2021](#); [Olson, 2014](#)), complexity of cataloging rules ([Perry, 2023](#)), technological limitations of existing systems ([Seikel & Steele, 2020](#)), the volume of work ([Perry, 2023](#)), subjectivity in cataloging ([Perry, 2023](#)), data entry errors ([Kushwah & Singh, 2022](#)), maintaining updated records ([Antelman et al., 2006](#)), standardization across systems ([Hines, 2021](#)), and the need for training and professional development ([Tosaka & Park, 2018](#)). [Breeding \(2022\)](#) notes that the time required by a library cataloger to create a MARC record varies from one hour to 20 minutes.

The above issues that catalogers face in bibliographic description can be broadly categorized into three areas: extraction of bibliographic details, conversion of them into MARC records, and management of records.

Research confirms that these have affected the quality of catalog records in Sri Lankan university libraries as well. A study which reviewed cataloging practices in four long established Sri Lankan university libraries highlighted a critical need for the standardization of cataloging practices aligned with international best practices ([Wanigasooriya & Gamage, 2024](#)). The common errors identified in this study were incorrect use of language Code (Tag 041), incorrect main headings and added entries (Tags 100, 700),

incorrect use of responsibility area and its author name format (Tag 245), structural errors in imprint data (Tag 260), and the use of uncontrolled vocabulary in subject headings (Tag 650). The study suggests a gap in adhering to AACR2, and MARC21 standards by the tested Sri Lankan University library online public access catalogs (OPAC). Furthermore, the study revealed that none of these catalogs were compliant with RDA. [Sampath \(2011\)](#) and [Ketheeswaren \(2017\)](#) also indicated the gaps in data entering into Sri Lankan University catalogs.

herefore, an intervention is required to make bibliographic description efficient, and effective. Thus, the aim of the research is to explore the ability of GAI to achieve this purpose.

Research Objectives and Questions

The research objectives and questions were derived from the above identified research problem. Also, using GAI for extracting metadata involves use of OCR technology. The vernacular languages Sinhala and Tamil are low resourced when compared to English ([Vasantharajan et al., 2021](#)), leading to low accuracy of capturing. Therefore, a fourth objective was added to explore the ability of GAI to convert Sinhala and Tamil books.

Table 1

Research objectives and research questions of the study

Aspect	Research Objectives	Research Questions
1. Data Extraction	1. To observe the capability of GAI in extracting bibliographic	1.1 Can GAI extract bibliographic details from the Web by ISBN?

	details from various sources.	1.2 Can GAI extract bibliographic details from a database by ISBN?
2. MARC Record Conversion	2. To evaluate the effectiveness of GAI in converting bibliographic details to MARC records, including those for foreign language materials.	2.1 How effectively does GAI convert book cover and/or title page details to a MARC record?
		2.2 How effectively does GAI convert book cover and/or title page details to MARC record in other foreign language materials?
		2.3 How effectively does GAI convert a catalog card to a MARC record?
		2.4 How effectively does GAI convert a National Bibliography page to MARC record?
		2.5 How effectively does GAI create DBIB compliant MARC21 records?
		2.6 How effectively does GAI create RDA compliant MARC21 records with a custom built GPT?
	3. To investigate the ability of GAI to manage	3.1 Can GAI display MARC records from a file?

3. MARC Record Management	and correct MARC records.	3.2 How proficiently does GAI correct errors in existing MARC records?
4. Capturing vernacular languages	4. To observe the ability of GAI to capture Sinhala and Tamil	4.1 Can GAI capture Sinhala and Tamil books, and convert to MARC records?

Generative AI Applications

Generative AI (GAI) is a type of artificial intelligence capable of creating new content, such as text, images, or music, by learning patterns from existing data and generating new outputs. A prominent example of GAI is GPT, which stands for "Generative Pre-trained Transformer." GPT is designed to understand a given input reasonably mirroring a human brain, and produce relevant output.

GAI chat applications, such as AI chatbots, facilitate real-time conversations and respond to user queries referred to as 'prompts'.

The chosen GAI tool for this study was OpenAI's ChatGPT 4. The reason was its rank as one of the best AI chatbots by December 2023 ([Top 5 AI Chatbots That You Need to Try, 2023](#)).

In the prompt box where conversations are input, ChatGPT 4 has a 'paperclip icon' with file attachment capability (Figure 1).

Figure 1

ChatGPT Version 4 Data Input field.



Researchers have extensively discussed the predictive power of GAI ([Barbaglia et al., 2021](#); [Management Solutions, 2018](#); [Zihni et al., 2022](#)). Therefore, authors observed that GAI has the potential to integrate with library cataloging, as a measure to improve cataloging efficiency and consistency. This study aims to explore the potential roles and benefits of GAI in enhancing cataloging methods in university libraries, with a focus on book data.

In university libraries, the volume of resources and the need for accurate cataloging is essential. Therefore, GAI's capability to standardize entries and accelerate technical services is particularly of interest. The research problem focuses on investigating whether GAI can effectively address these challenges, thus contributing to the improvement of library service quality and accessibility.

Review of Literature

AI has been applied in various fields since its inception in 1950s. Its applications range from healthcare ([Varghese et al., 2023](#)) to human resource management ([Bhatt & Shah, 2023](#); [Mer, 2023](#); [Singh & Chouhan, 2023](#)), marketing ([Malhotra & Ramalingam, 2023](#); [Paschen et al., 2019](#)), and educational performance assessment ([Halagatti et al., 2023](#)). However, the application of AI in the library and information sector is still in a development stage, with research gradually increasing in this area.

The rise and development of GAI offers a promising solution to the challenges faced by catalogers. For example, [Metz \(2024\)](#) visualized the goal of building systems that methodically solve problems, mirroring human reasoning through a series of logical steps. [Lowagie's \(2023\)](#) studies on creating automated processes that incorporate AI capabilities signifies a substantial advancement in improving cataloging efficiency and accuracy

while adhering to metadata standards. Going beyond the cataloging practice level to the standardizing level, [Gamage and Wanigasooriya \(2023\)](#) demonstrated the high similarity of a machine generated DBIB framework with the human created framework recommended by the NLSL.

[Xu, Feng and Chen \(2023\)](#) used a randomized online experiment to compare searching capability of GAI. They used ChatGPT-like and Google Search-like tools in the study. It revealed that the ‘ChatGPT’ group spent less time on tasks with no significant difference in overall performance. However, it was less effective in fact-checking tasks. [Abba \(2024\)](#) states that some African university libraries are using ChatGPT 4 as a knowledge base for ‘cataloguing information’. However, ChatGPT 4 cannot directly query a database (Hook, 2023). Instead it needs GPT4 API to do the task ([Langchain Tutorial. Query a Database with OpenAI’s ChatGPT, 2023](#)).

[Brzustowicz \(2023\)](#) could create RDA Compliant MARC21 records using GAI, but his experiments have been criticized by other researchers for the lack of rigor ([Amram et al., 2023](#); [Floyd, 2023](#)). ChatGPT has also demonstrated superior language translating ability when compared with a purpose built application ([Ghassemiazghandi, 2024](#)).

[Bandi et al. \(2023\)](#) states that image-to-text models are advancing enabling not only to convert images to text, but also the reverse mechanism as demonstrated by DALL-E. These have combined the power of computer vision, natural language processing, and attention mechanisms.

Researchers have confirmed the utility of ChatGPT’s custom GTP models too ([Almasre, 2024](#); [Zhao et al., 2024](#)).

Methodology

Studying different approaches of standardizing and enhancing the efficiency and effectiveness of bibliographic description is explorative in nature. Our focus was on the process over metrics, and flexibility and adaptability over strict protocols in the research design. A contextual understanding was necessary for identifying practical solutions and improvements. Therefore, a task-based approach was employed to answer the research questions. Using task-based tests, the study could simulate real-world cataloging scenarios and gather detailed observations on how various tools and methods perform in practice. This inevitably resulted in following the qualitative research methodology.

Since our focus was on working on multiple files to save time on cataloging functions (eg: extracting bibliographic records from multiple sources), we selected ChatGPT 4 as the GAI tool.

All tests were conducted in January 2024. By that time, ChatGPT 4 had the capacity to search the Web for additional information. In addition, it allowed creation of custom GPTs which the creator could build and configure. Therefore, a custom built GPT called CATMELK was created. It is publicly available at <https://chatgpt.com/g/g-YQm6gByUe-catmelk>. CATMELK can create RDA-compliant catalog records from images captured through a mobile phone, without the need of human mediated textual prompts.

Specific tasks and scenarios were designed to test the required functionality in relation to bibliographic description. Accordingly, the study utilized 49 prompts to carry out 10 tasks to observe reaction to the 4 aspects of activity (Tables 2 and 3). Tasks 1-2 focused on extraction of bibliographic details, 3-8 on conversion into MARC records, and 9-10 on records

management. Task 8 was completed using CATMELK. Since foreign language materials are also required to be added to collections, some materials in common foreign languages also were included in Task 4.

In some of the tasks, multiple inputs were included at once (for example, five ISBN numbers in a single prompt, or five cover page image files as attachments), and in some of the tasks a single input was added. These have been clearly mentioned under the tasks.

By exploring these use cases of GAI in reducing errors and streamlining cataloging processes, the study aimed to provide insights into the feasibility and effectiveness of integrating GAI technologies in library cataloging practice.

It should be noted that the tests were representative but not exhaustive, hence the selected research methodology. It ensured depth and contextual understanding, thereby maintaining research rigor.

Table 2

Mapping tasks and tests to the research questions

Research Questions	Tasks	Task Description
1.1, 4.1	TASK1	Extract bibliographic details from the Web by ISBN
1.2, 4.1	TASK2	Extract bibliographic details from the WorldCat database by Title and ISBN
2.1, 4.1	TASK3	Convert book cover and/or title page details to MARC record

2.2, 4.1	TASK4	Convert book cover and/or title page details to MARC record in other foreign language materials
2.3, 4.1	TASK5	Convert catalog card to MARC record
2.4, 4.1	TASK6	Convert National Bibliography page to MARC record
2.5	TASK7	Create DBIB compliant MARC21 records
2.6, 4.1	TASK8	Create RDA compliant MARC21 records with CATMELK
3.1	TASK9	Display MARC records from file
3.2	TASK10	Existing MARC record error correction

In the primary data collection phase, researchers directly interacted with GAI applications to see the initial response of AI applications. Subsequently, every test, results, and observations were carefully documented, ensuring comprehensive record-keeping. That followed with a thematic and content analysis, following qualitative analysis methodology. Afterwards, researchers identified patterns, themes, and insights, thereby facilitating meaningful conclusions about the applications' performance and user experience. Lastly, the researchers reflected on their roles and acknowledged any biases or assumptions that might have influenced the findings.

Results

We assessed the performance of ChatGPT 4 in self-performing the above designated tasks. Each task included several prompts fed into ChatGPT 4 (Table 3). Sharable URLs of the complete conversation of each session have been given below the task, whenever available. By the time of the study, ChatGPT did not support the sharing of sessions that include image uploads.

Thus the prompts of tasks which include image files have been given as complete as possible.

Table 3

Overview of Tests Conducted on ChatGPT 4.

Task	Test Description	Process		
		Sam	Prom	Res
TASK1	Extract bibliographic details from the Web by ISBN (OpenAI, 2024a)	10	3	*
	English Multiple/Single			√
	Sinhala and Tamil			X
TASK2	Extract bibliographic details from the WorldCat database by Title and ISBN (OpenAI, 2024b)	5	4	X
TASK3	Convert book cover and/or title page details to MARC record (OpenAI, 2024c)	11	3	*
	English Multiple			X
	English Single			√
	Sinhala and Tamil			*
TASK4	Convert book cover and/or title page details to MARC record in other foreign language materials (OpenAI, 2024d)	5	5	√
TASK5	Convert catalog card images to MARC records (OpenAI, 2024e)	10	4	*
	English Multiple/Single			√

	Sinhala and Tamil			X
TASK6	Convert National Bibliography page to MARC record (OpenAI, 2024f)	1	3	*
	English multiple/single			√
	Sinhala and Tamil			X
TASK7	Create DBIB compliant MARC21 records (OpenAI, 2024g)	1	7	√
TASK8	Create RDA Compliant MARC21 records with CATMELK (OpenAI, 2024h)	2	2	*
	English book image to RDA compliant record			√
	Sinhala and Tamil			*
TASK9	Display MARC records from file (OpenAI, 2024i)	4	5	*
	.mrc, .mrk, and .txt			√
	.iso			X
TASK10	Existing MARC record error correction (OpenAI, 2024j, 2024k)	10	13	√
	Punctuation marks identified			√
	Use of Language Code (Tag 041)			√
	Main headings and added entries (100, 700)			√
	Responsibility area and its author name format (245)			√
	Structural errors in imprint data (260)			√

Controlled vocabulary in subject headings (650)	√
Correct errors in multiple records	√

Note: The terms ‘multiple’ and ‘single’ refer to inputting several records simultaneously or individually. Sam, Prom, and Res are the number of samples tested, number of prompts used, and the result, respectively. Outcomes were indicated as success (√), failure (X), or mixed results ().*

Remarkably, the study highlighted the capability of these applications to streamline cataloging processes, and enhance compliance with MARC21 and RDA standards. Positive results were evident in the effectiveness of Optical Character Recognition (OCR) and web-based metadata retrieval too. However, challenges were also noted in performing such actions specially with the OCR capability for local language texts, unconventional presentation of bibliographic descriptions in Chinese materials, and inability of directly accessing external databases. GAI could overcome the local language conversion issue to some extent. A detailed description of the test results follow.

Extract Bibliographic Details from the Web by ISBN (TASK1)

A common method of searching for bibliographic information is by searching for the International Standard Book Number (ISBN). ChatGPT 4 successfully extracted metadata for ISBNs from the WWW. However, we noted challenges in extracting accurate information for certain ISBNs, especially for books in local languages and ones published within Sri Lanka. For example, it couldn't identify details of the Sinhala title with ISBN 9556460039 and the local English title with ISBN 8170031486.

Extract Bibliographic Details from the WorldCat Database by Title and ISBN (TASK2)

Worldcat.org is the online union catalog of materials cataloged by OCLC member libraries and institutions. It is a publicly searchable database. We faced limitations here, as direct access to WorldCat was not possible for GAI Applications.

Convert Book Details to MARC Record (TASK3)

Information crucial for cataloging is often found in specific sections of library materials, particularly on their initial pages. The title page, for instance, provides essential details such as the Title, Authors, and Imprint. On the verso of title page, copyright and edition-related information is presented, and in some cases, Cataloging in Publication (CIP) data also might be available. The successful completion of this task was evident, especially when structured information like CIP data is available. The system showcased its proficiency in OCR technology, exhibiting effectiveness in handling English records. However, OCR for Sinhala records almost always had difficulties except in a few instances. Often the following message was received; “It seems there was an error in processing the images due to a problem with the OCR language setting. The language 'sin' for Sinhala may not be supported in the current OCR setup.” OCR for Tamil brought mixed results.

Convert Book Cover and/or Title Page Details to MARC Record in Foreign Language Materials (TASK4)

Copyright pages of publications in Arabic, Chinese, French, Korean and Spanish were fed, asking to create MARC21 records. Record creation was successful. ChatGPT was able to recognize Chinese characters, but it was

challenging due to top to bottom writing in some cases, and bibliographic details not being available on a single page etc.

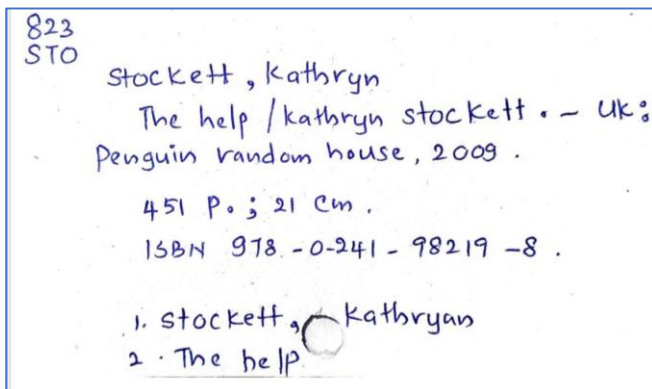
Convert Catalog Card to MARC Record (TASK5)

Some libraries have unconverted traditional catalog cards, of which collections are hidden until they are included in an online catalog. Efficient conversion of the information on these cards is necessary. ChatGPT 4 was successful in converting catalog card data into RDA compliant MARC21 records in a single command. However, the success was dependent on the clarity of the record and OCR capabilities (Figures 3 and 4). After attaching the image file, authors prompted with “Using the attached library catalog card, prepare an RDA compliant MARC21 record”. The ChatGPT 4-generated MARC21 record complied with the standards, and logical decision making was also evident. It had correctly omitted irrelevant information in the card. For example, manual catalogers often use the same card format for all tracings, including Title and Author added entries, as shown in Figure 2. The RDA-compliant record as shown in Figure 3 has omitted such added entries since enough access points are already available.

It was also observed that ChatGPT 4 voluntarily accumulate additional bibliographic information from the Web. For example, the generated record populated values for 520 and 650 MARC tags.

Figure 2

Image of a hand-written catalog card captured from a mobile phone camera, used for metadata extraction..



(Source: Handwritten by authors)

Figure 3

MARC record created by ChatGPT4 from the catalog card in Figure 2.

```
=LDR 0000nam 2200000 4500
=001 123456789
=005 20240508123456.0
=008 240508s2009 enk|||| |||| |engd
=020 \ $a 9780241982198
=040 \ $a [Library symbol] $b eng $e rda $c [Library symbol]
=100 1\ $a Stockett, Kathryn, $e author.
=245 14$ a The Help / $c Kathryn Stockett.
=264 \1$ a London : $b Penguin Random House, $c 2009.
=300 \ $a 451 pages ; $c 21 cm.
=336 \ $a text $b txt $2 rdacontent
=337 \ $a unmediated $b n $2 rdamedia
=338 \ $a volume $b nc $2 rdacarrier
=520 \ $a A poignant and powerful story set in the early 1960s in Jackson, Mississippi, focusing on the civil rights movement and the interactions between African American maids and their white employers.
=650 \0$ a African American women $x Employment $z Mississippi $v Fiction.
=650 \0$ a Civil rights movements $z United States $v Fiction.
=655 \7$ a Historical fiction. $2 lcft
```

An attempt to create MARC21 records from Sinhala medium catalog cards was unsuccessful, citing inability to interpret Sinhala script.

Convert National Bibliography Page to MARC Records (TASK6)

National Bibliographies are often considered authoritative sources for cataloging. Direct conversion of these to MARC format is helpful in some cases. English language pages from the Sri Lanka National Bibliography (SLNB) were successfully converted to a list of records. However, challenges were encountered in accurately extracting metadata from Sinhala and Tamil text due to OCR limitations and the heavy use of abbreviations in the SLNB.

Create MARC21 Records Following Descriptive Bibliographic Framework (DBIB) Guidelines (TASK7)

ChatGPT 4 created MARC21 records for books and monographs aligned with the DBIB framework as recommended by the National Library of Sri Lanka, when instructions on the essential tags were provided in the prompt. Instructions didn't have to be repeated in a single session. Once provided, it adhered to the instructions on the prompts that followed in the same session.

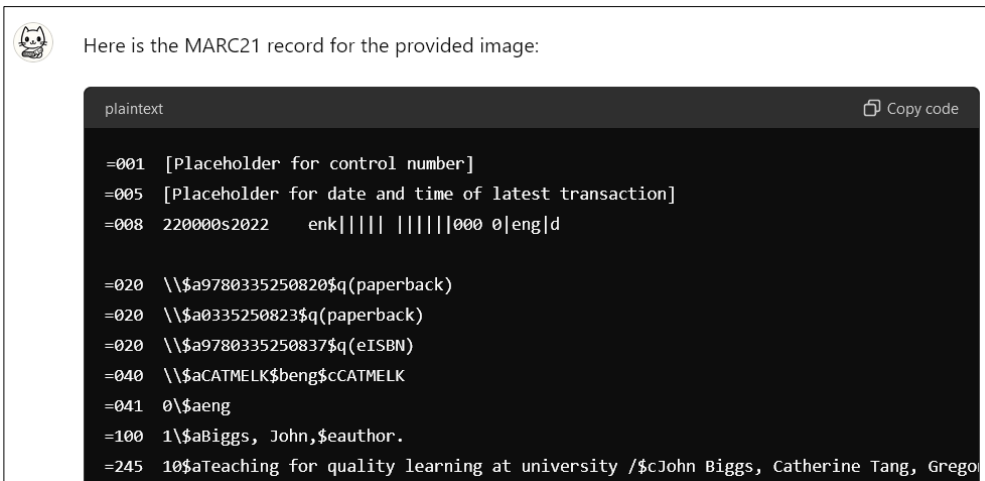
Create RDA Compliant MARC21 Records from Custom Built GPT (TASK8)

CATMELK was configured to create RDA and DBIB compliant records for book image prompts. When the details were comprehensive (for example, from a combination of the cover page, title page, and copyright page), it created nearly complete records. However, the catalogers and the library management system must provide additional details for which the GPT Model leaves placeholders (Figure 4). In addition, the model provides notes

with explanations for the decisions taken, making it helpful for novice catalogers to learn and understand the reasoning behind each description.

Figure 4

Screen shot from CATMELK GPT Model, displaying a section of the code



```
plaintext Copy code
=001 [Placeholder for control number]
=005 [Placeholder for date and time of latest transaction]
=008 220000s2022   enk||||  |||||000 0|eng|d

=020  \\$a9780335250820$q(paperback)
=020  \\$a0335250823$q(paperback)
=020  \\$a9780335250837$q(eISBN)
=040  \\$aCATMELK$beng$cCATMELK
=041  0\\$aeng
=100  1\\$aBiggs, John,$eauthor.
=245  10$aTeaching for quality learning at university /$cJohn Biggs, Catherine Tang, Grego
```

Display MARC Records from Files (TASK9)

MARC records available in some online catalogs can be downloaded to a PC for error correction and uploading back to the OPAC. MARC records can be downloaded as binary (eg: .mrc and .iso) and non-binary (.mrk, and .txt) files. Opening non-binary files and displaying data was straightforward. However, opening binary files was restrictive. ChatGPT 4 could open human readable parts of a .mrc file, but it was unable to encode an .iso file stating its complexity. These binary files can be easily opened on specialized applications such as MarcEdit and converted to non-binary formats.

Existing MARC Record Error Correction (TASK10)

Even without downloading files, ChatGPT 4 could effectively check records for errors, achieving higher success rates when handling tasks sequentially, such as performing OCR followed by MARC record creation

within the same conversation. The applications could accurately identify and correct errors in 10 consecutive MARC records presented in mnemonic (normal view) format.

Discussion, Conclusion and Recommendations

This study explored the application of Generative AI, particularly ChatGPT 4, for enhancing bibliographic description in university libraries in Sri Lanka. Its focus was on cataloging books. The examination included various tasks carried out under four main aspects. These were data extraction, MARC record conversion & compliance with standards, MARC records management, and working with vernacular languages. The results showed varying degrees of success, highlighting both the potential and limitations of GAI in enhancing bibliographic description function in university library online catalogs. Tasks 7-10 can be further automated to complete functions from capturing new information and error correction of existing records, to importing to the OPAC.

Data Extraction

The tasks involved extracting bibliographic details from the Web and the WorldCat database. The results were mixed, mostly negative with local languages. However, the results aligned with the observations by [Xu, Feng, & Chen \(2023\)](#), who showed that while GAI, specifically ChatGPT, can effectively reduce the time spent on search tasks, its fact-checking capabilities are limited. ChatGPT 4 performed well in extracting details in English but struggled with non-English tasks. As stated by [Hook \(2023\)](#), challenges persist in querying databases directly without additional API support. However, creating records for local languages faced challenges. These may evolve with

the new models of GAI such as ChatGPT-4o, which was far more successful in handling local languages in the recently conducted initial tests.

MARC Record Conversion

The conversion of book cover, title page, copyright page, catalog card, and National Bibliography page images into MARC records also showed mixed results. Just like [Lowagie \(2023\)](#) and [Bandi et al. \(2023\)](#) noted, AI capabilities for converting images to text were evident. Yet our study found that the effectiveness varies by language and task complexity. Single input instances in English were generally successful, but multiple input instances and non-English tasks had lower success rates. This suggests that step by step instructions to ChatGPT with single input task per prompt during a particular conversation can yield more results in bibliographic description, rather than asking multiple tasks to complete within a single prompt.

MARC21 and RDA Compliance

The creation of MARC21 records following specific guidelines showed promising results, especially for English records. This aligns with [Brzustowicz \(2023\)](#) on the ability of GAI in creating MARC21 and RDA compliant records. As [Metz \(2024\)](#) highlighted, human-like reasoning was evident in making decisions, for example, omitting non-RDA compliant data in the result from among the data collected from a traditional catalog card. As demonstrated by CATMELK and confirmed by [Almasre \(2024\)](#) and [Zhao et al. \(2024\)](#), custom GTPs have a special place in the GAI landscape since they can be pre-tuned for specific tasks excluding the need for prompt writing, making the task more efficient.

MARC Record Management

For MARC record management, the tasks included displaying and correcting existing records. The display of MARC records from files was mostly successful, except for .iso files. Error correction tasks were effective in identifying punctuation marks, structural errors, and controlled vocabulary. Handling responsibility areas, and language codes was also successful.

Conclusion, Recommendations, and Acknowledgement of Biases and Limitations

The study concludes that GAI has a significant potential as an assistant in library cataloging, particularly in saving time for routine cataloging tasks and serving as an educational tool for standards like RDA. It is advantageous for novice catalogers, facilitating their learning and adherence to cataloging standards, thereby improving the efficiency of cataloging. It was evident by the fact that CATMELK GPT Model provided descriptive notes on its actions. The study also highlights the transformative impact of GAI on cataloging efficiency and the need for ongoing exploration and refinement in integrating AI into library workflows.

A notable bias existed in the local language processing capability testing, with a preference for Sinhala content over Tamil due to the authors' lack of proficiency in Tamil. This limitation means the results cannot be generalized to Tamil medium contexts. It should also be noted that Sinhala is a language written and spoken by a population of around 13 million ([Abeywickrama & Mendis, 2013](#)) mainly within Sri Lanka while Tamil is written and spoken by more than 64 million in the world (Encyclopedia Britannica, Inc., 2024). Therefore, there is a disparity in language availability on the Internet.

Furthermore, the premium version of ChatGPT was available to the researchers, making it the preferred medium for testing. In January 2024 when the tests were conducted, ChatGPT 4 demonstrated significant capabilities in natural language processing tasks, such as text generation, translation, and basic data extraction. By May 2024, advancements in ChatGPT's development have markedly improved its performance. When asked to mark differences between January and May 2024 versions, ChatGPT 4o, the most recent version of the application highlighted enhanced multilingual support, better integration with real-time databases, improved verification algorithms and image-to-text models, and advances in OCR technology ([OpenAI, 2024](#)).

Therefore, it is important to note that the field of Generative AI is rapidly evolving. The initial biases, the subsequent advancements in GAI technology over the seven months since the tests were conducted, and the continuous evolution of AI capabilities could affect the conclusions of this study. Future research should address these biases, incorporate the latest advancements, and consider the dynamic nature of GAI to provide more comprehensive and generalized results.

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Application of Artificial Intelligence for Library Services: A Systematic Literature Review

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Abstract

Artificial intelligence (AI) revolutionizes traditional library services by offering opportunities for effective and quality service delivery through AI-powered systems. Artificial intelligence has the potential to automate many library operations and services to provide 24/7 assistance to library users in meeting their information requirements. Hence, libraries tend to integrate artificial intelligence into their operations and service delivery. This can be further verified by reviewing the current state of knowledge regarding artificial intelligence and libraries. Therefore, the objectives of the study were to find the current status of knowledge regarding the application of artificial intelligence for library services and to investigate the research gaps in the application of artificial intelligence for library services. The study followed the Systematic Literature Review (SLR) methodology and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

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The review used 88 articles published during the period from 2002 to 30th April 2024, which were extracted from LENS.ORG and Google Scholar. Biblioshiny of R software and VOSviewer software were used for the analysis. The review revealed that extensive research studies were focused on discovering different library services and operations where AI can be utilized to enhance the effectiveness and efficiency of service delivery, and challenges faced by libraries in using AI tools. The study further recognized areas where studies are lacking which include different AI tools for library service delivery, smart libraries, natural language processing, AI-powered Chatbots, ethical considerations of AI, education and personalized learning, digital library and Distributed Artificial Intelligence, AI for participatory library service, future of libraries in the age of AI, AI Literacy. Hence, the findings provide some implications for future research regarding artificial intelligence and libraries.

Keywords: Artificial Intelligence, Library Services, Library Technology, PRISMA, Systematic Literature Review

Introduction

Libraries are regarded as service-oriented organizations and their services have been transformed by advanced technologies in the modern era. In the digital age, the growing demands of library users are changing rapidly. This has compelled librarians to seek new and innovative technologies to maintain the user experiences of their libraries. Therefore, libraries face evolving challenges in managing vast amounts of information, providing efficient services, and ensuring a seamless user experience. Traditional library systems have been significantly transformed by the integration of automation and information technologies. One such transformative technology is Artificial Intelligence (AI), which has the potential to revolutionize library operations and services (Manjunatha, 2023).

Artificial intelligence (AI) is a broad field of computer science that involves building smart machines capable of performing tasks that typically require human intelligence (Sarker, 2022). It makes computers smart and intelligent by allowing computers to provide answers to the questions raised by people. Thus, the main goal of AI is to enable computers and machines to perform cognitive functions such as problem-solving, decision-making, perception, and comprehension of human communication (Sarker, 2022). Because of such potentials of AI, it emerged as a major technological milestone, influencing the operations of both service-oriented organizations and business organizations.

AI has become an indispensable tool for improving organizational efficiency and productivity. AI adoption in libraries can provide a new technological landscape for delivering library services innovatively and effectively. According to Okunlaya et al. (2022), there are new technological options such as biometric recognition, expert systems, machine learning,

machine vision, algorithms, sensors, and robotization which are some AI-based technologies that can be utilized for enhancing library services and operations. There are numerous AI tools that can be used in the libraries to improve the efficiency of the services and to fulfill 24/7 user information support with minimal human intervention.

It is astounding how AI technologies have strongly influenced many sectors in the 21st century, including libraries. AI has become the new emerging trend for libraries currently. AI in libraries can be considered as a collection of techniques that enable machines to detect, understand, behave, learn, and execute administrative activities, providing libraries with cutting-edge technologies. Librarianship as a profession is known for incorporating cutting-edge technologies not just for information dissemination but also apply computer-based products and services to various library operational processes, and different library services. The major impact of AI applications on library functions shows the real efficiency and accuracy of the services rather than its technological exploitations. Hence, AI can be recognized as a novel type of technology that libraries utilize to achieve the main aim of the library.

Libraries tend to increasingly integrate AI for their operations and service delivery. This can be further verified by reviewing the current state of knowledge existing in the world in relation to AI and libraries. Therefore, the present study focused on the empirical literature published during the period from 2002 to 30 April 2024. The study aimed to discover the current state of knowledge on the application of AI in library services and identify areas where further research studies are needed. At present, the application of AI-driven technologies for library services is becoming a new level of accuracy and effectiveness in library service delivery in the world and a number of research

studies have been carried out across the world. However, no study was conducted on a systematic literature review on the application of AI for libraries in the context of Sri Lanka. Therefore, the present study involved a systematic literature review along with a bibliometric analysis of AI-powered library services. The findings of the study will significantly contribute to libraries in Sri Lanka by helping them apply AI tools for effective service delivery and formulating policies to promote the ethical use of AI. The objectives of the study were (1) To find the current status of knowledge regarding the application of artificial intelligence (AI) for library services, and (2) To investigate the research gaps in the application of artificial intelligence (AI) for library services through the literature review.

Methodology

Study selection process and methods

The study employed the Systematic Literature Review (SLR) methodology to explore the application of AI tools in library services. The article selection procedure was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram. The steps followed during the article selection were “Identification”, “screening”, and “included”. Figure 1 illustrates the steps carried out during the study using the PRISMA flow diagram.

The initial stage “identification stage” includes determining the search terms and search strategy, identifying relevant databases for searching scholarly articles and the data extraction method. The key search terms used for the article retrieval were “artificial intelligence”, “AI” and “library services”. Search terms “artificial intelligence”, and “AI” were combined using OR operator and the term “library services” was added with AND operator. LENS. ORG and Google scholar were used for retrieving articles.

LENS. ORG is an open access platform which covers research articles across many subject disciplines. Similarly, Google scholar indexes a vast amount of scholarly literature from various disciplines and sources. Therefore, LENS. ORG and Google scholar were used for the study.

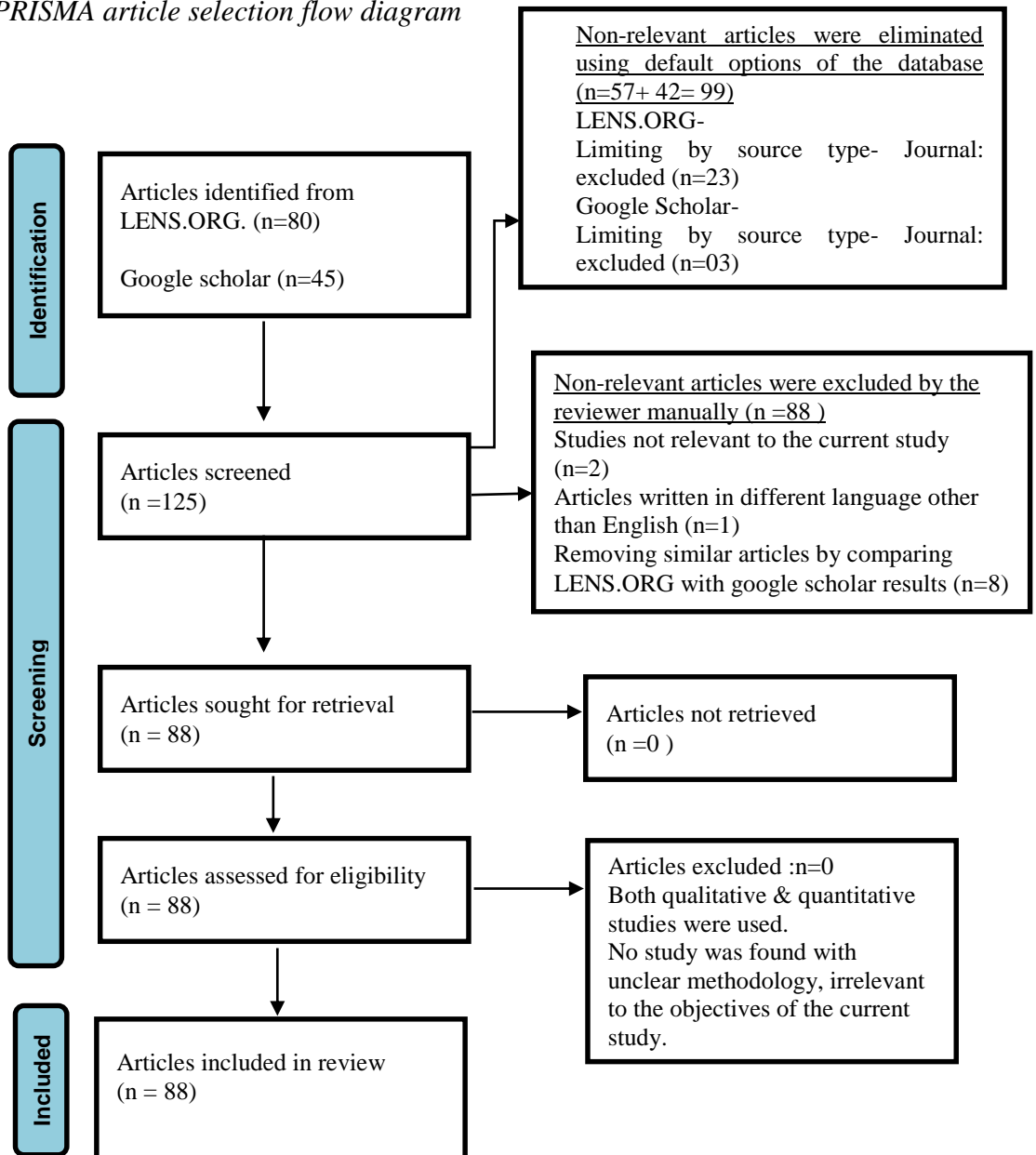
The initial search identified 80 publications from LENS.ORG and 45 publications from Google Scholar. According to the PRISMA (2020) flow diagram, the articles identified should be screened based on inclusion/exclusion criteria. The inclusion criteria for screening the publications were empirical studies published in English in Journals relating to artificial intelligence and library services from 2002 to 30 April 2024. Though the application of AI tools in library services has seen significant development and adoption over the past two decades, only 01 research paper was found from LENS.ORG & Google Scholar before 2002. Therefore, articles published during 2002 to present (30 April 2024) were considered for the study.

Screening was performed through the default options of LENS.ORG and Google Scholar, and manually. The articles that met the inclusion criteria “empirical studies” published in “English” in “Journals” from 2002 to 30 April 2024 were extracted using the default options of LENS.ORG and Google Scholar. The other types of publications such as books, book chapters, research notes, book reviews, conference papers unpublished data, etc., non-English articles were excluded using default options of LENS.ORG and Google Scholar. Duplicate records identified by comparing results from both databases were excluded manually. This resulted in 88 publications for the eligibility assessment. The eligibility assessments were conducted manually by the authors. Both qualitative and quantitative studies were taken for the present study. No article was found with unclear methodology and irrelevant

to the objectives of the current study. Therefore, all 88 articles were included for data extraction and review.

Figure 1

PRISMA article selection flow diagram



Methods of analysis

The method of data analysis for the research was bibliometric analysis which was employed using two software programs: Biblioshiny and VOSviewer. Biblioshiny of R package was used for evaluating the data extracted from the LENS.ORG scholarly database and generating metrics like annual scientific productions, average citations received, and identification of the most relevant source articles and sources. VOSviewer, a dedicated visualization software, was employed to create scientific maps. These maps visually represent the intellectual landscape of the research area. One map that can be developed from VOSviewer is a keyword co-occurrence network.

The keyword co-occurrence network map illustrates how frequently keywords appear together in the analyzed articles, providing insights into the most prominent research themes and their relationships. This map visually depicts the relationships between keywords based on how frequently they appear together within the articles analyzed in the area of investigation. Keywords that co-occur frequently are positioned closer together in the network, with the size and thickness of the connecting lines indicating the strength of the association. Prominent research themes represented by clusters of interconnected keywords can be identified by analyzing this map. This allows the present study to not only understand the core research areas but also explore potential emerging trends and knowledge gaps within the field of AI applications in library services. Therefore, a keyword co-occurrence network map was used to find the current knowledge of the application of AI tools in library services which was the first objective of the study.

Additionally, VOSviewer was used to generate a density visualization map based on the keyword co-occurrence analysis. This visualization helps in

identifying areas of high and low research activity separately and potential emerging trends within the field. This was used to achieve the second objective of the study: to investigate the areas where research studies are lacking in the application of AI tools in library services. According to [Van Eck & Waltman \(2023\)](#), each point in the density visualization map has a colour that indicates the density of items and by default, colours range from blue to green to yellow. The colour of a point closer to yellow indicates a large number of items in the neighborhood of a point and the higher its weight. The colour of a point closer to blue indicates the smaller the number of items in proximity to a point and the lower its weight.

Additionally, results on annual article publications, average citations received, and most relevant sources where articles published were generated by the Biblioshiny of R software.

Results and Discussion

Study Selection

Based on the PRISMA flow diagram, 88 articles published during the period from 2002 to 30th April 2024 in English were selected for the study after a rigorous screening process. Keywords used during the retrieval process of articles were “artificial intelligence”, “AI”, and “library services”. The important bibliographic details such as article title, abstract, keywords, author names, publication year, journal name, and number of citations of selected articles were extracted to an MS Excel sheet.

Study Characteristics

The study characteristics were assessed using Biblioshiny of R software, and only the articles extracted from LENS.ORG were analyzed since the Biblioshiny software doesn't support analyzing Google Scholar results.

Totally, the research study reviewed 88 articles published between 2002 and 30th April 2024. However, the analysis was done for 57 articles published across 35 different journals, which were extracted from LENS.ORG. A total of 57 articles were analyzed, and they had an average citation count of 5.614 per article, indicating a significant influence from AI-related studies to the field of library and information science. In total, there were 155 author-identified keywords and 594 references, providing a well-rounded picture of the research landscape. With contributions from 113 authors, the study appears to have incorporated a diverse range of perspectives. Overall information about the articles obtained from LENS.ORG was given in Table 01.

Table 1

Overall information of the articles obtained from Lens. Org

Description	Results
Timespan	2002:2024
Journals	35
Number of articles	57
Average citations per doc	5.614
References	594
Author's Keywords	155
Authors	113
journal articles	57

Figure 2 illustrates the annual scientific production of articles, created by Biblioshiny for 57 articles extracted from LENS.ORG. It indicates that fewer articles were published on AI and libraries between 2003 and 2019. But the number of articles published increased significantly from 2020 to 2024. The highest number of 26 articles have been published in 2023. Furthermore, a few more articles (14) were published in 2024 as the SLR was focused until 30 April 2024.

Figure 2

Annual article publications in Lens. Org

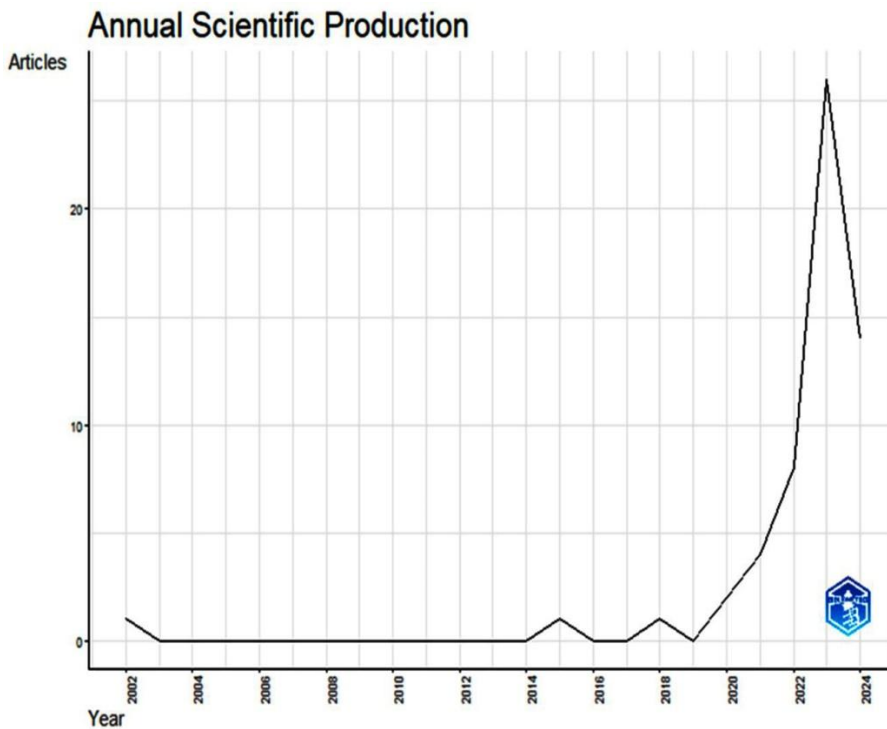


Figure 3 shows the average citations per article. The number of citations indicates the impact and significance of AI for the field of library and

information science. The figure indicates that the average number of citations per year has fluctuated over time, showing an overall increasing trend.

Figure 3

Average citations per year for publications in Lens. Org

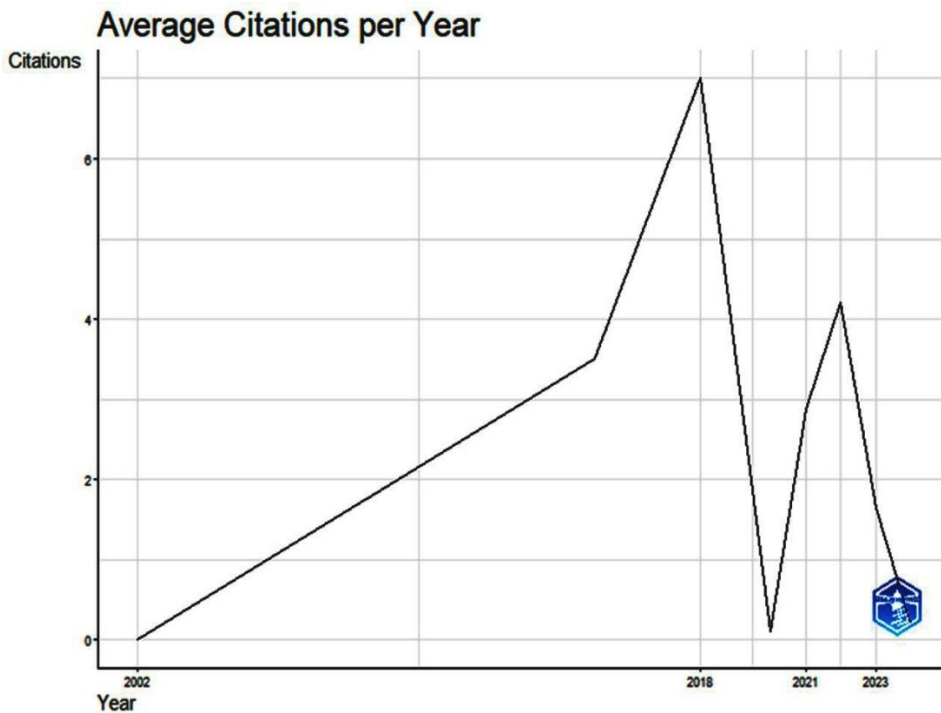
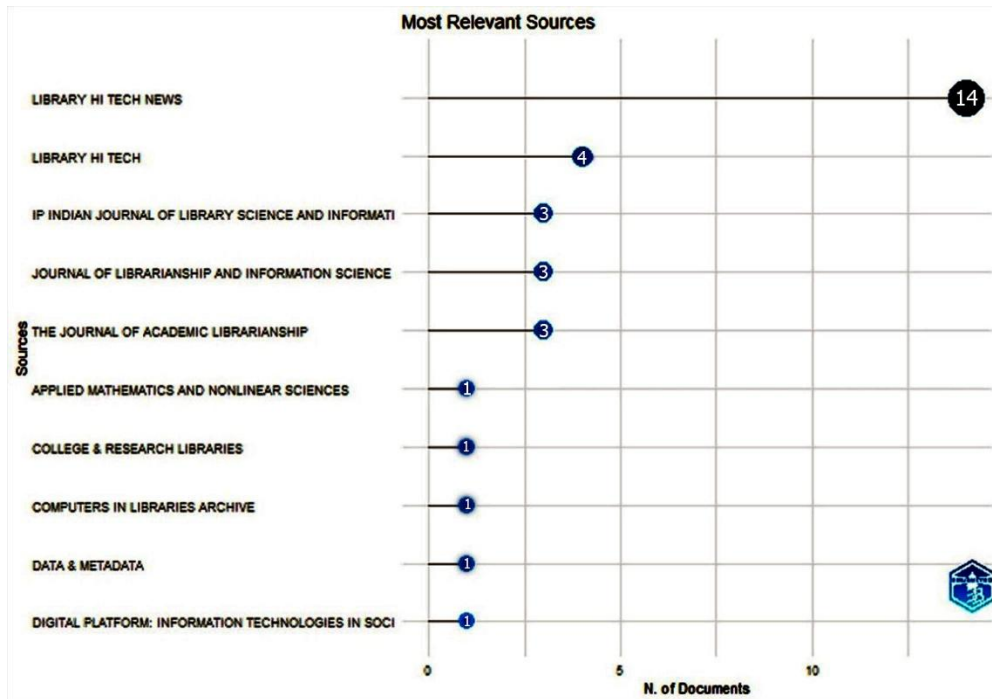


Figure 4 is a Biblioshiny visualization of the most relevant sources of the articles. It shows 10 journals that have published the highest number of articles. The journal of Library Hi Tech News is recognized as the top and most relevant source where 14 articles have been published. Only five sources were identified where 3 or more than 3 articles were published. These 05 source journals were Library hi tech news, Library hi tech, IP Indian Journal of Library Science and Information Technology, Journal of Librarianship and Information Science, and The Journal of Academic Librarianship.

Figure 4

Source journals of articles of Lens. Org



Results of the Study aligning with the objectives

This section explains the findings of the study in relation to the research objectives. The data extracted from both LENS.ORG and Google Scholar were used for the analysis. The findings were obtained using VOSviewer software through keyword co-occurrence analysis. Keywords network visualization and density visualization were mainly used in achieving 02 research objectives. The keyword co-occurrence network visualization was used to address the 1st research objective i.e. to find the current state of knowledge regarding the application of AI for library services. The keyword co-occurrence density visualization addressed the second objective i.e. to investigate the research gaps in the application of AI for library services.

Current knowledge of the application of AI for library services

The keyword co-occurrence network visualization developed by the VOSviewer software was used. The frequency of occurrence and co-occurrence of keywords indicate the areas where investigations were frequently conducted. Therefore, a higher occurrence of a specific keyword is considered an area frequently investigated.

Accordingly, Table 2 lists how many times each keyword appears across the articles. The left column, "Minimum keywords occurrences," indicates the threshold for counting a keyword. The right column, "Threshold keywords level," indicates the number of articles containing keywords that meet the respective minimum occurrence threshold in the left column. Therefore, according to Table 2, 228 keywords appear at least once in the articles. There are 55 keywords with two-time occurrences and only 17 keywords occurred 4 times. This suggests that some keywords are more common than others, with a higher number appearing only once in the articles, while a smaller number of keywords appear multiple times. 17 keywords that appear in a minimum of 04 articles were selected for further review.

Table 2

Occurrence of keywords in articles

Minimum keywords occurrences	Threshold keywords level
1	228
2	55
3	25
4	17

Table 3 depicts 17 keywords and the number of times each keyword appeared in articles. According to the table, "Artificial intelligence" stands out as the most frequent term, appearing 50 times in articles. Other prominent

keywords include "Library services" (16 times), "Academic libraries" (13 times), and "Machine learning" (10 times). These terms suggest a focus on the intersection of technology and libraries, particularly in the context of artificial intelligence and machine learning. The table also reveals interest in specific technologies like "RFID" (Radio-Frequency Identification) and "Chatgpt". Overall, table 3 provides an overview of the key themes and areas of interest within the analyzed articles.

Table 3

Keywords with a minimum of 04 occurrences in articles

Keyword	No. of occurrences
Artificial intelligence	50
Library services	16
Academic libraries	13
Machine learning	10
Robotics	5
Nigeria	5
Technology	7
Library	7
RFID	6
Smart libraries	4
Developing countries	4
Librarians	5
Libraries	8
Natural Language processing	6
Education	4
Library Science	4
Chatgpt	4

Figure 5 illustrates a keywords co-occurrence network visualization created using VOSviewer. It visually represents how frequently certain keywords appear together across a set of articles. Circles represent keywords, and their size indicates how often a particular keyword appears in the

documents. Lines connect circles (keywords) that co-occur frequently, meaning they appear together in the same articles. The thickness of the line indicates the strength of the co-occurrence association. Thicker lines suggest stronger connections between keywords. Accordingly, in Figure 5, “artificial intelligence”, “library services”, and “academic libraries” are denoted in larger circles, representing the most frequent keyword. The remaining keywords are represented in circles depending on the frequency of their occurrences. The circles in the map are visualized in three red, green, and blue clusters. The keywords that appear close together in a cluster suggest that they are frequently discussed together in articles. Therefore, 03 clusters red, green, and blue represent 03 common themes in relation to the application of AI in libraries. These three themes are given in Table 4, which are 1). Application of AI for libraries and challenges need to be addressed 2). Integration of AI Technologies in Academic Libraries 3). Different AI Tools that can be used in library service delivery, are explained in detail as follows.

Figure 5

Keyword co-occurrence network visualization. Note: total keywords-228, total keywords more than 4 occurrences-17, clusters-3

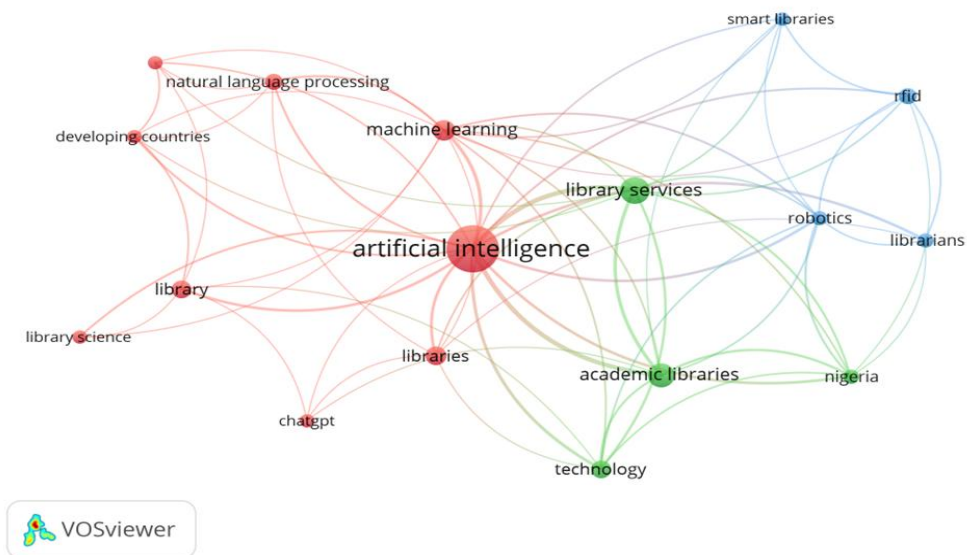


Table 4

Keywords categorized into clusters

Cluster	Common theme	Keywords
Cluster 01 (09 items, Red cluster)	Application of AI for libraries and challenges need to be addressed	Artificial Intelligence, ChatGPT, Developing Countries, Education, Libraries, Library, Library Science, Machine Learning, Natural Language Processing
Cluster 02 (04 items, Green cluster)	Integration of AI Technologies in Academic Libraries	Academic Libraries, Library Services, Nigeria, Technology
Cluster 3 (04 items, Blue cluster)	Different AI Tools that can be used in library service delivery	Librarians, RFID, Robotics, Smart Libraries

Cluster 01: Application of AI for libraries and challenges need to be addressed

[Manjunatha \(2023\)](#) stated that there is a substantial association between AI and libraries. The application and utilization of AI in libraries have become widespread ([Alala et al., 2024](#)). A study done by [Eiriemiokhale & Sulyman \(2023\)](#) discovered that librarians in university libraries in Kwara State, Nigeria perceived that AI is beneficial as it provides patron-tailored recommendations to items, reduces manual and repetitive tasks performed by librarians and facilitates the discovery of new knowledge. Among different AI tools, [Khan et al. \(2023\)](#) recognized ChatGPT as a conversational AI system that can provide quick answers to user’s queries, Perplexity as a language model that can assist tasks such as cataloguing and content classification and

iAsk.Ai (natural language processing system) that can assist with research and reference inquiries. Regarding ChatGPT, [Zakaria & Sani \(2024\)](#) presented different themes such as information retrieval, reference assistance, language support, user engagement, personalization, information literacy, collection development, and cataloging and classification where libraries can get use of artificial intelligence (AI), specifically ChatGPT.

[Alala et al.](#) in 2024 mentioned that technologies such as expert systems designed for reference services, book reading and shelf-reading robots, and virtual reality for immersive learning are prominent in libraries among other applications. Libraries use artificial intelligence and machine learning to enhance and automate various library operations and strengthen user services through effective search and discovery, personalized recommendations, automated cataloguing, and virtual assistance ([Jain, 2023](#); [Mahmud, 2024](#)). AI chatbots are a good solution for libraries to implement a virtual assistance service to fulfill user needs 24/7 with minimal or without human intervention ([Nawaz & Saldeen, 2020](#); [Panda & Chakravarty, 2022](#)). [Oyelude \(2021\)](#) presented a different set of areas where AI can be applied to enhance library services such as content indexing, document matching, content mapping, and content summarization. As another different application, [Semeler et al.](#) in 2024 highlighted the ability of creating Python code with AI which can help data librarians work more efficiently with various types of data sources. [Isiaka \(2023\)](#) discovered that AI cataloguing, AI classification, AI indexing, information retrieval tools, and robotics referencing as the purpose applications of AI for service delivery in libraries. [Ali et al. \(2024\)](#) presented that natural language processing, voice searching, and chatbots are the most familiar and popular tools currently used in university libraries in Pakistan. [Stafford \(2021\)](#) suggested chatbots, text mining, and automatic metadata generation as possible ways to improve the efficiency of library services

through AI. According to [Sudhakara & Naik \(2023\)](#), AI and machine learning play a significant role in digitization efforts, automating the process of digitizing and archiving historical documents and rare collections. [Akinola \(2023\)](#) recognized various AI tools such as natural language recognition, robotics, big data, and machine learning to improve library operations and services.

The above findings indicate the different areas where AI is applied by libraries in automating library operations and providing enhanced library services. However, some studies have identified the challenges that need to be addressed to ensure its effective and ethical use. Therefore the challenges that the libraries face in utilizing AI technologies include inadequate technology infrastructure ([Barsha & Munshi, 2023](#); [Mahmud, 2024](#)), funding limitations ([Alam et al., 2024](#); [Bello & Abdulsalam, 2023](#); [Jha, 2023](#); [Mahmud, 2024](#)), high costs ([Akinola, 2023](#); [Barsha & Munshi, 2023](#)), shortage of AI-skilled expertise ([Alam et al., 2024](#); [Bello & Abdulsalam 2023](#); [Barsha & Munshi, 2023](#); [Isiaka, 2023](#); [Mahmud, 2024](#)), lack of technical skills by library staff ([Isiaka, 2023](#); [Jha, 2023](#)), data privacy risks and concerns ([Akinola, 2023](#); [Balasubramanian & Tamilselvan, 2023](#); [Barsha & Munshi, 2023](#); [Mahmud, 2024](#)), potential biases ([Mahmud, 2024](#)), staff resistance to change ([Akinola, 2023](#); [Alam et al., 2024](#)), attitudes of librarians ([Jha, 2023](#)), poor network connectivity ([Akinola, 2023](#)), erratic power supply ([Bello & Abdulsalam 2023](#)), ethical implications ([Akinola, 2023](#)). Therefore, it is important to address these challenges in offering AI-driven services for library users.

Cluster 02: Integration of AI Technologies in Academic Libraries

Academic libraries integrate AI technologies into library services and operations to enhance their efficiency and effectiveness. Utilization of these technologies in academic libraries makes them adapt to the changing

technological landscape while meeting the main aim of any library which is meeting the needs of library users. Clark & Lischer-Katz (2023) mentioned that a rapid increase in the application of AI, immersive technologies (XR), big data, and other technologies to library services has been observed since 2015. Though academic libraries offer a range of traditional library services to support the academic and research needs of students, faculty, and researchers, AI-powered library services transform the way of accessing and utilizing information resources by students and researchers (Jain, 2023). Amzat & Adewojo (2023) stated that the application of AI and the metaverse in academic libraries provides opportunities for personalized learning experiences, efficient resource management, and global collaboration. Lo (2023) concluded that academic libraries should focus on taking a proactive approach to AI, ensuring its effective, ethical, and responsible use in library services and operations.

Cluster 03: Different AI Tools that can be used in library service delivery

The literature presented different AI tools that can be used in delivering quality library service and enhancing library operations. Oyetola et al. (2023) recommended that academic libraries should utilize AI technologies like chatbots, barcodes, RFIDs, and robots in quality service delivery and libraries should take the benefits of artificial intelligence in reconnecting library's remote users and thereby re-establishing their relevance among the user community. Asim et al. (2023) identified text-to-speech and speech-to-text technologies, Google Assistant to search by voice command, Radio Frequency Identification (RFID) system for self-checkout, check-in, and security purposes, and intelligent data analysis for collection management as the commonly using AI-based library services in university libraries of Pakistan. Abba (2024) found that AI technologies such as Chatbot, ChatGPT,

LibKey from ThirdIron, robots, RFID technology, and Grammarly were some popular tools used by university libraries in Africa. Ali et al. (2021) discovered facial recognition, RFID, self-check-in checkout out, and pattern recognition i.e, Thumb Impression, QR code and Barcodes, data visualization lab, and AI-based discovery search interfaces were popular among different types of libraries in Pakistan. Ali et al. in 2024 recognized natural language processing, voice searching, and chatbots as the most popular tools while robotics technology is a rarely used AI-based tool in university libraries in Pakistan. Oyetola et al (2023) recommended that academic libraries in Nigeria should utilize AI technology such as chatbots, barcodes, RFIDs, and robotics to provide effective services to their library users.

Research gaps in the application of artificial intelligence (AI) for library services

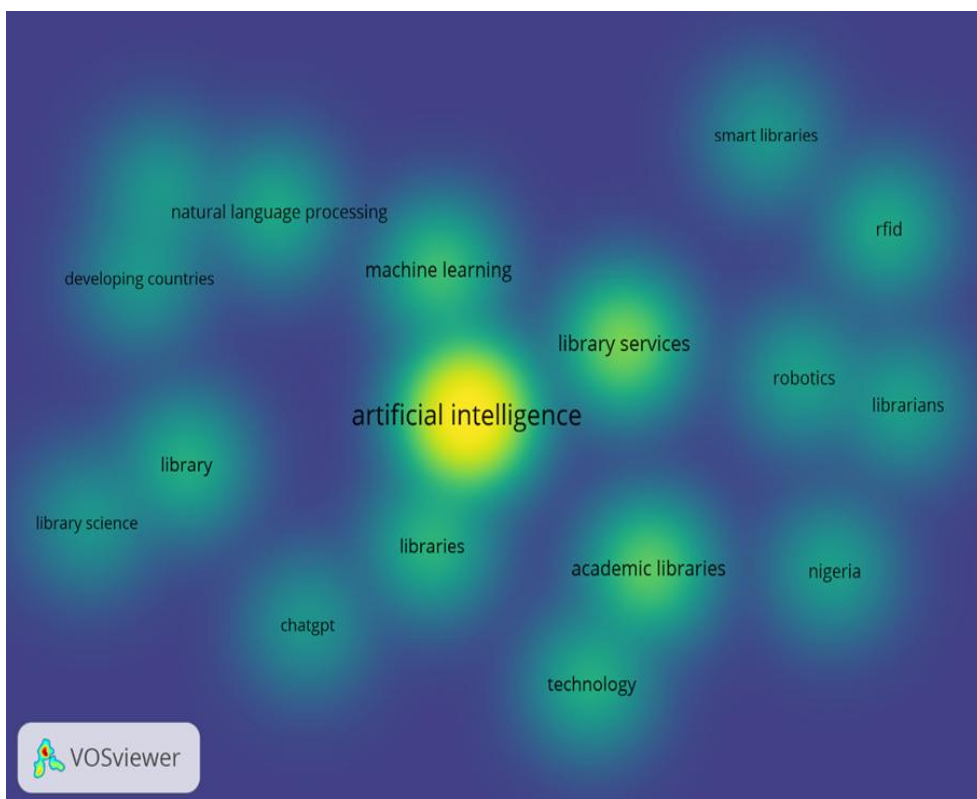
The results relevant to the 2nd research objective of the study are given next. Figure 6 is the density visualization map of keywords related to artificial intelligence and libraries, created by VOSviewer. The density visualization map shows a yellow background at the center. According to the VOSviewer manual, yellow nodes indicate sufficient research for established knowledge. However, keyword nodes with green to blue backgrounds indicate that there were fewer studies on those keywords. Thus, keyword points with a green background indicate insufficient research. Therefore, different AI tools for library service delivery, smart libraries, and natural language processing could be recognized as areas where empirical studies are lacking.

Additionally, keywords that occur a minimum of 3 times and less than that were used in identifying areas where potential gaps in the research studies. Based on that, AI-powered chatbots, ethical considerations of AI, education

and personalized learning, digital library, and Distributed Artificial Intelligence, AI for participatory library service, the future of libraries in the age of AI, and AI Literacy were identified as areas with an insufficient level of research studies.

Figure 6

Density visualization map of keywords



Conclusion

Most libraries tend to integrate AI technologies into library services and operations resulting in a transition from the traditional library services to AI-powered library services. AI has great potential to enhance library services and operations by improving efficiency, personalizing services, and providing

better access to resources. The present study followed the SLR methodology to discover (1) the current state of knowledge regarding the application of artificial intelligence (AI) for library services, and (2) the research gaps in the application of artificial intelligence (AI) for library services. Based on the inclusion and exclusion criteria, the study reviewed 88 articles published during the period from 2002 to 30th April 2024. LENS.ORG and Google Scholar were used in retrieving articles relevant to the study, and PRISMA guidelines were applied for selecting articles and reporting the findings.

Based on the literature, the study discovered that most of the research studies on the application of AI for libraries were focused on presenting different library services and operations where AI can be utilized to enhance the effectiveness and efficiency of service delivery and challenges faced by libraries in using AI. Virtual assistance service to fulfill user needs 24/7 with minimal or without human intervention, book reading and shelf-reading robots, virtual reality for immersive learning, effective search and discovery, personalized recommendations, document matching, content mapping, content summarization, working more efficiently with various types of data sources, AI cataloguing, AI classification, AI indexing, information retrieval tools, robotics referencing, natural language processing, voice searching, text mining, automatic metadata generation, automating the process of digitizing, archiving historical documents and rare collections, big data analysis, supporting remote library services, efficient administration of library resources, enhancing information accessibility for differently abled users, and futuristic collection development are recognized as different library services and operations where AI is applied. However, some studies have identified the challenges that need to be addressed in utilizing AI technologies. The challenges are inadequate technology infrastructure, funding limitations, high costs, shortage of AI-skilled expertise, lack of technical skills by library staff,

data privacy risks and concerns, potential biases, staff resistance to change, attitudes of librarians, poor network connectivity, erratic power supply, and ethical implications. It is important to address these challenges to ensure the effective and ethical use of AI during library service delivery. The literature presented some tools that can be used for the effective delivery of library services which include chatbots, barcodes, RFIDs, robots, text-to-speech and speech-to-text technologies, Google Assistant to search by voice command, Radio Frequency Identification (RFID) system for self-checkout, check-in, and security purposes, intelligent data analysis for collection management, ChatGPT, LibKey from ThirdIron, Grammarly, facial recognition, QR code, Barcode, data visualization lab, AI-based discovery search interface natural language processing, voice searching tools.

The study recognized different AI tools for library service delivery, smart libraries, natural language processing, AI-powered Chatbot, ethical considerations of AI, education and personalized learning, digital library and Distributed Artificial Intelligence, AI for participatory library service, future of libraries in the age of AI, and AI Literacy as areas with insufficient level of research studies. The findings encourage to leverage more AI tools and areas where AI can be applied to enhance the efficiency of library service delivery.

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Massive Open Online Courses (MOOCs) as Catalysts of Educational Transformation in the Higher Education Sector of Sri Lanka: A Systematic Literature Review

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Abstract

This systematic literature review evaluates the transformative effects of Massive Open Online Courses (MOOCs) in Sri Lanka's higher education and library services. It explores how MOOCs democratize education by broadening access to previously costly and limited educational infrastructure and integrating them into library practices for enhanced access and professional development. The review synthesizes various sources to assess MOOC utilization, challenges like low completion rates, inconsistent quality, and digital divides. Strategic improvements are proposed to align MOOCs with educational and socio-economic goals in Sri Lanka. The findings highlight MOOCs' current uses, barriers, and potential as supplements to traditional education, aiming to optimize learning outcomes and support educational transformation in both academic and library environments.

Keywords: Massive Open Online Courses (MOOCs), Higher Education, Educational Transformation, Systematic Literature Review

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Introduction

Massive Open Online Courses (MOOCs) are a significant disruptor in the digital education world, which aims to provide online courses to unlimited participants at very little to no cost. (Baturay, 2015). As such, MOOCs were born out of a) a need for access to flexible and scalable learning experiences and b) a realization that the Internet could be used to reach global audiences with educational content. (Flynn, 2013). They are an exemplary case of disruptive innovation, redefining traditional educational models by making high-quality education accessible to everyone. MOOCs have many advantages; for example, they offer educational resources to the economically underprivileged, increase accessibility to admitting institutions without the need for physical presence, provide the opportunity to learn at one's own pace and engage with diversified learners. (Clarke, 2013). In addition, MOOCs also promote lifelong learning, enabling all of us to develop and build on new skills and knowledge endlessly.

MOOCs have profoundly changed higher education by providing colleges and universities with ways to extend their reach and increase the depth and breadth of educational programs (Alhazzani, 2020). For instance, in higher education, MOOCs may complement traditional classroom experiences or even replace specific courses (Hollands & Tirthali, 2015). They offer a channel for universities to demonstrate their talent and reach an international audience. This widens the student base and makes the learning experience more informative due to various perspectives and interactions. Yonkin further echoes Professor Flynn (2013), highlighting MOOCs as a means to democratize education by

making courses of the highest standard from top universities available to anyone with Internet access ([Flynn, 2013](#)).

Academically rigorous MOOCs will likely be instrumental in sparking revolutionary changes in education as they drive innovation, help alleviate systemic issues, and bridge the gap between education and entrepreneurship. ([Beltrán Hernández De Galindo et al., 2019](#)). They point to a trend towards more individualized, learner-centred learning paths where learners can customize their educational journeys to fit their interests and career options. ([Ahmad et al., 2022](#)). MOOCs create the most potent online education system to help learners in the third world and developing countries with no or minimal access to education. ([Liyanagunawardena, 2015](#)). In addition, MOOCs encourage lifelong learning, allowing educators and working professionals to keep up to date with the latest developments in their field. Due to their technology and versatility, MOOCs are increasingly essential for educational institutions to address diversified learning needs and the rapidly changing digital education landscape.

With all their promise, MOOCs face several hurdles to becoming more effective. One of the critical problems is high drop-out rates, where many students still need to complete the course ([Annabi & Wilkins, 2016](#)). There are various reasons for this, but they all stem from a lack of motivation, little support, and how hard self-paced learning is. Courses are also plagued by worries about whether MOOCs offer high-quality educational experiences, as some deliver a different academic rigour and quality than others ([Conole, 2015](#)). The split between those with and without digital opportunities and digital cohesion is one of the most

significant hurdles, especially in many developing countries with limited internet access or access to technology. These issues must be addressed through a multi-pronged approach that includes better course design, more robust learner support mechanisms, and the provision of more equal access to digital resources as digital divides widen. This will only effectively unblock the promise of MOOCs to democratize high-quality education. Massive open online courses (MOOCs) are a widely known open education approach that enables learners to access many non-levying or less paid courses worldwide ([Jemni et al., 2017](#)).

Research background

MOOCs, dating back to 2000, function as an innovative educational process enriched with digital technologies to connect today's academia internationally ([Baturay, 2015](#)). One way MOOCs can be identified as a prominent portion of OER is that they provide complete course modules, the entire curriculum, related reference materials, teaching materials, feedback and evaluation and further discussion forums to actively engage learners and educators. ([Alhazzani, 2020](#)). This is done through continuous assessments, projects, assignments, certification awarding, encouraging learners and keeping them in touch throughout the course. However, the beauty behind MOOCs is that they are provided at a lower cost or free of charge for anyone across the world. The only requirement is having connected to the internet at any time anywhere in this world. ([Hollands & Tirthali, 2015](#)).

Intellectual progress, innovation and socio-economic development are expected through higher education. This includes colleges and universities, technical colleges, and professional institutions providing

education opportunities beyond high school graduation. ([Galán et al., 2022](#)). Higher education is an essential component of the worldwide knowledge economy, involving further study at universities, colleges, and other educational institutions after high school. ([Neborsky et al., 2020](#)). This level of education generally includes undergraduate and postgraduate courses and vocational training. Our higher education programs, which lead to bachelor's or master's degrees or certificates, have been thoughtfully developed to develop extensive expertise, knowledge, and abilities throughout academic and professional domains. ([Vivek & Nanthagopan, 2023](#)).

The higher education system in Sri Lanka is engaged and increased by a long-standing tradition of higher education institutions providing an extensive selection of degree programs. Constraints include inadequate facilities, limited funds, and a failure to sustainably keep up with the increasing demand for higher education ([Ekanayake & Weerasinghe, 2020](#)). It utilizes MOOCs to enhance and update our higher education system as it adapts to changes in the educational environment. The Covid-19 pandemic has primarily driven the digitalization of the higher education sector ([Vivek & Nanthagopan, 2023](#)). Traditional in-person teaching had been expected throughout the pandemic, although several institutions moved to blended learning models after the worldwide outbreak. Based on the research Evaluation of Student Dropout Rate in Alternative Higher Education Sector of Sri Lanka: A Case Study, most Sri Lankan educational institutions successfully utilized online teaching ([Bandara et al., 2022](#)). The growing demand for high-quality education at each academic level has brought about significant changes in the educational system, highlighting the importance of enhancements in higher educational institutions in Sri

Lanka ([Lakshmi et al., 2023](#)). Public-private partnerships (PPP) in construction initiatives, particularly those related to higher education, have significance for economic benefits and innovation. Essential requirements for effective project execution in Sri Lanka have been discovered and identified ([Kandawinna N. et al., 2022](#)).

MOOCs are in Sri Lanka's higher education sector, primarily since the outbreak of the transition to E-Learning in universities. Gamage et al., 2023 concluded that 70.7% of undergraduates adopt E-Learning approaches ([Gamage et al., 2023](#)). Additionally, research suggests that MOOCs might successfully expand teacher education programs nationwide by improving online teaching capacities (Perera & Abeysekera, 2022). Open and distance learning (ODL) challenged traditional education in Sri Lanka. Employability improvement was a result of ODL ([Karunananda, 2007](#)). Establishing and popularizing MOOCs and e-learning in Sri Lanka was a burning necessary during the pandemic and crisis period ([Hettiarachchi et al., 2021](#)). MOOCs, as an answer to the insufficient infrastructure and increasing educational demands in Sri Lanka, can be developed to enrich the Sri Lankan higher education sector.

This study aims to provide insights to policymakers, academia, and educational organizations on the level of awareness and access of undergraduates to online learning opportunities by studying the factors driving the popularity of MOOCs and identifying ways of adapting MOOCs to be a part of the higher education system in Sri Lanka. ([Lazarus & Suryasen, 2022](#)).

Research Objectives

- Analyze the present deployment of MOOCs in the higher education sector globally.
- To identify barriers and opportunities in implementing MOOCs in Sri Lanka.
- To provide recommendations for harnessing MOOCs for educational transformation.
- To evaluate the impact of MOOCs on the LIS profession and how they can be integrated into library services and practices.

Research Questions

- How are Massive Open Online Courses (MOOCs) now being implemented in the higher education sector in Sri Lanka?
- What are the difficulties and advantages linked to the execution of MOOCs?
- How might MOOCs improve the quality and accessibility of higher education?
- How can MOOCs be utilized within library settings to enhance professional development and user engagement?

This study is expected to provide significant insights into the transformative potential of MOOCs in Sri Lanka. The research intends to identify effective techniques for implementing MOOCs in higher education by examining the latest research. That will assist in overcoming challenges while providing new opportunities for learners nationwide.

Materials and Methods

This article presents the findings from a systematic literature review study complying with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement and its associated procedures. ([Stracke & Trisolini, 2021](#)).

Systematic literature reviews and meta-analyses continue to gain prominence and utility in the educational field, mainly due to frequent inadequacies in validating and reviewing studies within academic research. These reviews maintain a rigorous and responsible methodology for searching, selecting, and critically analyzing relevant studies. They aim to encapsulate the existing state of research on a specific topic through meticulously pre-planned and documented methods within a review protocol. Such reviews are based on a thorough evidence analysis derived from a careful evaluation of the available literature based on uniform criteria. Conducting a systematic review requires mastery over a sophisticated work methodology, explicitly involving a well-structured process that clearly defines the review question and outlines the procedures for locating, evaluating, selecting, and synthesizing studies. The methods outlined in the PRISMA statement were followed to ensure adherence to these rigorous standards ([Stracke & Trisolini, 2021](#)).

Systematic Review Process: The Methodology in the PRISMA Statement

The methodology of the PRISMA Statement includes a 27-item checklist covering aspects such as methods, results, discussion, and funding, along with a four-phase study flow diagram that addresses record

identification and screening, study eligibility, and studies included. Adherence was maintained to all 27 items on the PRISMA checklist. (Stracke & Trisolini, 2021).

The review encompasses literature published from January 2013 to January 2024. The scope was deliberately limited to the most recent eleven years to manage the volume of studies included, and previous systematic reviews on the educational transformation of MOOCs covered the period up to 2013. Recent systematic literature reviews on MOOCs have yet to specifically address the topic of Massive Open Online Courses (MOOCs) as Catalysts for Educational Transformation in the Higher Education Sector in Sri Lanka.

Before the initial screening, two inclusion criteria were established based on formal aspects: firstly, studies had to be published in English, and secondly, they were required to be published in journals or peer-reviewed proceedings of scientific conferences. Additionally, a protocol for checking duplicates using EndNote was implemented before the screening. The abstracts of the studies that passed this initial check were then analyzed in a second screening to evaluate their eligibility based on their relevance and relation to the research question. The exclusion criterion for this phase was relevance, specifically questioning, "Does this study have any relevance to the research question?" Due to the potential vagueness of this criterion, it was applied solely to eliminate studies that significantly diverged in topic or discipline. In cases of uncertainty, studies were not excluded but were retained for further full-text analysis. The final criterion for inclusion in this analysis was the availability of full texts. The studies meeting all these criteria were then subjected to quantitative and

qualitative synthesis. The outcomes of the quantitative analysis are detailed in the Results section, while the qualitative findings are discussed in the Discussion section.

Systematic Review Process: The Realization of the PRISMA Statement Procedures

Following the procedures outlined in the PRISMA Statement, as depicted in the flow chart (see Figure 1), the initial phase involved record identification through searches conducted in Five electronic databases: Emerald, EBSCO host, Google Scholar, JSTOR, and Scopus.

Figure 1:

Selection of studies using PRISMA Procedure.

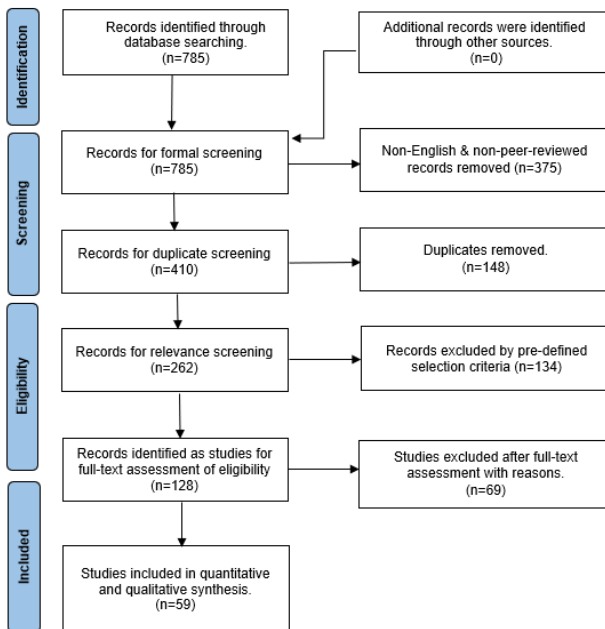


Figure 1 above presents the flow chart for the PRISMA Statement procedures and the results from the selection of studies for the systematic literature review following the PRISMA methodology. (Page et al., 2021).

Initially, the broad search term "Massive Open Online Course (MOOCs) AND Higher Education Sector" was tested in five databases, resulting in 2,114 records. Analyzing this large number of records within the given timeframe could have been more practical. Therefore, the search term was refined to "Massive Open Online Course (MOOCs) AND Higher Education Sector AND Educational Transformation," yielding 785 records. This number was deemed feasible for a systematic literature review. The amendment "AND Educational Transformation" was selected due to the primary interest in the educational aspects of MOOCs in higher education.

Methods of data collection

Starting with these 785 records, the pre-defined PRISMA Statement procedures were followed. Initially, non-English studies and non-peer-reviewed journal and scientific conference publications were screened out, reducing the number by 375 to 410 records. Then, 148 duplicates were removed, leaving 262 records. These remaining records were assessed for eligibility based on pre-defined selection criteria, analyzing their titles, keywords, and abstracts. This step eliminated 134 records, resulting in 128 records considered for full-text evaluation. Of these, full texts for 69 studies could not be obtained, leading to a final total of 59 selected studies.

The datasets of the systematic literature review are publicly available in the annexes to allow other researchers to re-use them and benefit from their collection and data.

Results

Research approaches

Following the selection process, 59 studies were incorporated into the quantitative and qualitative analysis for the systematic literature review, as outlined previously. This section details the findings.

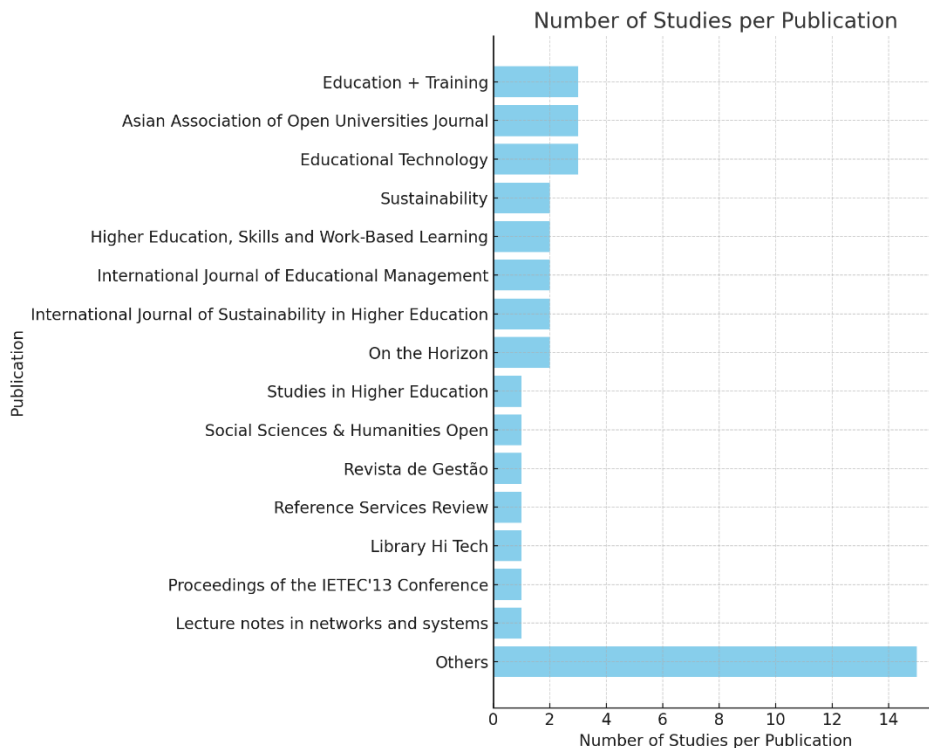
The 59 studies analyzed were published in a range of journals and proceedings. Three publications each contributed three studies: Education + Training (CLA13, OLS16, SEM15), Asian Association of Open Universities Journal (AHM17, AYO20, BOR20), and Educational Technology (MIL13, NGA15, TAE14). Additionally, six journals each provided two studies: Sustainability (STR21, AHM22), Higher Education, Skills and Work-Based Learning (HOS22, ROS17), International Journal of Educational Management (ANN16, GUP21), International Journal of Sustainability in Higher Education (CAN24, HUE22), On the Horizon (BJE14, SPE17), and again, Educational Technology featured MIL13 and TAE14.

The remaining 39 studies each originated from distinct publications. These include Studies in Higher Education (CAR21), Social Sciences & Humanities Open (HAB23), Revista de Gestão (DOS22), Reference Services Review (WUK13), Library Hi Tech (HUA16), Proceedings of the IETEC'13 Conference (KAM13), Lecture notes in

networks and systems (KOP23), and many others, totaling one study from each publication.

Figure 2:

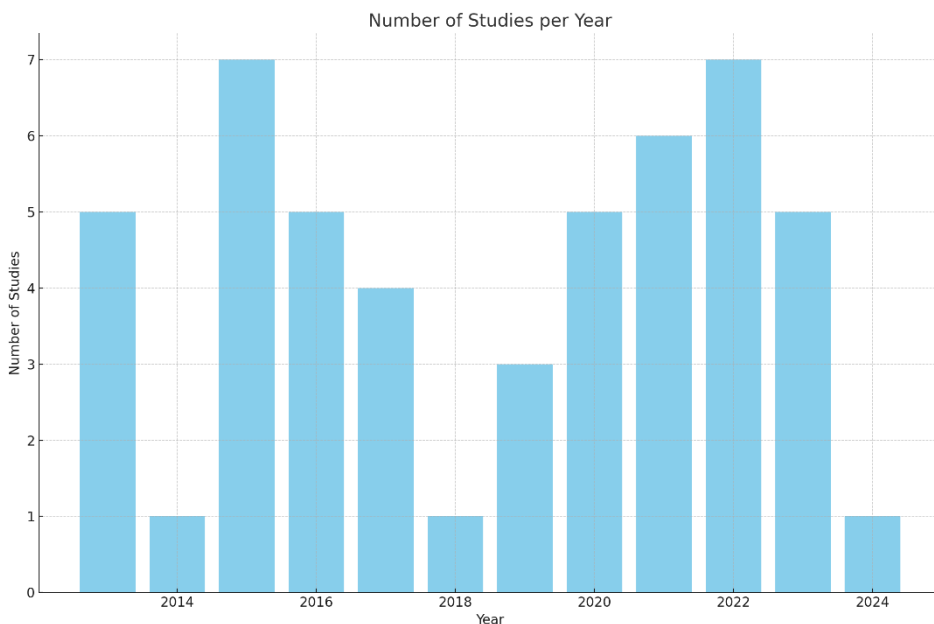
Number of studies per publication.



The temporal distribution of these studies spans from 2013 to 2024, with a specific count per year: five studies from 2013, one from 2014, seven from 2015, five from 2016, four from 2017, one from 2018, three from 2019, five from 2020, six from 2021, seven from 2022, five from 2023, and one from 2023. Over a decade, this timeline shows continuous interest and consistent contributions to research on the subject area.

Figure 3:

Number of studies per year.

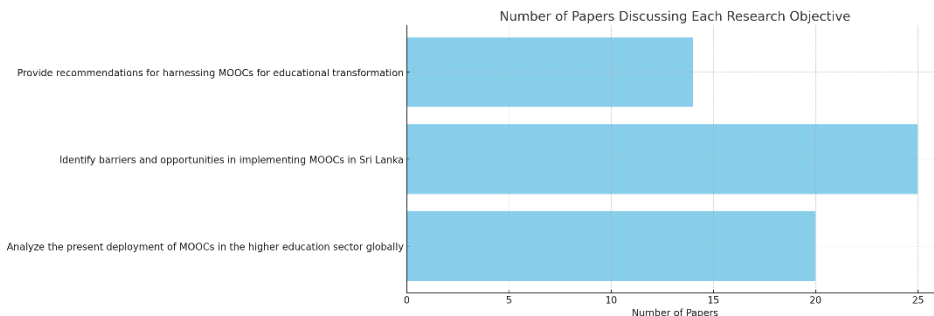


Number of papers discussing each research objective

There are many papers on the three research objectives of implementation and impact of MOOCs (Figure 4). The data indicates that the most common objective is to analyze the current deployment of MOOCs in the higher education sector worldwide (around 25 papers). Just under 25 papers were focused on barriers and opportunities in MOOC implementation in Sri Lanka. Over 20 papers deal finally with recommendatory trends on deploying MOOCs to trigger an educational transformation. This distribution focuses on global deployment and issues in Sri Lanka and, to a lesser extent, recommendations aimed at educational transformation through MOOCs.

Figure 4:

Number of papers discussing each research objective



The Role of MOOCs in Transforming Global Education

Massive open online courses have become the force that transforms global education, especially in countries like Sri Lanka, where severe educational disparities are still an issue. As a tool that provides opportunities to enhance academic quality and make learning more accessible and affordable, MOOCs blend perfectly into local education systems and offer a means of reacting to the increasing demands. The present paper is designed to explore the aspects of MOOC implementation in Sri Lanka, their uses as tools for bridging the gap between different groups of learners, facilitating lifelong learning and the process of gaining new skills, and facilitating a new social and technological education model. The problem is currently being addressed with the help of MOOCs that contribute to the substantial improvement of learning outcomes and the enhanced efficacy of the education process. The analysis conducted in

the paper reveals a range of implications for MOOCs about educational policy and strategic planning in Sri Lanka.

Bridging Educational Gaps: MOOCs and Lifelong Learning

The information shows that MOOCs are vital in addressing educational inequalities in Sri Lanka, especially in remote or underserved areas. They deliver much-needed remedial education, which is critical in helping students prepare for the demands of higher education. [Agasisti et al., \(2022\)](#) state that they provide students with extra coursework that is crucial in improving the foundational understanding that the learners have in different fields of study. It is important to note that access to more basic MOOCs prepares students well to succeed in the more demanding university academic programs even though the institutions do not offer them online. They are also essential pathways to broader curriculums, as highly reputable international universities design most courses. This means they enhance the student's learning opportunities while considerably improving the overall quality of education that the learners can access in Sri Lanka, especially in remote areas without traditional education.

Addressing Educational Inequalities in Remote Areas of Sri Lanka

The information given by [Raja & Kallarakal \(2021\)](#) supports that MOOCs are a significant advancement in addressing educational disparities. They add that education technology is changing the institutional level by democratizing access to quality education. MOOCs can also address educational disparities by giving learners many flexible learning options that may break geographical and economic access limitations, as noted by [Ayoub et al., \(2020\)](#). The conclusion is that, given the above information, MOOCs will play a vital role in creating equity in

learning by ensuring equal opportunities for all learners to take and pass higher education, regardless of where they are located or their economic status.

The Impact of MOOCs on Institutional and Educational Equity

Considering the needs, MOOCs are established as critical aspects of improving the quality of education due to their convenient and affordable learning measures. Ahmed et al., (2017) noted that MOOCs are a crucial enabler of continued learning and growth, strategies deemed essential to supporting the needs of current and future generations ([Ahmed et al., 2017](#)). Continued and easy access to convenient educational provisions allows individuals to remain aware of current trends and maintain up-to-date skills. Besides, it assists people in meeting their diverse academic needs, ensuring optimal quality. (Raja & Kallaragal, 2021).

MOOCs as Tools for Lifelong Learning and Professional Development

Moreover, the increased MOOC use contributes significantly to the accessibility of education, especially for individuals from far-off areas. According to Brown (2014), the cost-effectiveness linked to MOOC use and the freedom to choose one's working hours have become critical drivers of access to education ([Brown, 2014](#)). Therefore, as research shows, the advantage of flexibility that allows students to access materials at any time and attend classes at a place irrespective of any factor reimposes the traditional barriers like limited access to educated materials due to distance or financial constraints, which limits quality education access ([Agasisti et al., 2022](#)).

Blended Learning Models: Combining MOOCs with Traditional Education

In addition, MOOCs are also essential mechanisms for professional development and lifelong learning to accommodate changes in the job market and dynamics of the economy. According to Ayoub, Amin, and Wani (2020), MOOCs are linked to platforms such as SWAYAM and incorporate credit transfer systems, presenting the learner with a structured curriculum but with areas for personal customization and flexibility ([Ayoub et al., 2020](#)). Therefore, MOOCs are priceless toward lifelong professional development and skills playbook defined by market trends. ([Annabi & Wilkins, 2016](#)).

Advanced Educational Technologies and Digital Literacy in MOOCs

Thus, MOOCs have shown the possibility of improving the traditional purely face-to-face (f2f) system and developing an inclusive and flexible higher education system. Annabi & Wilkins 2016, state that combining MOOCs and conventional educational models allows for the development of blended learning models, uniting all the benefits of f2f and online education ([Annabi & Wilkins, 2016](#)). This suits all learning styles and needs, improves the quality of learning experiences, and makes it more available for students. ([Ahmed et al., 2017](#)).

Strategic Use of MOOCs for Sustainable Education Models

Moreover, MOOCs have adopted advanced educational technologies for interactive learning and enhanced digital literacy. According to Goglio and Bertolini (2021), MOOCs promote the best practices in the technology-enhanced learning process ([Goglio & Bertolini,](#)

2021). Interaction of students with advanced technologies creates an essential experience supporting a modern demand for critical skills in the digital age. ([Carannante et al., 2021](#)).

Eliminating Geographical and Financial Barriers to Education

Using MOOCs strategically increases the university's performance and helps advance sustainable education models. Gamage et al., 2023 suggests that MOOC research can inform policymakers' expectations in Sri Lanka and the strategic uses of MOOCs to ensure realistic implementation ([Gamage et al., 2023](#)). Such measures are vital for correlating the educational targets with the framework of national development and making education support society ([Nunez, 2017](#)).

Ensuring Educational Equity through MOOCs

At the same time, MOOCs are well suited to eliminate geographical and financial barriers to obtaining knowledge. Nunez (2017) said that focusing on affordability and open accessibility to good education might help democratize access. ([Nunez, 2017](#)). Therefore, the new way of giving away knowledge of good quality leads to the possibility that one may be able to afford a good education ([Knoedler, 2015](#)).

The Strategic Role of MOOCs in Enhancing Education in Sri Lanka

First of all, MOOCs have a significant influence in ensuring educational equity. It offers students the chance to take courses at various universities and access multiple resources from different universities around the globe. According [Al-Rahmi et al., \(2019\)](#) MOOCs have done

away with “the above geographical and monetary entry barriers,” contributing to fairer access to education. They believe that “education’s optimal opportunity” now exists because all learners have access to the best educational opportunities, regardless of where they reside and how much money they make. ([Knoedler, 2015](#)).

In summary, MOOCs present a strategic tool to address Sri Lanka's educational issues. They provide the required horizontal and vertical access, flexibility and affordability and can transform students and educators. MOOCs can fill the gaps in the formal education system in remote or poorly resourced locations and promote remedial education while enabling students to attend courses offered by other universities worldwide. Furthermore, it can increase the quality of education via CDP and equal the country's lifetime learning standards with the most advanced educational approaches. MOOCs democratize education, tearing down geographic and financial limitations and creating conditions for equitable educational experience. Finally, the strategic implementation of MOOCs can change the outcomes of all universities, make education policy changes, and build sustainable models; thus, they will reshape the education landscape of Sri Lanka.

Discussion

Bridging Educational Gaps

In addition, MOOCs have also proven to have a great potential to reduce educational inequalities in most rural and underserved areas of Sri Lanka. This transformative potential is demonstrated in its ability to provide both remedial and advanced courses online on one platform

accessible from anywhere, diminishing the geographical and logistical hindrances to accessing education. ([Agasisti et al., 2022](#)). More than just supplementing formal education, these course platforms increase access to people who are generally not well served, thus enhancing the inclusiveness and equity of the education offered across the country.

Enhancing Educational Quality

Therefore, the uncharted paths of these versatile and cost-effective MOOCs derive a flexible model of education that addresses multiple diverse students' requirements and contributes to better educational quality. Furthermore, MOOCs support a continuous education process that complements a lifetime career development due to the fast dynamics in the global labour market ([Ahmed et al., 2017](#)). Thus, implementing MOOCs expands educational establishments' capabilities in the method and form assortment, improving academic performance.

Increasing Accessibility

As a result, MOOCs have contributed dramatically to a broader spread of higher education in Sri Lanka. The opportunity to adapt the learning process to different life situations, the emphasis on distance and affordable access is beneficial for students of remote regions, which makes it possible for the quality of education for them to obtain the same quality of education as urban peers (Raja & Kallarakal, 2021). Thus, through digital platforms, higher education reduces its limitations from infrastructure.

Supporting Lifelong Learning and Professional Development

In conclusion, MOOCs' necessity in promoting lifelong learning and professional development cannot be ignored and is considered a prerequisite for sustainable economic growth. MOOCs promote an uncomplicated blending of on-the-job learning and professional development, enabling workers to continually acquire the skills necessary for the present and future labour market ([Ayoub et al., 2020](#)). The current skill development is necessary to promote and develop a strong, sturdy, and adaptable workforce capable of assisting states in attaining national and economic goals.

Integrating with Traditional Education

Combining MOOCs with conventional face-to-face (f2f) education has contributed to more inclusive and flexible higher education sector in Sri Lanka. Since different learners have preferred approaches to studying and learning, integrating online and face-to-face approaches has served these learner differences. Moreover, as research has increasingly established, learners who experience tailor-made learning from their educationists exhibit more student participation and improved learning outcomes ([Annabi & Wilkins, 2016](#)). Generally, the hybrid approach allows education providers to maximize resource utilization and increase product and service lines with minimal resource allocation.

Leveraging Technology for Educational Enhancement

Moreover, using advanced educational technologies in MOOCs presents many interactive and collaborative learning resources and tools that support student engagement and, most importantly, develop digital

literacy skills among learners. This manner, as proven by Raja and Kallarakal (2021), makes learning more engaging and efficient and allows a student to become better prepared for a workplace that has solid and numerous digital requirements (Raja & Kallarakal, 2021). Finally, the teacher who created a MOOC course has the capacity to update and expand existing offerings to guarantee that educational content is current and aligned with the latest academic and industrial trends.

Strategic and Policy Implications

The strategic effect of MOOC adoption is high, leading to policy implications at multiple levels—national policies and those developed by tertiary education providers. The knowledge and experience acquired from MOOC implementation will enable policymakers and tertiary education leadership in Sri Lanka to formulate a set of strategies that allow them to develop relevant education through digital means to level the field. ([Gamage et al., 2023](#)). These strategies will have to depend on both the technological and pedagogical sides of implementing digital but also the socio-economic repercussions of it.

Promoting Educational Equity

MOOCs are vital for educational equity to make quality education more accessible and affordable. Through courses that can be accessed from anywhere at any time, MOOCs level the playing field, especially for disadvantaged students. In this regard, the potential of MOOCs to bridge learning disparities and provide equitable classes is critical to the future of educational reform in the Sri Lankan context. ([Gamage et al., 2023](#)).

The current analysis presents a comprehensive overview of how MOOCs can transform higher education in Sri Lanka by linking the literature review findings to broader theoretical consequences. In this respect, it takes into consideration the existing practices. It presents some expectations for the future and policy ideas to ensure MOOCs will continue taking a prominent place in every educator's toolkit.

Relevance and Future Application

Over recent years, the relevance of Massive Open Online Courses (MOOCs) in many countries' higher education sectors, such as Sri Lanka, is growing, notably since there is an urgent need for fundamentally new educational models, which would be both democratizing and flexible. With the existing and widely reinforced challenges in the Sri Lankan educational infrastructure adapting to the exponentially growing need for higher education, MOOCs may represent an adequate compensatory measure. More specifically, the closely integrated use of MOOCs in the existing educational infrastructures could mean the transition to more scalable, flexible, and cost-effective vectors of educational system maintenance. Given the pandemic experience, when digital learning became not an alternative but an integral continuation of education, the above approach deserves attention.

In summary, looking to the future, the use of MOOCs in Sri Lanka is likely to continue and expand. As digital literacy rises and technological infrastructure develops, MOOCs are destined to be several of the vital building areas of higher education. This can involve using MOOCs to increase a wider variety of programs, such as vocational education and professional development while adjusting them to meet the needs of the

country's economy and the job market. Moreover, MOOCs' function in encouraging lifelong learning could expand to create a lifelong learning climate. This stimulating state of mind can help employees in all sectors of the world work more creatively and effectively.

All in all, MOOCs are a way forward to achieving social inclusivity. Disadvantaged people may use MOOCs for a high-quality education; hence, overhead costs, physical limitations, extreme poverty, and other factors might not impede learners from getting a proper education. MOOCs may thus be used to achieve community development in rural areas or remote locations as there are little to no education centres available in such locations; in fact, MOOCs would help by offering a broader range of topics and advanced programs.

From a policy standpoint, the anticipated use of MOOCs in Sri Lanka must be utilized via strategic plans developed by government bodies in collaboration with private businesses and educational establishments. Such practices ensure that MOOCs are aligned with broader educational objectives and economic goals, which helps to use available resources and educational technology more effectively.

Furthermore, new ways to deliver MOOCs, such as using artificial intelligence to offer a more personalized learning experience or augmented reality to improve practical learning, could revolutionize digital education. This would lead to greater interest and improved results for learners and position Sri Lanka as a major player in digital education within the region. Finally, continuous monitoring and enhancement of MOOC plans are essential for their success. Since educational priorities will shift in response to current events and new technologies, the capacity to respond

and the willingness to change will determine how effective MOOCs are in supporting Sri Lanka's educational reform.

Limitations

The limitations of the current research are essential to point out. To begin with, a meta-analysis of all 59 studies selected above proved impossible as they were not supported with appropriate and no effect sizes. Second, it was not feasible to use an alternative method, including comparing effect sizes with the help of the Standardized Index of Convergence (SIC) ([Bernstrøm & Houkes, 2018](#));([Wielenga-Meijer et al., 2010](#));([Stracke & Trisolini, 2021](#)). SIC has been proven beneficial in determining the findings from the studies examining the same relationships and does not require using compatible effect sizes. However, since a minimum of three studies for any sub-category based on effect sizes were not reported, it was impossible to utilize this method.

Moreover, the analysis of the importance of the study categories posed a limitation. Indeed, the number of studies per category formed research interest of now but not its actual importance. Finally, the defined research range is limited to the last eleven years (2013 - 2024) and particular search terms for databases could have omitted some crucial studies, limiting the intended coverage of the systematic review. Among other limitations, it is essential to notice that only English peer-reviewed papers were considered, thereby omitting the contributions published in different languages or presented via non-scientific channels.

Furthermore, the distribution of the 59 studies over four dimensions and multiple sub-categories also indicates the urgent need for

more comprehensive research on MOOC quality. To collect information on more under-represented dimensions, future systematic reviews may use more extensive search terms and restrict the selection to a single database. In such a way, it will be easier to track all included works and ensure all existing literature is analyzed.

Conclusions

Raja & Kallarakal 2021 and Agasisti et al. 2022 conducted a meticulous analysis that reviewed how MOOCs are currently being used in Sri Lankan higher educational institutions, to what extent they have been used or implemented, key barriers and opportunities, and how they can be utilized to transform education. The analysis found that most MOOC usage in Sri Lanka aimed to improve educational access and quality across demographically diverse groups of students, with the most vulnerable populations experiencing expansion and extension of educational opportunities. ([Raja & Kallarakal, 2021](#)); ([Agasisti et al., 2022](#)).

While discussing barriers, infrastructural insufficiencies, low digital literacy levels among the target population, and the necessity to reconfigure pedagogical processes shared the highest significance ([Gamage et al., 2023](#)). Meanwhile, MOOCs' opportunities are based on the ability to accompany a person throughout their life, develop professionally in the environment of the general education system, and form an environment of continuous and flexible education: "Lifelong learning can address these concerns and offer workers the training opportunities they need to have careers in new high-growth fields." ([Ayoub et al., 2020](#)).

The conclusion drawn from addressing the general research objectives and questions highlights that the predominant use of MOOCs in the Sri Lankan higher education sector primarily serves as an alternative means of accessing education. In scenarios such as these, MOOCs in Sri Lanka help to surmount access barriers, particularly those presented by geographical and financial constraints. Reflecting global trends in educational resource availability, MOOCs play a pivotal role in advancing the agenda to democratize access to new educational opportunities by opening educational resources more broadly. Upon addressing the study's questions, it is evident that the incorporation of MOOCs not only yields substantial benefits in both application and financial terms, notably through cost reductions, but also emphasizes the need for their usage to align with the strategic objectives of educational policy at the national level. ([Annabi & Wilkins, 2016](#)).

Moreover, the potential for MOOCs to revolutionize the LIS profession is significant, emphasizing their integration into library services and practices. This integration could enhance professional development and user engagement, fostering an environment of continuous learning and accessibility.

In conclusion, the recommendations derived from this research call for a multi-stakeholder perspective centered on the government, the institutions of learning, and the private sector to formulate cohesive strategies that optimize MOOCs. Some strategies developed include investment in technological advancement, improvement of digital literacy projects, and creating guidelines to see MOOCs accredited and contained within the formal education systems ([Gamage et al., 2023](#)).

To conclude, MOOCs have the transformative capacity for Sri Lanka's higher education, which can revolutionize the quality and availability of education within the country. For MOOCs to support education transformation, an integrated approach is required, including policy-making, infrastructure development, and collaboration with stakeholders. Further research may explore how MOOCs can be embedded into the existing educational systems and the long-term effects of such embedding on the quality of education and employment opportunities.

Data Sharing Statement:

The data supporting the results of this systematic literature review are included within the paper and are supplemental.

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Bibliotherapy: Tracing Its Global Evolution and Exploring the Contemporary Research Landscape in Sri Lanka

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Abstract

Bibliotherapy, the use of literature for therapeutic purposes, has gained increasing attention globally as a complementary approach to mental well-being. Bibliotherapy is a form of creative arts therapy that involves telling stories or reading specific texts and implementing personal connections to the content of books as a therapy. Mainly, there are two types of bibliotherapy as clinical bibliotherapy and developmental bibliotherapy. Clinical bibliotherapy is employed by mental health professionals to address emotional-behavioral problems and achieve therapeutic goals. Developmental bibliotherapy, used by educators, librarians and healthcare assistants and it facilitates to address milder psychological issues. The idea of bibliotherapy is not a new one and it has undergone a dynamic evolution. At early stages, bibliotherapy is developed as ‘reading therapy’. There are various anecdotes scattered throughout the ages that concerning the value of reading. It has been around for centuries, and have been referred to by different terms, depending on the time period. The objectives of this paper were to examine the global evolution of bibliotherapy from its historical roots to the present and to explore the contemporary research landscape of bibliotherapy in Sri Lanka. The methodology based on this study was literary survey. Accordingly, the paper attempts identify the contemporary research landscape in Sri Lanka while revealing global evolution of bibliotherapy. Challenges and possibilities affecting bibliotherapy researches in Sri Lanka are also discussed.

Keywords: Bibliotherapy, Evolution, Guided reading, Reading therapy, Sri Lanka

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Introduction

In recent years, the field of library and information science in Sri Lanka has witnessed a growing interest in research on bibliotherapy. This emerging focus highlights the growing recognition of the potential of bibliotherapy in supporting psychological well-being through literary engagement. It is important to contextualize this within the broader global scenario, where bibliotherapy has a longstanding historical tradition extending over several centuries. Globally, bibliotherapy is a subject area of interest not only across the field of Library and Information Science but also diverse fields including Health Science, Education, Religion, and Psychology.

Exploring Bibliotherapy

The term ‘Bibliotherapy’ is synthesis of two words as *Biblio + therapeia*. Both of these terms have their origins in Greek. The meaning of term *biblus* is ‘book’ and *therapeia* refers ‘therapy’, ‘treatment’ or ‘healing’. [Altunbay \(2018\)](#) states that, bibliotherapy helps individuals identify with the literature they read, using works of high literary and aesthetic value. This process empowers them spiritually by offering solutions to their personal problems.

According to the available literature, bibliotherapy has been referred to by a plethora of other names and terms, including the following; Biblio-counseling, Biblio-education, Biblio-psychology, Litera-therapy, Biblio-prophylaxis, Biblio-guidance, Book-matching, Guided reading, Reading therapy, Library therapeutics. Even though all the above expressions mean the same thing, the term 'bibliotherapy' is much more popular and is widely used in professional literature. Typically, persons habit to use literature with the intention of teaching or entertaining. However, the use of literature in bibliotherapy extends beyond informal applications; it is a structured intervention with established guidelines and procedures. Bibliotherapy is

intentionally designed to address the needs of its recipients and support to promote personal growth, skill development and mental-wellbeing.

As stated by [Agustina \(2020\)](#), bibliotherapy in the librarianship primarily focuses on selecting appropriate books for children in their developmental stages. Further books that can be used as preventative and remedial solution to problems. Books are often intended to captivate or comfort the reader, which can be identified as the therapeutic quality of a book ([McCaffrey, 2016](#)). As well as, bibliotherapy is one approach that manages mental well-being through the structured use of literature. Bibliotherapy is also seen as an effective and cost-efficient therapy, offering a novel method for delivering cognitive behavioral therapy in clinical settings ([Hogdahl, 2013](#)). When the facilitator recommends specific reading materials, clients are guided to recognize their distorted thinking, express emotions, and gain insight into their own circumstances. These stages promote greater awareness of realistic ways to reframe their understanding, ultimately motivating individuals to develop a positive mindset and attitudes ([McKenna et.al., 2010](#)).

Bibliotherapy has a somewhat indescribable definition ([Eich,1999](#)). Because the term bibliotherapy cannot be easily defined in fact of its diversity usage. Certain researchers ([Hynes & Hynes, 2012](#)) have classified it as a problematic term. “It is problematic because researchers, scholars, practitioners and professionals of varied fields have defined bibliotherapy in divergent ways and have differing views on its usage” ([Camp, 2015, p. 9](#)).

Definitions of bibliotherapy also vary depending on the types of literature used and the specific field of study. For instance, some restrict its use to non-fiction and self-help literature, while others expand the scope of bibliotherapy materials to include fiction, such as picture books, chapter books, and graphic novels. The idea of the [Gavigan \(2012\)](#) abides by the [Camp \(2015\)](#) as “it is

difficult to develop consensus on a definition of bibliotherapy because the technique has been used across a range of disciplines, such as medicine, education, psychology, human services, and other social sciences”.

Bibliotherapy is also described as using literature to offer insight and promote emotional healing. ([Forgan, 2002](#); [Heath et al., 2005](#); [Tunnel et al., 2012](#)). [Agustina \(2020\)](#) acknowledged bibliotherapy as an expressive therapy that involves with reading specific literature for healing determinations. Utilizing relationship of individuals with the contents of books, poetry, and other written words as therapy.

[Katz & Watt \(1992\)](#) describe bibliotherapy as guided reading that is always intended to create a therapeutic outcome. They suggest that supplementary reading allows the client to learn and relate to other people’s experiences. [Favazza \(1966\)](#), a senior medical student provides another definition of bibliotherapy as “a program of selected activity involving reading materials which is planned, conducted, and controlled under the guidance of a physician as treatment for psychiatric patients and which uses, if needed, the assistance of a trained librarian” (p.138).

[Yusuf & Taharem \(2008\)](#) define bibliotherapy as a method for fostering interaction between clients and therapists, where they share literature to address the client's therapeutic needs. Prater et.al (2006) simply defined bibliotherapy as helping people to solve problems with books. Russell and [Shrodes \(1950\)](#) define bibliotherapy as "a process of dynamic interaction between the personality of the reader and literature" (p.16). They further stated that it is an interaction that can be used for personality assessment, adjustment, and growth. Another scholar defined bibliotherapy as an individual's effort to enhance their mental and emotional well-being by using reading materials to address needs, alleviate stress, or support personal growth ([Hoagland, 1972](#)).

Traditional definitions of bibliotherapy appear to emphasize reading as a form of therapy or the use of books with therapeutic purposes ([Camp, 2015](#)).

With technological advancements, the means used in bibliotherapy have evolved. Consequently, the definition of bibliotherapy has also shifted to include "the use of written materials or computer programs, as well as listening to or viewing audio and videotapes, to gain understanding or address issues related to a person's developmental or therapeutic needs" ([Marrs , 1995, p. 845](#)).

The [Online Dictionary for Library and Information Science \(2011\)](#) defines bibliotherapy as "the use of books to address issues that people may face at any given time." As a result, bibliotherapy is considered a modern approach that helps individuals connect with their issues, explore others' experiences, and contemplate various solutions to resolve conflicts ([Jack & Ronan, 2008](#)).

Through all afore-mentioned definitions of bibliotherapy, three fundamental elements emerge, namely:

1. Self-help reading
2. Therapeutic intention
3. Personal improvement

The literature employed for bibliotherapy encompasses a wide range of materials, including fabrications, non-fiction, self-guided books, rhymes, song lyrics, narratives, chapter books, and other printed works. Therapeutic intention is mainly based on the characters of the selected literature. Personal growth is mainly roofed with modeling behaviors, mental healing, and problem solving etc.

Achieving a consensus on the definition of bibliotherapy is challenging due to its application across various fields, including medicine, education, psychology, human services, and other social sciences ([Camp, 2015](#)).

Objectives of the Study

1. To examine the historical and contemporary evolution of bibliotherapy on a global scale.
2. To explore the current research landscape and developments in bibliotherapy within Sri Lanka.

Methodology

This qualitative study employed a literary survey method in means of gather data. The collected data was then analyzed comprehensively in pertinent to the research objectives. The literary survey involves systematic exploration and synthesis of existing literature from various scholarly sources, including peer-reviewed journal articles, books, conference proceedings, and other relevant publications available in both print and electronic formats. As the global evolution of bibliotherapy has evolved over the centuries, four distinct time frames have been used to present the data in an accessible and clear manner.

Findings and Discussion

The collected data underwent a thorough analysis using four distinct time frames to assess the global evolution of bibliotherapy. Meanwhile, the current research landscape in Sri Lanka has been explored. The findings pertaining to these main objectives are revealed as follows.

The Global Evolution of Bibliotherapy

The idea of bibliotherapy is not a new one and it has undergone a dynamic evolution. At early stages, bibliotherapy is developed as ‘reading therapy’. There are various anecdotes scattered through-out the ages that concerning the value of reading. It has existed for centuries and has been known by various names depending on the time period ([Aiex, 1993](#)). According to the existing literature, bibliotherapy has a lengthy history and “it has been simmering in the pot for about 200 years” ([Forrest, 1998, p. 158](#)). However, bibliotherapy was not used with children until nearly fifty years later, in 1946 ([Myracle, 1995](#)). The following section outlines key historical events and influential figures who support to nourished the development of bibliotherapy. Consequently, the relevant information is presented conferring to distinct time frames as follows.

In Early Time

The ancient Greeks and Romans were the pioneers in acknowledging that texts could function as potential therapeutic instruments. Around 300 BC, an inscription including "The Healing Place of the Soul" was discovered in the library of Thebes in Alexandria, Egypt ([Jones, 2006](#)). [Gervay, \(2011\)](#) as cited in [McCulliss \(2012\)](#) states that other similar inscription was found in the Medieval Abbey Library of St. Gall in Switzerland including “The Medicine Chest for the Soul,” As a result, various artists and philosophers have explored the impact of literary texts on the spiritual and moral aspects of human existence. For example, Aristotle introduced the concept of catharsis (Greek = “kátharsis”) in his work, ‘Politics’ ([Marx et al., 2017](#)). The cathartic effect of poetry has also been emphasized by Hindu and Buddhist poets ([Martinec et al., 2022](#)). Greek historian Diodorus Siculus in his monumental work, *Bibliotheca Historica*, mentions that above the entrance to the kingdom where books are stored by King Pharaoh Ramses II of Egypt, there was the oldest

motto known by libraries in the world, ‘the healing place of the soul’ in Alexandria Library in Egypt during BC in the 300s. [Nystul \(2003\)](#) also concurred with this and he says that the earliest use of bibliotherapy goes back to the Grecian times. Further in Rome, Aulo Cornelius Celso associated reading with medical treatment ([Vélez & Prieto, 2018](#)). In 1272, reading the Quran was prescribed in Al-Mansur Hospital in Cairo, Egypt as a medical treatment ([Rubin, 1978](#)). Further in 8th century in Baghdad, sick people were instructed to read the Quran day and night ([Martinec, 2015](#) as cited in [Martinec et al., 2022](#)). A French writer and physician, François Rabelais (1494–1553) prescribed literature for his patients as part of their treatment ([Schneck, 1944](#)).

In 18th Century

Beginning of the eighteenth century, libraries became as an integral place and books were utilized to calm the mental condition of the mentally ill patrons. Dr. Benjamin Rush, a pioneer of American psychiatry in the 1800s, and Dr. John Minson Galt, revealed at a conference held in 1802, the act of reading in the hospital as a part of patients’ therapy and treatment ([Tews, 1970](#)). In 1811, a hospital in Boston, decided to provide Bibles and other suitable religious' books to patients in each ward and then religious group throughout the country continued to donate religious literature and small libraries or "reading rooms" to hospitals. Therapeutic value of reading is discussed in a publication of ‘Society of Friends’ at New York in 1883. Further in 1840, the initial documented use of bibliotherapy as an intervention technique was reported ([Afolayan, 1992](#)). This is regarding the selection of books for mentally ill patients ([Sturt, 1990](#)). In 1853, The first publication on the therapeutic role of literature was published in the mid-19th century by John Minson Galt, an American writer and superintendent at the Eastern State Hospital in Virginia. He mentioned the principals and applications of reading therapy one of his publications ([Panella, 1996](#)) and further wrote about the

benefits of reading for mental patients. In late eighteenth century, Dr. Philippe in France offer books to heal different types of mental illnesses and that modality referred to today as moral therapy. a leading campaigner for humane treatment of the insane. At the same time, Dr. Daniel Hack Tuke began providing books as a means to address various ailments in England.

In 19th Century

In the 19th century, the practical uses of bibliotherapy grew considerably ([Marx et al., 2017](#)). In 19th century, the reading of religious texts was recommended in prisons and psychiatric hospitals in Europe ([Beatty, 1962](#)). In addition, the American Medical Association (AMA) established the first Council on Bibliotherapy in 1939.

E. Kathleen Jones, a library administrator at the Mclean Hospital, Massachusetts in 1904, became the first qualified professional librarian. He perceived the primary function of the librarian as administering book therapy to the patients of that hospital. A program was conducted by Jones with combination of psychiatry and library science ([Hendricks et al., 1999](#)).

In accordance with [Silverberg \(2003\)](#), [Russell & Shrodes \(1950\)](#) assert that bibliotherapy was officially acknowledged as a facet of librarianship within that field as early as 1904. [Vélez and Prieto \(2018\)](#) noted that there is evidence suggesting that doctors in the nineteenth century asserted that reading was one of the most effective methods for improving the condition of in-patients.

Another significant advance of bibliotherapy took place in 1916. Samuel Mchord Crothers writes a paper for an issue of *Atlantic Monthly*, in 1916. It was the first published article including the word ‘bibliotherapy’. By reason of this, bibliotherapy is first coined by Samuel Mchord Crothers. The

aim of that was to produce explanations by using literature in the treatment of individuals suffering from mental problems. There, Samuel discussed a technique of prescribing books to patients who need help understanding their problems, and he labeled this technique as “bibliotherapy” ([Crothers, 1916, p. 291](#)). By means of this evidence, it is predicated that bibliotherapy has dates back at least to the early nineteenth century ([Pardeck & Pardeck, 1998](#)).

Book therapy became more and more popular, especially after World War I, around 1918. Because of the World War I, resulted in millions of deaths and disabilities, and countless people struggled with economic, social, and political depression in its aftermath. Alternative methods and new applications were utilized to treat the trauma and breakdown this environment caused in the human spirit. One of these is bibliotherapy ([Altunbay, 2018](#)).

In 1919, a librarian wrote an article on bibliography, making a new revolution in librarianship. The librarian co-authored the publication with a neurologist. Its name was ‘The therapeutic use of hospital library’ ([Noordin et al., 2017](#)). Medical officers at the Crichton Royal Asylum in Dumfries, USA carried a book catalogue and prescribed a book for each patient to read during their daily medical practice ([Forrest, 1998](#)). Bibliotherapy made a significant advancement in 1941 when its definition was included in the 11th edition of Dorland’s Illustrated Medical Dictionary as “the employment of books and the reading of them in the treatment of nervous diseases.”

In the 1920s, a librarian named Sadie Peterson-Delaney worked at the Veteran’s Hospital in Tuskegee, Alabama. Delaney used to discuss bibliotherapy extensively in her literary works and carrier. She defined bibliotherapy as, “the treatment of patients through selected reading” ([Dictionary of American Library Biography, 1978](#)). 'Bibliotherapy as an Aid to Rehabilitation' and 'The Place of Bibliotherapy in a Hospital' are her leading

writings on bibliotherapy. she had success in the outstanding program that was related to bibliotherapy towards physically disabled African – American war veterans and veterans with mental or emotional issues. The School of Library Science at Western Reserve University started the first training programs in bibliotherapy in the 1920s ([Panella, 1996](#)). Another notable event occurred in 1939, when the American Medical Association formed the first Council on Bibliotherapy.

During the 1950s, bibliotherapy became an interactive therapy. [Shrodes's \(1950\)](#) dissertation, *Bibliotherapy: A Theoretical and Clinical-Experimental Study*, is considered a landmark publication in the field of bibliotherapy ([McCulliss, 2012](#)). Psychiatrists Jack J. Leedy and Sam Spector used guided reading as a catalyst ([McCulliss, 2012](#)). The Graduate School of Library Science at Villanova University presented a bibliotherapy course in 1970. Towards the end of the 19th century, librarian [Rubin \(1978\)](#) helped establish clear guidelines for bibliotherapy by creating two categories as developmental bibliotherapy and therapeutic bibliotherapy.

In 20th Century

The therapeutic use of books has increased in recent years. Bibliotherapy became popular in the 20th century as an all-ages; children, young adults, adults and seniors' therapy. Bibliotherapy is recurrently employed as a therapeutic technique and is often integrated with other therapies, such as cognitive-behavioral therapy (CBT). Today, bibliotherapy continues to be utilized by librarians and psychologists, and has also expanded into various other fields such as social work, healthcare, education, counseling, and parenting. While it initially focused solely on books, it now encompasses a broader range of media, including literature, poetry, self-help books, movies, comic books, art, music, dance, and storytelling.

By the 20th century, there was a tendency to use the Internet more and more among the majority of people living in the society, regardless of children and adults. Accordingly, going beyond the traditional printed media (books) utilized for bibliotherapy activities, Web-based bibliotherapy was brought into practice for many psychological problems by using Web-based materials by various researchers all over the world of academia ([Carlbring et al., 2006](#); [Noruzi & Alireza, 2007](#); [De Jesús-Romero et al., 2022](#)). Polygonal terms found in the literature for the concept of web therapy are web counseling, web guidance, web psychology, web therapeutics, e-therapy, internet therapy, online therapy, e-mail therapy, and cyber therapy ([Barathi et al., 2016](#)).

[Pehrsson & McMillen \(2005\)](#) created a “Bibliotherapy Evaluation Tool” to help counselors incorporate literature into therapy. This tool included 15 self-assessment questions based on key selection criteria, which were developed from a review of existing literature and clinical experience.

[Tukhareli \(2014a\)](#) wrote a detailed book titled *Healing Through Books: The Evolution and Diversification of Bibliotherapy*. This book offers an extensive overview of contemporary theories and practices in bibliotherapy, highlights trends in the field's development in the 21st century, and explores how these trends align with recent developments in healthcare and social sectors.

In the years after 2010, extensive research has focused on enhancing the practice of creative bibliotherapy for various stakeholders, such as health professionals, librarians, educators, and social service providers. Creative bibliotherapy can be incorporated into support groups, offering a secure and motivating environment for self-exploration and social interaction ([Montgomery & Maunders, 2015](#); [Calla et al., 2017](#); [Troscianko, 2018](#); [Tukhareli, 2014b](#)).

Alternatively, bibliotherapy programs have been launched for individuals who living with HIV/AIDS, and cancer. The bibliotherapy program was designed to alleviate the isolation experienced by individuals with HIV/AIDS and cancer, raise their awareness about the disease, and enhance their well-being. [Trasmontano et al. \(2013\)](#) conducted a study to explore how patients with HIV/AIDS perceive the relationship between their spirituality and their experience of the illness. Several other research papers examine the role of bibliotherapy within library settings and identify specific bibliotherapeutic approaches to support individuals affected by HIV/AIDS ([Tukhareli, 2011](#); [Roche, 1992](#); [Roberts 2015](#)) and some other researchers ([Malibiran et al., 2018](#); [Bálint & Magyari, 2020](#); [Roghani et al., 2021](#)) believe that bibliotherapy is acceptable as an intervention tool for cancer patients. [Roberts \(2015\)](#) applied a psycho-educational self-help intervention program to assess its efficacy for cancer patients. The COVID-19 pandemic extended its spread nearly every corner of every country. The onset of COVID-19 has caused fear and stress, resulting in emotional and psychological issues due to social and physical distancing, as well as economic downturns. In this regard, the intervention of bibliotherapy is very positive, as evidenced by research ([Stip et al., 2020](#); [Monroy-Fraustro, 2021](#); [Rahmat et al., 2021](#); [Adeyeye & Oboh, 2022](#)) conducted from 2019 to 2023. In fact, bibliotherapy can be regarded as an intervention that can be adapted to meet the demands of the present day. Thus, throughout the 20th century, the scholarly exploration of bibliotherapy's theoretical aspects has transformed into a practical approach for addressing everyday needs.

Contemporary Research Landscape on Bibliotherapy in Sri Lanka

The available literature reveals that intervention of bibliotherapy is quite new to Sri Lanka, compared to several other countries. But from a practical point of view, it is not a new phenomenon to Sri Lankan society. In ancient times, our forefathers also got the same comfort through reading literary works such as *Jātaka*, *Yashodaravata*, *Dhammapadaya*, *Pujavaliya* etc. It appears that the term 'bibliotherapy' is generally not well-known among them. Further, there is no evidence available concerning the publication of any literature related on bibliotherapy.

But, as per the contemporary publications, there seems to be a positive tendency in bibliotherapy studies and publications in Sri Lanka. A recent publication ([Senevirathna & Lansakara, 2022](#)) deliberates the potential challenges in applying bibliotherapy to the context of Sri Lanka. They introduced the explanations for challenges as; well-trained Bibliotherapist/ bibliotherapy professionals are required, the need for government involvement to strengthen the bibliotherapy programs, and increase the awareness of the general public regarding this therapeutic tool. A feature article has written by [Gunawardhana \(2022\)](#), a university librarian as “*Bibliotherapy in Practice: Initiated a new service at the University System of Sri Lanka*”. She has introduced a bibliotherapy process with for component as; 1) Initial Stage 2) Mirroring 3) Insight 4) Follow up (IMIF). Another study led by [Somaratna \(2021\)](#) to assess “*the perception of student counsellors regarding the initiation of bibliotherapy services in a university setting*”. The result indicates that there is insufficient literacy among the student counselors regarding the process of bibliotherapy. [Premarathne \(2016\)](#) writes a concept paper discussing “*bibliotherapy as a tool for reducing the study behavior issues among undergraduates*”.

[Arulanantham & Navaneethakrishnan \(2013\)](#) conducted a study introducing bibliotherapy to improve the health and social conditions of post-war communities. They evaluated the effectiveness of bibliotherapy in public libraries and assessed librarians' attitudes towards taking on the role of bibliotherapists. [Attanayake \(2012\)](#) writes a paper on 'Bibliotherapy: Through *Yasōdarāvatha* (The story of *Yasōdarā*)' with purpose of promoting bibliotherapy in Sri Lanka with help of ancient Buddhist literary works. *Yasōdarāvatha* is suggested by author as recommended reading for bibliotherapy, since it promotes tolerance, love, acceptance, and solace.

When considering the authorship of the above-mentioned researches, it is clear that most of studies were conducted by librarians. Furthermore, only a small number of psychiatrists in Sri Lanka seem to have shown any interest in bibliotherapy. Professor Harischandra, a famous psychiatrist, Dr. Tolusha Harischandra, and Dr. Jayatunga are given precedence in this regard.

Professor Harischandra writes a book under the title of "Psychiatric Aspects of *Jātaka* Stories" and makes a comprehensive study on a practical and active therapeutic means for the cure of psychiatric disorders. In chapter VII, he discusses the therapeutic uses of *Jātaka* stories relating to bibliotherapy but only with limited explanation. He states, that "I would say that *Jātaka* book serves a bibliotherapist as a comprehensive pharmacopeia" ([Harischandra, 1998, p. 114](#)). Further he discusses under the titles of various psychological treatments, how *Jātaka* Stories can be mobilized in therapeutically.

The aforementioned studies demonstrates that research landscape on bibliotherapy is still in its early stages in Sri Lanka.

Conclusion and Recommendations

The idea of bibliotherapy dates back to ancient civilizations, where reading was viewed as a source of comfort and healing. Notable milestones in the evolution of bibliotherapy include its use in military hospitals during World War I, the development of reading programs in libraries, and the integration of bibliotherapy into psychotherapeutic practices.

The modern notion of bibliotherapy began to take shape in the early 20th century with the recognition of its therapeutic potential by healthcare professionals, counselors, librarians, teachers, etc. Accordingly, bibliotherapy has expanded globally, with diverse applications in clinical and non-clinical settings. Research has demonstrated its effectiveness in addressing various mental health issues, including depression, anxiety, and trauma. The integration of digital platforms has also broadened access to bibliotherapy resources.

When consider the contemporary research landscape on bibliotherapy in Sri Lanka, have seen a growing interest in bibliotherapy within the Sri Lankan academia. Research studies have explored the effectiveness of bibliotherapy, potential challenges in applying bibliotherapy to the Sri Lankan context, recommended readings for bibliotherapy, bibliotherapy process, initiating bibliotherapy service etc. When considering the authorship of these contemporary researches, it is clear that most of studies were conducted by librarians. Furthermore, it seems that only a small number of psychiatrists in Sri Lanka have shown some interest in bibliotherapy.

Currently, most of the existing research literature on bibliotherapy produced by researchers in Sri Lanka is in English, which limits its accessibility to those more comfortable with local languages. Hence, it is

crucial to conduct research and disseminate knowledge about bibliotherapy in Sinhala and Tamil languages to facilitate wider adoption of this effective therapeutic tool in Sri Lanka.

Sinhalese literature is predominantly infused with Buddhist teachings, underscoring the importance of expanding research initiatives on bibliotherapy within this literary tradition. Conducting localized research to comprehend the specific needs of Sri Lankan populations can enhance the efficacy of bibliotherapy. Moreover, fostering collaborative research efforts is crucial to promoting bibliotherapy in the Sri Lankan context. Encouraging interdisciplinary collaborations among mental health professionals, educators, librarians, and counselors aims to deepen the understanding and application of bibliotherapy, enriching its impact.

The findings of this study contribute to a broader understanding of the global evolution of bibliotherapy and the contemporary research landscape on bibliotherapy in Sri Lanka. ongoing research will be crucial in shaping its integration and ensuring its benefits are maximized for diverse populations. It is crucial for advancing future research and practical applications across various populations and within indigenous literature.

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Online Learning Challenges Encountered by University Students Amidst the COVID-19 Pandemic: A Systematic Review of Digital Divide Perspective

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Abstract

The COVID-19 has required a rapid conversion from the conventional learning to online learning, revealing and intensifying the digital inequality amongst university pupils. The primary objectives of this systematic review study are to identify the digital divide challenges encountered by university students in online learning amidst the COVID-19 pandemic and to understand the underlying reasons contributing to these challenges. This study focuses on empirical research published between 2020 and 2023. The review utilized the seven phases of systematic review recommended by the Evidence for Policy and Practice Information and Co-ordinating Centre. A comprehensive Scopus and Web of Science search was undertaken using word string "higher education/university education/university students", "online learning/distance learning," "COVID-19/pandemic," "digital divide/digital inequality/digital exclusion," and, and the initially 190 articles were extracted.

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The criteria for inclusion restricted the number of publications that were examined to a total of 11. The analysis reveals two primary categories of digital divide challenges: the first-level digital divide, characterized by limited access to essential digital devices and internet connectivity, and the second-level digital divide, which relates to varying levels of digital competency among students. Key factors contributing to these challenges include financial constraints, geographical disparities, and inadequate technological infrastructure. Students from economically disadvantaged backgrounds and rural areas faced significant obstacles in engaging with online learning platforms, leading to adverse academic outcomes. Strategies for bridging the digital divide should be implemented in collaboration with educational institutions, government agencies, and private sector stakeholders. These strategies should focus on the enhancement of technological infrastructure, the provision of financial support, and the provision of digital literacy training programs. The review highlights the importance of understanding the digital divide in shaping future educational practices and policies, aiming to create a more inclusive and resilient higher education system in the post-pandemic era. By addressing the identified challenges, institutions can empower all students to succeed in an increasingly digital learning environment.

Keywords: digital divide, COVID-19, online learning, higher education

Introduction

Following the declaration of the new coronavirus, COVID-19, as a worldwide pandemic in 2020, governments around the world enforced stringent public health measures to control the virus's transmission and reduce the number of deaths. Entire countries were subjected to a lockdown, leading to the halting of all operations in both governmental and private institutions. As a result of the widespread transmission of the virus across several countries and continents, combined with the shutdown of educational institutions, a substantial majority of over 80% of students worldwide were unable to physically attend their respective universities and colleges ([WHO, 2020](#)). Consequently, there is no opportunity for education to be delivered in a conventional way, such as through in-person classes. During that period, individuals throughout the globe began to embrace and implement online education in their educational institutions as a way to maintain educational activities ([Sumra et al., 2022](#)).

Online education refers to a situation when students are geographically separated from their teachers and need a way of receiving instruction ([Wang et al., 2013](#)). Technology tools and internet access serves as a mediator in the interaction between learners and their instructors ([Onyema et al., 2020](#)). Digital technology is crucial for online education; thus, the absence of access to digital technology might prevent students from accessing learning opportunities. Prior to the start of the lockdown, online learning was not regarded with much seriousness. However, amidst the lockdown, some higher education institutions quickly moved to online instruction and learning. This shift has brought

attention to the disparities and significant inequalities among students ([Moonasamy & Naidoo, 2022](#)).

The unequal distribution of access of digital devices and connectivity is what gives rise to the issue that is now commonly known as the digital divide or digital inequality. It states to the uneven distribution of digital technologies, internet access, and digital literacy across various societal groups, with a particular emphasis on socioeconomic divisions ([van Dijk, 2020](#)). It is classified into three levels: the digital access divide (first level), digital capability divide (second level) and digital outcome divide (third level) ([Wei et al., 2011](#); [van Dijk, 2020](#)). The notion of a digital access divide refers to disparities in the physical accessibility of technology, encompassing both accessing devices and internet connectivity. The notion of a digital capability divide denotes to the difference in the computer skill and competency while a digital outcome divide concentrations on the disparity in results that arise from an individual's engagement with technology. The pandemic has shown the unforeseen and unexpected difficulty of the digital inequality ([Shah et al., 2021](#)). Although certain learning procedures were gradually transitioned to online platforms, the pandemic not only intensified the use of digital methods in education but also worsened the existing digital gap ([García-Morales et al., 2021](#)).

The digital disparities in tertiary education pertain to the disparities in the availability and utilization of information and communication technology (ICT) among university students and the education system as a whole. These disparities can take various forms, including limited access to digital equipment, connectivity of internet, and digital skills, among

other factors ([García Zare et al., 2023](#)). Numerous studies prioritize digital divides as a crucial determinant when assessing results in online education. According to studies done in India, students—from primary school through university—have major difficulties engaging in their studies. Deficiency of resources and the acceptance of novel methods of instruction and learning that utilize digital technology throughout the pandemic have negatively affected the educational process of these students ([Maity et al., 2021](#)). Likewise, France has found that the improper use of ICT influences the outcomes of its pupils and that the digital divide in the nation makes institutions unprepared for training their instructors and pupils in the use of technology ([Youssef et al., 2022](#)).

Previous systematic studies have examined the obstacles of online education at the university level, with a particular attention on all the stakeholders involved ([Ndibalema, 2022](#)). Nevertheless, the student plays a crucial role as a primary stakeholder in this study. When compared to other stakeholders like instructors and institutions, students encounter socio-economic and cultural obstacles that hinder their learning in tertiary education, particularly in the background of online learning. This review only focuses on the issues of digital disparity that students in higher education experience. This is because digital resources are a crucial component of online learning. Therefore, understanding the specific digital divide obstacles that students encounter and the underlying causes of these challenges will assist higher education institutions and government authorities in understanding the obstacles related to online learning. Thus, this review goals to identify and examine the challenges related to the digital divide that university students experience, providing

insights that can inform strategies to bridge these gaps and enhance the effectiveness of online education in the future.

Problem Statement

Despite the growing recognition of the digital divide as a vital determinant of educational outcomes, there remains a limited understanding of the specific obstacles faced by university pupils in this context. This gap in knowledge underscores the necessity for a comprehensive examination of the digital divide obstacles encountered by students during the pandemic, as well as the underlying factors contributing to these challenges. Addressing these issues is essential for higher education institutions and policymakers to develop targeted interventions and support systems that promote digital inclusion and equitable access to education.

Objectives

1. To identify the challenges faced by university students in online education amidst the COVID-19 pandemic within the framework of the digital divide.
2. To understand the reasons that contribute to these challenges.

Methods

A thorough literature analysis was undertaken to determine the study queries of this study, particularly about the obstacles faced by university students in online learning due to the digital inequality during the pandemic, as well as the main reasons of these obstacles. The

assessment was carried out utilizing the seven steps of systematic review as recommended by the [Evidence for Policy and Practice Information and Co-ordinating Centre, \(2007\)](#). The initial stage involved the formulation of specific conditions for eligibility (Table 1). For the purpose of this review, a decision was made taking into account the following factors.

- In terms of the literature type, only research papers containing empirical data have been chosen with open access. This implies that review articles, book series, books, book chapters, conference proceedings, and closed access have all been excluded.
- To mitigate potential confusion and translation challenges, the research efforts deliberately excluded publications in languages other than English.
- The time frame for this study spans from 2020 to 2023, as it primarily examines the challenges of digital in online learning amidst the pandemic.
- Full research papers were included in the analysis to ensure a comprehensive understanding of the study. This involved analyzing variables such as the size of the sample and the process used for selecting participants, the methods used for collecting data, and the overall strategy taken in the study.

Table 1

Criteria for inclusion and exclusion

Inclusion	Exclusion
peer-review research paper with empirical evidence	review articles, book series, books, book chapters, conference proceedings
Open access	Closed access
Year of publication 2020 - 2023	Publication outside the set period
English	Non-English
Full text	Abstract

The second phase involved doing a comprehensive search for appropriate studies related to the issue. This included a thorough review of research conducted in two prominent scientific databases, namely Scopus and Web of Science. The search was restricted to scholarly works published between the timeframe of 2020 to 2023. As per the guidelines provided by the Joana Briggs Institute (2024), the qualifying keywords are defined based on the population, Intervention, Context and Outcomes (PICO) ([Lizarondo, 2020](#)). As shown in Table 2, these keywords were employed to construct a search query for each database.

Table 2

PICO description and search string

PICO	Description	Search String
Population (P)	The focus is on university students, encapsulating both	"higher education" OR "university education"

	higher education students and those specifically in university education	OR "university students"
Intervention (I)	Methods of learning that occur online or at a distance, rather than in-person	"online learning" OR "distance learning"
Context	The COVID-19 pandemic is the specific context in which these phenomena and populations are being investigated.	"COVID-19" OR "pandemic"
Outcomes (O)	Disparities in access, skills, and benefits related to digital technology and the internet	"digital divide" OR "digital inequality" OR "digital exclusion"

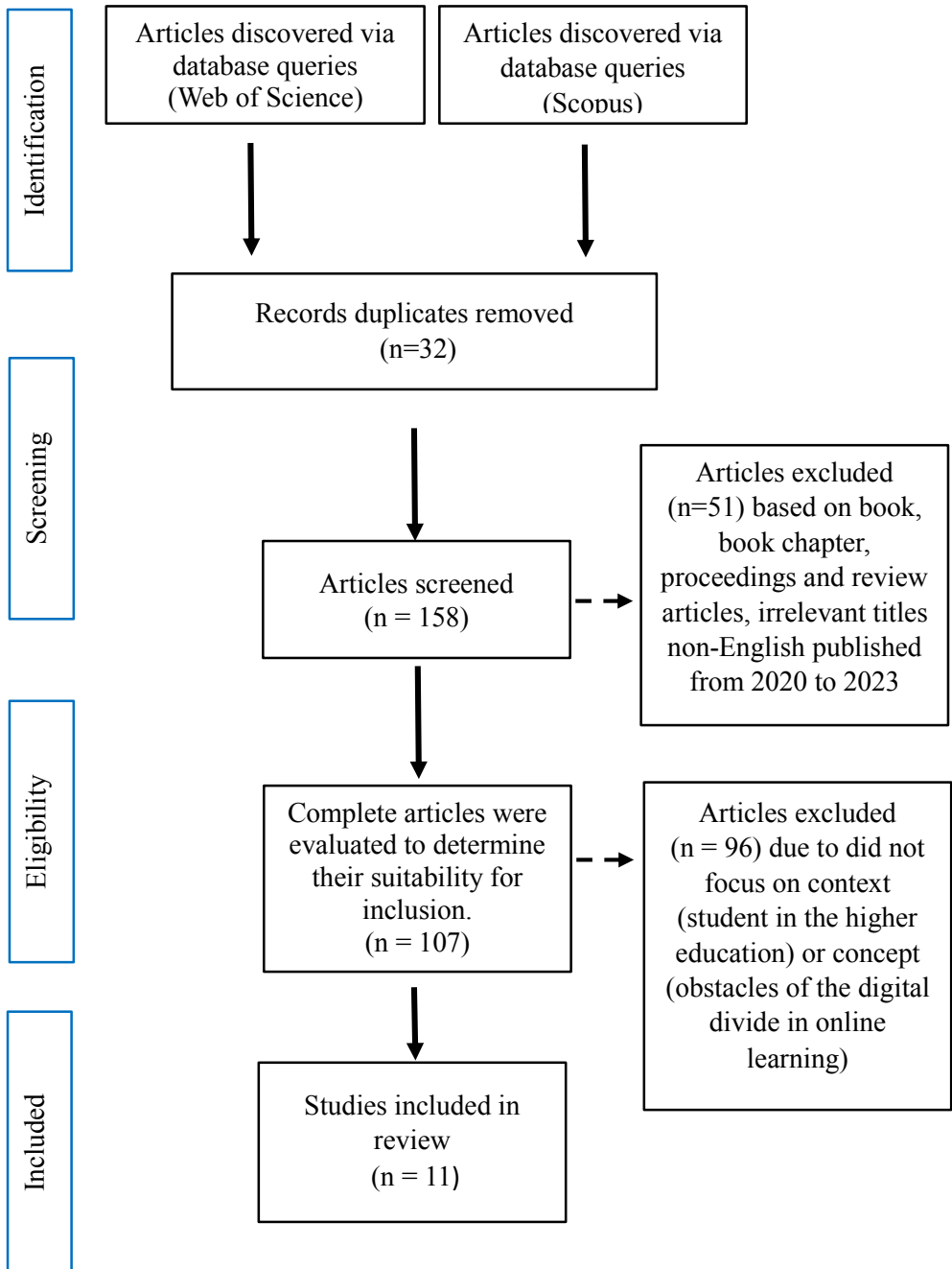
During the initial search, a total combined amount of 190 publications were retrieved from two databases. Following a comprehensive examination, an overall total of 32 duplicates were detected and consequently eliminated. In the third step, the 158 articles were screened according to the inclusion criteria specified in the previous stage (first phase). A total of 51 articles were excluded based on the screening procedure's exclusion criteria. Finally, a total of 107 complete articles analysis for eligibility. After the evaluation, a total of 96 articles were eliminated due to the fact that some of them did not address the

implications of digital disparity on online learning or the student community. After the final round of evaluation, a total of 11 articles were incorporated into the analysis. The selection process was documented using the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA 2020) procedure ([Page et al., 2021](#)) (see Figure 1). The Rayyan platform was employed to maintain thorough documentation of the process of selection and screening ([Ouzzani et al., 2016](#)).

In the fourth stage, The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (QualSyst) were employed to assess the methodological quality of all the studies contained within the study ([Kmet et al., 2004](#)), which is a set of standard criteria for assessing the quality of primary research papers from various fields. The QualSyst tool was designed to facilitate the simultaneous assessment of various methodologies by analyzing both qualitative and quantitative research. Quantitative studies are evaluated against 14 elements, whereas qualitative studies are evaluated against 10 elements. The evaluation is based on the degree to which these criteria have been fulfilled, with a scoring system of 2 for yes, 1 for partial, 0 for no, and N/A for not applicable (Table 3). The overall score was computed without considering elements that were considered to be "not applicable." The ultimate consensus summary ratings are represented as a percentage, with greater values indicating a higher level of methodological quality.

Figure 1

PRISMA flow diagram, as derived from Page et al. (2021)



In the fifth stage, descriptive mapping was conducted to assess the research articles and their relevance to the study topic. A detailed mapping was conducted to capture three key aspects: the fundamental attributes of the study (such as publication year, country, study design, data collection method, and sample size), the specific types of digital divide issues encountered by university students and the underlying causes of these challenges, and any recommendations placed in the studies (Table 4 & 5 in the result section).

In the sixth stage, the findings were summarized. A table was developed to summarize the numerous obstacles associated with the digital divide with regard to the change to online learning during the pandemic, in order to provide a meaningful summary. The synthesis of important issues from research articles was conducted in a series of stages. While considering the stages proposed by Bazeley, the aggregative synthesis approach was implemented (Bazeley 2014, cite in [Ndibalema, 2022](#)).

The results have been divided into categories and presented in Figure 2 as a consequence of an aggregative synthesis. During this phase, the study objectives focused on identifying the issues of the digital inequality and determining the reasons of these challenges based on the included studies. These challenges were divided into two categories, which correspond to the first and second levels of digital divide challenges. Furthermore, the reasons of the issues related to the digital divide categorized into three aspects: financial constraints, geographical location, and technological infrastructure.

Discussion and conclusion comprised the seventh phase. Discuss the theme that has emerged from the reviewed articles in the discussion section. Furthermore, the discussion contained several emerging recommendations from the incorporated studies, which would serve as lessons for bridging the digital divide among university students and enhancing future practices in the context of adjusting to studying online throughout pandemic-related events.

Table 3
Quality assessment of included studies

Item Quant	Quali	Element	Included studies						
			Gocotano, et al. (2021)	El Said, (2021)	Asher, S. (2021)	Gan & Sun, (2021).	Moonasamy & Naidoo, (2021)	Katz, et al., (2021)	
1	1	Clear Objective/Question	2	2	2	2	2	2	2
2	2	Suitable study design	2	2	2	2	2	2	2
3	5	Sample method appropriate	2	2	2	2	2	2	2
4		Clearly respondents' characteristics described	2	2	-	-	2	2	2
5		Interventional and random allocation was possible	0	0	-	-	0	0	0
6		Interventional and blinding of investigators was possible	0	N/A	-	-	0	0	0
7		Interventional and blinding of subjects was possible	0	N/A	-	-	0	0	0
8		Outcome/s and exposure measure/s well defined	2	2	-	-	2	2	2
9		Well define Sample size	2	2	-	-	2	2	2
10		Suitable Analytic methods described	2	2	-	-	2	2	2
11		Estimate of variance is reported for the main results	1	2	-	-	2	2	2
12		Controlled for confounding	1	1	-	-	1	1	2
13		Result described with sufficient details	2	2	-	-	2	2	2
14	9	Conclusions supported by the findings?	2	2	2	2	2	2	2
	3	Strong context for the study	N/A	1	1	2	2	-	-
	4	Link with the theoretical framework	2	2	2	2	2	-	-
	6	systematic data collection methods	2	2	2	2	2	-	-
	7	systematic Data analysis	2	2	1	2	2	-	-
	8	Use of Verification procedure/s	1	1	1	1	1	-	-
	10	Reflexivity of the account?	N/A	0	1	1	1	-	-
		Total score (quantitative)	71%	81%	-	-	-	-	85%
		Total score (qualitative)	64%	80%	80%	90%	75%	Strong	Strong
			Good-Adequate	Strong-Good	Good	Strong	Good	Good	Good
			Adequate	Good					

Continue

Continue

Item		Included studies						
Quant	Quali	Element	Rahman, (2021)	Sumra, et al., (2022)	Alam, et al. (2023)	Garcia Zara, Zara, (2023)	Müller, (2023)	
1	1	Clear Objective/Question	2	2	2	2	2	
2	2	Suitable study design	2	2	2	2	2	
3	5	Sample method appropriate	2	2	2	2	2	
4		Clearly respondents' characteristics described	2	2	2	2	2	
5		Interventional and random allocation was possible	0	0	0	0	0	
6		Interventional and blinding of investigators was possible	0	0	N/A	0	0	
7		Interventional and blinding of subjects was possible	0	0	N/A	0	0	
8		Outcome/s and exposure measure/s well defined	2	2	2	2	2	
9		Well define Sample size	2	2	2	2	2	
10		Suitable Analytic methods described	2	2	2	2	2	
11		Estimate of variance is reported for the main results	1	2	2	2	2	
12		Controlled for confounding	0	1	1	1	2	
13		Result described with sufficient details	2	2	2	2	2	
14	9	Conclusions supported by the findings?	2	2	2	2	2	
	3	Strong context for the study	-	-	2	-	-	
	4	Link with the theoretical framework	-	-	2	-	-	
	6	systematic data collection methods	-	-	2	-	-	
	7	systematic Data analysis	-	-	2	-	-	
	8	Use of Verification procedure/s	-	-	1	-	-	
	10	Reflexivity of the account?	-	-	1	-	-	
		Total score (quantitative)	68%	75%	81%	75%	79%	
		Total score (qualitative)	Adequate	Good	90%	Good	Good	

Source: Kmet et al., 2004, pp4-5

Full agreement, 1; partial agreement, 0; no agreement, N/A; not applicable.

Summary scores: strong (>80%), good (70–80%), adequate (50–70%) and limited (<50%)

Calculation of the summary score in percentage (quantitative)

Total sum = (number of "yes" * 2) + (number of "partials" * 1)

Total possible sum = 28 – (number of "N/A" * 2)

Summary score: total sum / total possible sum * 100

Calculation of the summary score in percentage (qualitative)

Total sum = (number of "yes" * 2) + (number of "partials" * 1)

Total possible sum = 20 – (number of "N/A" * 2)

Summary score: total sum / total possible sum * 100

Result

Eleven articles retrieved from the Scopus and Web of Science databases highlight the diverse issues related to the digital gap that university students have faced during the COVID-19 pandemic. The papers originate from many peer-reviewed journals and contain empirical study findings on the issue. Table 4 provides a summary of the main characteristics of the studies that were incorporated.

Table 4
Fundamental attributes of included studies

Author & year	Country	Research method	Target population	Data collection method	Sample size	Data Analysis
Gocotan et al. (2021)	Philippines	Mixed method	University students	online self-completion survey questionnaire and interview	639 and 20 for interviews	Simple descriptive analysis and Narrative analysis
Said (2021)	Egypt	Mixed method	University students	online self-completion survey questionnaire and interview	748 and 8 for interviews	T-tests and Chi-square Narrative analysis
Asher (2021)	Pakistan and United States	Qualitative	University students	Interview	7	Thematic analysis
Gan & Sun (2022)	The United States	Qualitative	University students	Online survey with open ended question	206	Thematic analysis
Moonasamy & Naidoo (2022)	South Africa	Quantitative	University students	Online survey	200	Descriptive analysis

Katz et al., (2021)	The United States	Quantitative	University students	Online survey	2,913 from 30 U.S. universities	Structural equation modeling with cluster-bootstrapped standard errors and p-values
Rahman (2021)	India	Quantitative	University students	Online survey	132	Descriptive analysis
Sumra et al., (2022)	Pakistan	Quantitative	University students	Online survey	750 students and 300 teachers.	Partial Least Squares Structural Equation Modeling (PLS-SEM)
Alam et al., (2023)	Bangladesh	Mixed method	University students	online self-completion survey questionnaire and interview	275 for questionnaire and 20 for interviews	Simple descriptive analysis and Thematic analysis
García Zare et al., (2023)	Peru	Quantitative	University students	Survey	9326	F-test (analysis of variance—ANOVA) and the Friedman test, as well as multivariate analysis
Müller et al., (2023)	France	Quantitative	University students	Online survey	2275	Robust linear regressions and binomial logistic models

Source: Authors

This study examined publications within the time period from 2020 to 2023. Based on the predetermined criteria, the majority of articles (7 out of 11) were published in the year 2021. In 2022, one paper was published, while in 2023, a total of three papers were published out of eleven. The seven studies specifically examined the difficulties faced by university students from underdeveloped countries with regard to the digital divide. Meanwhile, three articles covered this issue in developed countries, and one article made a comparison between developed and developing nations. In addition, three studies employed a mixed methods approach, with two studies specifically utilizing qualitative methods for their findings. It is important to mention that most of the reviewed publications, namely six out of eleven, utilized a quantitative research methodology. The QualSyst tool was used to evaluate the quality of the methodology. The quality ranges of all the included papers are from strong to adequate.

Table 5 displays the aggregated results of the studies that were incorporated. It is evident that university students faced several problems associated to the digital inequality when engaging in online learning throughout pandemic period. While many academics have discussed the many institutional and related problems associated with online learning, this study specifically examined the issues confronted by students in the context of the digital gap. In addition, Table 5 presents the causes for the issues and provides ideas to address the digital divide among students.

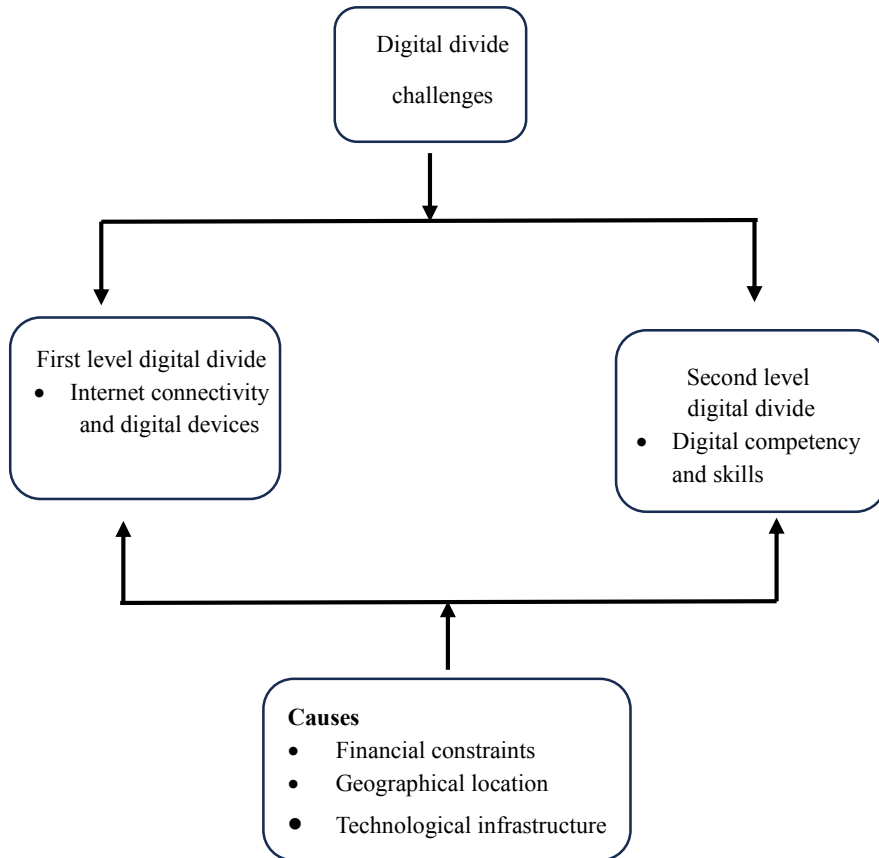
Synthesis of the findings

The digital divide challenges encountered by university students during the COVID-19 pandemic are categorized into two primary groups,

while the underlying causes of these issues can be categorized into three categories, as illustrated in Figure 2.

Figure 2

Results Synthesis



Source: Authors

Table 5

Findings on obstacles, causes and recommendations

Author and year	Obstacles faced by university students in relation to the digital divide (DD)	Reasons for obstacles	Recommendations
Gocotano, et al. (2021)	<ul style="list-style-type: none"> • Unavailability of network • Shortage of digital devices (majority students use mobile phone for online learning) • Lack of digital literacy skills 	<ul style="list-style-type: none"> • Low family income • Educational background of parents • Limited infrastructure • Health issues related to technology use • Expensive internet data 	<ul style="list-style-type: none"> • Training on technological proficiency • Adequate infrastructure • Study materials and activities • Support for low-income families • Recognition of non-Digital learning modes
Saïd, (2021)	<ul style="list-style-type: none"> • Disparities in access to reliable internet and digital devices • Internet Connectivity Issues • Lack of IT skill 	<ul style="list-style-type: none"> • Poor IT infrastructure • Financial Constraint • Limited technical support 	<ul style="list-style-type: none"> • Enhance technological infrastructure • Provide training and support • Improve technical support services • Develop robust communication channels • Address socioeconomic disparities • Encourage interactivity in online courses
Asher, (2021)	<ul style="list-style-type: none"> • Lack of access to technology • Poor internet connectivity • Limited digital skills 	<ul style="list-style-type: none"> • Economic disparities • Lack of infrastructure • Power outages • Insufficient government investment • Inadequate teacher preparation • Cultural barriers 	<ul style="list-style-type: none"> • Emergency preparedness • Technology training • Investment in infrastructure • Increased accessibility • Support for international students
Gan & Sun, (2021)	<ul style="list-style-type: none"> • Lack access to essential technology: computers and reliable internet connection • Slow internet speed • Technical issues related to software and hardware • Lack the necessary digital skills to navigate online learning environments effectively 	<ul style="list-style-type: none"> • Low socio-economic status • Limited access to resources • Family responsibilities • Disruption of public access points • Institutional barriers 	<ul style="list-style-type: none"> • Mobilizing resources for internet access • Institutions should implement programs that offer free laptop computers and updated software to students • Extended IT support • Creating opportunities for student interaction

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Moonasamy & Naidoo, (2021)	<ul style="list-style-type: none"> Lack of internet access to basic digital tools Lack of skills 	<ul style="list-style-type: none"> Location (rural areas) Power outages Poverty-stricken communities High data cost 	<ul style="list-style-type: none"> Public and private partnership for Online provision Training programs – both teacher and student Investment in technology infrastructure
Katz, et al., (2021)	<ul style="list-style-type: none"> Slow internet connectivity Lack of digital devices Lack of Familiarity with Online Learning 	<ul style="list-style-type: none"> Financial hardship Prior Experiences of Being Under-Connected 	<ul style="list-style-type: none"> Universities should provide resources or support for students to secure reliable internet connections and access to necessary technology. Institutions should offer technical support to help students navigate online learning platforms and troubleshoot any issues they encounter Institutions should consider offering training programs or resources to help students develop their digital skills
Rahman, (2021)	<ul style="list-style-type: none"> Low internet connectivity (rural areas) Lack of digital devices Lack of Digital Literacy 	<ul style="list-style-type: none"> Lack of Investment in Digital Infrastructure and lack of government support Geographical Disparities Economic Constraints Irregular electricity High cost of data plan 	<ul style="list-style-type: none"> Enhance digital infrastructure to support online learning Reduction of data cost Development of Innovative Techniques and Tools Student-Friendly Content
Sumra, et al., (2022)	<ul style="list-style-type: none"> Poor internet access inadequate internet coverage (remote areas) Lack the necessary digital skills 	<ul style="list-style-type: none"> Geographical inequality Economic vulnerability Limited institutional preparedness Inadequate government policies Insufficient digital infrastructure 	<ul style="list-style-type: none"> Development of online curriculum Investment in infrastructure Digital literacy programs
Alam, et al. (2023)	<ul style="list-style-type: none"> Lack of access to technological devices Inadequate internet Connectivity Digital literacy deficiency 	<ul style="list-style-type: none"> Financial constraints Infrastructural limitations Insufficient government initiatives and support for technology integration in education 	<ul style="list-style-type: none"> Government subsidies for technology access Increased digital literacy training Improved internet infrastructure

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<p>Garcia Zara, (2023)</p>	<ul style="list-style-type: none"> • Lack of access appropriate technology devices • Lack reliable internet service at home • Lack of digital competencies 	<ul style="list-style-type: none"> • Economically disadvantages background • Inadequate infrastructure • Insufficient digital skills training • Lack of institutional support • Social and health impacts of the pandemic 	<ul style="list-style-type: none"> • Enhancing access to technological devices (with support university and government authority) • Improving internet connectivity • Implement digital skills training program • Continuous assessment of the digital divide a its impact on educational outcomes
<p>Müller, (2023)</p>	<ul style="list-style-type: none"> • Less digital access • Lack of quality of digital equipment 	<ul style="list-style-type: none"> • Low socioeconomic status • Institutional support limitations 	

Source: Authors

The included studies revealed two primary digital divide challenges (first and second level digital divide) faced by students of the higher institutions amidst the pandemic, along with three major causes (financial constraints, geographical location and technological infrastructure) for these challenges.

Challenges

First level digital divide – accessibility of internet and digital devices:

The first level digital divide presents two primary issues for students, namely a lack of digital devices and limited internet connectivity. In accordance with the results of the study, it has been seen that students in multiple nations encounter difficulties arising from the digital access divide. This issue has been observed among university students belonging to Pakistan, the United States, Bangladesh, South Africa, India, Peru, and the Philippines ([Alam et al., 2023](#); [Asher, 2021](#); [Gan & Sun, 2022](#); [García Zare et al., 2023](#); [Gocotano et al., 2021](#); [Moonasamy & Naidoo, 2022](#)).

The inadequate availability of digital devices contributes to diminished academic performance among university students. This problem had significant effects on their capacity to attend online classes, engage in virtual discussions, and submit assignments on schedule. Students without personal computers or smartphones had to rely on shared devices or smartphones with limited data plans, making it difficult to keep up with the demands of online learning ([García Zare et al., 2023](#)). As per the research conducted by [Gocotane et al. \(2021\)](#) and [Rahman, \(2021\)](#), a significant trend is the predominant use of mobile phones, with examples

like 78% in the Philippines ([Gocotano et al., 2021](#)) and 82% in India ([Rahman, 2021](#)) for online class participation and academic activities.

Hence, students may encounter challenges in successfully accomplishing their academic responsibilities, such as effectively engaging in online exam, making assignments, and delivering timely PowerPoint presentations. According to [Alam et al. \(2023\)](#), a significant proportion of students, approximately 59 percent, encountered difficulties in submitting their academic work on time in an e-learning environment. In addition to that, a low or unreliable internet connection, hence posing challenges for students in terms of accessing online materials and engaging in virtual classrooms with smoothness and efficiency ([Gocotano et al., 2021](#)). Consequently, these challenges led to unfavorable academic consequences, such as receiving poor grades or experiencing unfavorable outcomes in their academic performance.

However, research conducted by [Said \(2021\)](#) found that students' academic performance, as measured by their grades, was not negatively impacted despite the challenges posed by limited digital infrastructure and a lack of experience with online education.

Second level digital divide – Digital competency and skills:

The digital capability divide, also referred to as the second level digital divide, is a concept that concerns the level of technological literacy and computing proficiency that individuals possess ([van Dijk, 2020](#)). Students who possessed limited knowledge and experience with digital tools and platforms encountered challenges when attempting to navigate online learning environments. Their limited competence in utilizing social

networking sites, learning management systems, and video conferencing platforms posed a hindrance to their capacity to actively engage in online educational settings ([Alam et al., 2023](#); [Gan & Sun, 2022](#)).

Moreover, [Gocotane et al. \(2021\)](#) discovered that a significant proportion of students (40%) possessed limited computer literacy skills, which could potentially hinder their proficiency in fulfilling various academic responsibilities, such as creating videos and presentations using diverse platforms. According to [Asher \(2021\)](#), it was observed that students in Pakistan were unprepared for the challenges posed by online learning. The majority of individuals experienced frustration due to their inability to comprehend writing assignments on online platforms.

Causes

Financial constraint:

During the COVID-19 pandemic, the digital divide among university students was significantly impacted by economic constraints ([Alam et al., 2023](#)). A significant number of students coming from economically disadvantaged backgrounds had financial constraints that hindered their ability to acquire digital devices and continue internet access. Consequently, students encountered difficulties in accessing online educational resources and participating consistently in virtual instructional sessions ([Alam et al., 2023](#); [Gan & Sun, 2022](#); [Katz et al., 2021](#)).

During the pandemic, pupils only able to cover their basic needs, difficult to afford the good internet connectivity to continue their education online platform, as a result they difficult submit their academic work on time ([Gocotano et al., 2021](#)). Due to financial limitation, a

significant number of students share their desktops or laptops at home with their siblings, resulting in a limited amount of time to complete academic activities such as sending emails, accessing instructional courses, and completing academic assignments([Asher, 2021](#)).

Geographical location:

A substantial factor contributing to the exacerbation of the digital disparity has been the geographical location, particularly in rural and remote regions. The presence of inadequate technological infrastructure in these locations has led to the emergence of slow or unreliable internet connections, hence posing challenges for students in terms of accessing online materials and engaging in virtual classrooms with smoothness and efficiency. [Moonasamy & Naidoo \(2022\)](#) asserted that a significant proportion, approximately 58 percent, of students coming from rural regions express dissatisfaction with online education mostly due to inadequate connectivity to the internet. Consequently, these students have difficulties in achieving academic success when compared to their urban counterparts.

Technical infrastructure:

The digital divide is influenced by the availability and quality of technology infrastructure, including power supply (electricity supply) and steady internet connectivity. Power is an essential component within the context of digital platforms. Frequent power outages can have an adverse effect on online learning. According [Ashar, \(2021\)](#), power outages are a common occurrence during the summer season in Pakistan. A significant number of students rely on reconditioned desktop computers that can only

function when there is a continuous supply of electricity. The efficacy of distance teaching and learning in Pakistan has been substantially impeded by the challenges of limited resources, frequent power outages, and inadequate connectivity. Students who experienced unreliable broadband internet connections encountered greater difficulties in effectively navigating and accessing online course platforms ([Katz et al., 2021](#)).

Discussion

Due to COVID-19 outbreak, the conventional leaning pattern has been shifted to online distance learning and this has increased the dependency of the persons on digital sources ([Müller et al., 2023](#)). Based on the study of [Alam et al., 2023](#), pupils who do not have or have limited access to the advancement in digital resources experience a setback of their learning and academic accomplishments compared to students who enjoy easy access to the said resources. This systematic review synthesized findings from several studies, indicating the digital divide challenges that students encountered in adapting to online learning. The discussion focuses on the consequences of these challenges, the underlying causes and potential strategies for addressing the digital divide.

An important obstacle that has been highlighted is the insufficient availability of essential digital devices and reliable internet connectivity. A significant number of students, especially those from socioeconomically disadvantaged families, faced challenges in engaging in online classes due to insufficient resources, such as a lack of digital devices and limited internet access. The problem was worsened in rural regions, where there

is generally a lack of technical infrastructure. For example, a significant proportion of students, particularly those from rural regions, lack of digital devices for online learning ([Gocotano et al., 2021](#); [Moonasamy & Naidoo, 2022](#)). This is in line with previous research, which indicates that families with lower incomes are more likely to rely on smartphones and frequently lack access to multiple internet-enabled devices, such as tablets, PCs, or laptops ([Anderson & Kumar, 2019](#)). Due to the disparity in digital devices for academic work, students tend to have lower average grades ([Gonzales et al., 2020](#)).

Besides access limit, the review of the literature reveals that students' digital literacy remains another factor due to which students cannot conveniently access and utilize online learning platforms ([Asher, 2021](#); [Gan & Sun, 2022](#)). According to [Asher's \(2021\)](#), many students claimed lack of preparedness to undertake online learning and struggling with certain technologies and learning platforms. Such a state of unpreparedness is not only reveals in the ability to contribute to the learning processes, but also results in frustration and isolation. However, study conducted by [Said, \(2021\)](#) indicates that, Despite students' limited access to digital devices or technological infrastructure and their limited or no prior experience with online learning, they showed the same academic performance as far as grades are concerned.

The present study investigates three primary factors contributing to the issues of the digital divide: financial constraints, geographical disparities, and lack of technology infrastructures. Financial limitations have arisen as a major obstacle, preventing students from obtaining the digital devices and internet connectivity. Specifically, pupils from poor

socioeconomic backgrounds tend to have limited access to digital resources compared to their peers from middle or upper-class backgrounds ([Gonzales et al., 2020](#); [Robinson et al., 2020](#)). They have expressed that they prioritize fulfilling their fundamental requirements rather than accessing educational materials, hence further restricting their capacity to participate in online learning. According to [van Dijk \(2020\)](#), an uneven allocation of resources results in disparities in access to digital technology. This, in turn, can lead to unequal involvement in society, exacerbating existing inequalities in resource distribution.

Geographical disparities also play a vital role, as students in rural and remote areas often face additional obstacles related to connectivity and technological infrastructure. Previous research suggests that the majority of students in many nations, particularly those in rural regions, are unable to connect to the internet ([Esteban-Navarro et al., 2020](#); [Ruiz-Martínez & Esparcia, 2020](#)). Sri Lanka serves as a notable illustration of differences in internet access across urban, rural, and estate sectors. In 2021, the estate sector had a lesser utilization of internet in comparison to urban and rural locations. The estate sector had a utilization rate of 26% for internet, whereas urban areas had rates of 61.2% for internet, and rural regions had rates of 42% for internet % ([Department of Census and Statistics, 2021](#)). Consequently, these regional differences have an adverse impact on pupils originating from remote and rural regions.

In order to address the digital divide among students, higher education institutions must implement an active strategy. Recommendations from the reviewed studies emphasize the importance of investing in technological infrastructure, providing financial support for

students, and enhancing digital literacy training programs. For example, while [Said \(2021\)](#); and [Gan & Sun, \(2021\)](#) provided guidelines on what institutions should do to enhance online learning, institutions should train their students on the technological competence, and adequate facilities should be in place to meet the technological needs of the students. Hence, institutions need to adopt policies such as provision of cheap or free internet connection, provision of digital equipment and training that would prepare the students with necessary skills to succeed in online classes.

In addition, the development of sustainable solutions that address the digital divide necessitates collaboration among educational institutions, government agencies, and private sector stakeholders. Policymakers should prioritize investments in technology infrastructure, particularly in marginalized areas, to ensure that all students have equitable access to educational resources ([García Zare et al., 2023](#); [Moonasamy & Naidoo, 2022](#)).

In general, the future of online education is significantly impacted by the challenges presented by the digital divide during the COVID-19 pandemic. Higher education institutions can establish a more inclusive and equitable learning environment that enables all students to succeed by comprehending and resolving these challenges. Continued research is necessary to monitor the evolving nature of the digital divide and to inform ongoing efforts to enhance access and equity in higher education.

Limitation

This study contains certain constraints that should be acknowledged. Initially, it primarily focuses on the challenges faced by

university students, which may restrict the understanding of the digital divide to a narrow perspective; future research should incorporate insights from educators and institutional stakeholders to offer a more inclusive view of the problems arising from the quick change to online learning during the pandemic. Furthermore, the review is restricted to research that has been published in journals and undergone peer review, potentially omitting valuable information from grey literature, conference proceedings, or books that could offer alternative viewpoints on the issues encountered by students and the effectiveness of strategies implemented to address the digital divide. Furthermore, the review's focus on English-language publications may introduce a language bias, leading to the exclusion of relevant studies published in other languages and, consequently, important insights from non-English-speaking regions. Finally, this study investigates the difficulties linked to the digital disparity amid the COVID-19 epidemic, it is crucial to recognize that the digital inequality is a complex and evolving issue influenced by technological advancements, policy changes, and socioeconomic factors, necessitating ongoing research beyond the pandemic period to fully understand these dynamics.

Conclusion

The COVID-19 has catalyzed a rapid change to online learning, exposing and intensifying the pre-existing digital divide among university students. This systematic review has identified critical challenges faced by students, including limited access to digital equipment, inadequate internet connectivity, and varying levels of digital competency. These challenges

have significant implications for students' academic performance and overall educational experience, particularly for those from economically disadvantaged backgrounds and rural areas.

Overall, the pandemic taught educational institutions the importance of having a possibility plan to survive with future unanticipated situations similar to COVID-19. To address the issues arising from the digital divide, it is crucial to implement a comprehensive approach that combines community involvement, educational institutions, and partnerships between the government and private sector. This approach aims to ensure equal access to digital learning environments and enhance academic performance for all students. To enhance the accessibility and affordability of digital resources for university students, it is crucial for the government to offer financial assistance. Moreover, it is crucial for universities to build partnerships with telecommunications and internet service providers in order to offer affordable or complimentary Wi-Fi access to university students. Furthermore, educational institutions employ a comprehensive program to train teachers and staff in IT capabilities, providing efficient technical assistance. In addition, community members should utilize public libraries to obtain free digital devices and establish community centers with complimentary computers and internet access. These levels of collaboration are essential for closing the digital divide. Furthermore, it will be critical to maintain the dedication to narrowing the digital disparities in order to promote a higher education system that is both inclusive and resilient during the post-pandemic era.

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**Social Media in Higher Education: A Study on Use of Social Media by
New Entrants at the Faculty of Dental Sciences, University of
Peradeniya, SRI LANKA, during the COVID-19 Pandemic**

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Abstract

The transition to online education prompted by the COVID-19 pandemic had a negative impact on educational institutions globally, especially in developing countries. The absence of formal online learning management systems (LMS) in many of these institutions presented significant challenges. In response, many educators and higher educational institutions turned in to social media platforms and other digital tools to continue providing education and support the learning process. The present study attempts to understand social media behaviour of new entrants to the faculty of Dental Sciences of University of Peradeniya, more specifically for fulfilling their information need related to academic programs during the CORONA outbreak. The study was carried out at the Faculty of Dental Sciences during the library orientation program for new entrants. Although 117 undergraduates registered with the dental library for the academic year 2022/2023, only 112 students participated in the survey. An online questionnaire made with Google Forms was administered among the research sample.

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According to key findings, WhatsApp, Facebook, and Research Gate were the most popular social media platforms used by Dental Science new entrants for the purpose of academic information during the COVID-19 pandemic. More specifically, 65% of them had been used these online platforms as a tool of searching scientific and academic information related to their academic programs. There were some positive impacts of using social media for academic purposes. One significant benefit was that social media helped them to maintain better relationships with their peers during the CORONA pandemic, facilitating peer support and collaboration etc. However, the students have perceived some negative impacts of social media as well i.e. students found social media to be quite time-consuming. Despite the potential of educational benefits of social media, the study indicated a gap in awareness and utilization of them for academic purposes. A significant proportion of students, about 35%, were not aware of the educational potential of social media. The majority of respondents appeared to prioritize using social media for entertainment rather than accessing educational content or utilizing academic features available on these platforms. On top of these findings, it can be recommended that educational institutions and policymakers in Sri Lanka consider strategies to harness the educational potential of social media for undergraduates. By raising awareness and encouraging the use of social media for academic purposes, they could enhance the learning experience and make better use of digital tools to support education in the context of ongoing and future disruptions.

Keywords: Social Media, COVID 19, Undergraduates, Dental Sciences, Sri Lanka, University of Peradeniya

Introduction

In the contemporary world, social media is performing a significant role in altering each and every aspects of human life. As [Boyd & Ellison \(2008\)](#) identified, these are profile-based websites that allow users to maintain social relationships by viewing, visiting, and sharing their lists of social connections with other members. As [Hamade \(2013\)](#) explored these sites can be used for work-related issues, personal issues, romantic relationships, and shared interests such as music, arts, sports, politics, etc. [Lawson & Murray \(2018\)](#) highlighted the application and potential of Social media in higher education. “Social media is one of advancements in technology that has been instrumental in enhancing communication, collaboration, entertainment. Social media is now being widely used in educational endeavors” ([Lawson & Murray, 2018, p.69](#)).

As of today, social media has become a crucial component of many people’s daily lives. It is fair to say that this situation became more acute during the CORONA outbreak. The COVID-19 pandemic significantly transformed the higher education system on a global scale. As this sudden and unprecedented emergence of the pandemic, most of the higher educational institutions of the world had to rapidly transition to online and remote learning to ensure the safety of students and educators. In response to the unexpected outbreak, libraries, like other service-oriented organizations, were compelled to find better alternatives to continue providing their services ([Dharmarathne, 2021](#)). Therefore the ultimate goal of this study was to examine the way of using social media platforms for learning purposes during the CORONA outbreak by the first year undergraduates of the faculty of Dental Sciences of the University of Peradeniya. The study encompasses some specific objectives

as well, i.e. to understand the way of using different social media platforms by new entrants in the faculty of Dental Science specifically for obtaining learning information during the CORONA outbreak, to explore the communication patterns students used on social media platforms to share academic information with their peers and to investigate the perceived positive and negative impacts of social media among dental science new entrants. Since this is an emerging and sudden phenomenon, limited studies have been undertaken in the Sri Lankan context to understand the social media behavior during the COVID-19 pandemic by undergraduates of the university system in Sri Lanka, more specifically for the purpose of learning activities.

Review of Literature

Social media or social networking sites are no longer a new concept in today's information-driven world. It has become a part of daily life in many countries and plays an essential role in building social relationships, work, and gathering information ([Boulianne, 2015](#)). As [Boyd & Ellison \(2007\)](#) highlighted, the ultimate goal of social networking sites was to connect people based on common language or shared racial, sexual, religious or nationality-based identities, shared interests, political views and activities. Unlike in the past, social media's intervention in higher education has dramatically changed over the past decades. The situation has become more acute and transform in to a technological revolution with the sudden emergence of COVID-19 outbreak. Due to this sudden and unprecedented challenge, most of higher educational institutes all over the world have compelled to choose better alternatives to sustain their educational programs rather than continuing of conventional practices. As a result, the COVID-19 pandemic has driven policymakers, university administrators, and higher education institutions to

explore alternatives to the traditional in-person classroom learning system ([Sobaih et al.](#)). [Sobaih et al. \(2020\)](#) further states that the global COVID-19 pandemic has compelled higher education institutions to transition from face-to-face to online learning. However, many public institutions, particularly in developing countries, often lack access to formal online learning management systems (LMS) necessary for facilitating communication between students and faculty members. As [Lawson & Murray \(2018\)](#) discovered there are four effects of social media on learning namely; increased student engagement, new knowledge acquisition, life-long learning, and meaningfulness of learning with expert access. Most of the studies that have been undertaken to examine the way of using social networking sites for higher education during the CORONA outbreak and Post COVID period have proved the above statement with substantial evidences.

[Pallathadka \(2020\)](#) carried out a research at the Manipur International University in India to explore the use of social networking sites and video apps by the undergraduate students for online learning during the CORONA lockdown. A total of 188 undergraduates participated in the survey. A questionnaire made with Google forms was used as main data gathering instrument. According to findings, majority of undergraduates agree that the lecturers facilitate learning through video apps like Zoom, Google Meet, LMS, or Edmodo. Also they accept that their learning is exceptional when using social media and that social media gives satisfaction to them. Students believe that social media empower them as citizens. Majority of the respondents feel that every online session makes the domain knowledge grow. Further they believe that they can apply the knowledge obtained from online classes to real-life situations.

Another qualitative study was undertaken by [Papademetriou *et al.* \(2022\)](#) to examine the way of using social media by academic staff and students at a higher education institution in Cyprus during the COVID-19 outbreak. Researchers found that social media has positively impacted in four ways to sustain the educational process and quality of education during the COVID-19 pandemic. The four positive impacts are (a) promoting teaching and learning, (b) motivating students to be active participants, and (c) establishing connections in the university community. According to their findings almost all students of the Cyprus universities have effectively utilized social media for teaching and learning activities during the Corona Outbreak. Research outcome shows that 100% of undergraduates of Cyprus universities have extensively used social media for three major purposes during the pandemic i.e. academic and learning purposes, connecting with colleagues, students, peers, and other academics.

In line with above studies, [Zarzycka *et al.* \(2021\)](#) conducted an online survey based on some selected universities in Poland to understand the role of social media in facilitating students' communication and collaboration during the COVID 19 pandemic . A total of 234 students participated in the survey. The researchers discovered that the growing use of Facebook for professional purposes enhances students' communication and collaboration in distance learning courses. The students had been used Facebook and LinkedIn social media platforms as a mode of communication to share ideas with their teachers during the CORONA outbreak.

With the unprecedented emergence of the COVID-19 pandemic, most of the countries in East Asia and Africa faced severe difficulties in sustaining

their economies, education and public health in compared to those of countries in the West globe. [Aduba & Mayowa-Adebara \(2021\)](#) carried out a research at the Delta State University in Nigeria to examine the way of using social media and challenges faced in using novel technology by the LIS students and the academia during the COVID 19 pandemic. The study found that, unlike in the past, the novel communication modes such as WhatsApp, Telegram are heavily used by the LIS educators for delivering online lectures during the period of CORONA lockdown. Students highlighted several benefits of receiving lectures through online platforms such as “lecturers are always available, opportunity to store lectures and files for re-use at convenience, collaborative learning, sharing learning materials, freedom in asking lecturer questions, and conducive learning at home” etc. (pp.01). However, students faced several challenges with online lectures, including not having a Smartphone or Android phone, being overwhelmed by the large amount of available learning materials, receiving too many messages during lectures, the high cost of purchasing data for each session, the time-consuming and eye-straining nature of online learning, and frequent network failures.

[Karimeldin et al. \(2022\)](#) conducted a cross-sectional descriptive study at the College of Medicine, University of Bisha (UBCOM) in Saudi Arabia to evaluate social media usage and its impact on male medical students' learning during the CORONA lockdown. According to findings, majority of male undergraduates commonly used Twitter for teaching and learning activities followed by YouTube and Facebook. Most of students confirmed that social media has positively affected to enhance their learning activities during COVID-19.

In the Sri Lankan context, so far there have few studies been undertaken to examining the way of using social networking sites for teaching and learning purposes during the COVID-19 pandemic. ([Nafrees et al., 2020](#); [Sellahewa et al., 2021](#); [Rathnakara, 2023](#); [Ilangarathna, et al., 2022](#); [Mufassirin et al., 2023](#)). A quantitative descriptive study was carried out by [Ilangarathna, et al., \(2022\)](#) to investigate the students' satisfaction with their online learning experience at Sri Lankan universities during the COVID-19 pandemic. Undergraduates who were studying in the faculties of Engineering of six state universities in Sri Lanka were selected for this survey. As researchers observed students' participation in the online classes were very low in the initial stage of COVID, however it was gradually improved over the time. Most of students had to face some obstacles in participating online classes such as malfunctioning of devices, power outages and sharing among family members when accessing their digital devices. Further, accessing a proper internet connection, problems associated with the connectivity, data package limitations, inability to purchase an internet connection are some of the other major drawbacks encountered by the students. A quite similar study was carried out by [Sellahewa et al. \(2021\)](#) at the Sabaragamuwa University of Sri Lanka by using 85 postgraduate students. They found that the majority of respondents (65%) were satisfied with online education during the CORONA lockdown. They rated Zoom online console as most preferred platform for their online education due to the user friendliness. Poor internet connectivity (56%) and lack of concentration (34%) than the physical mode were the main issues encountered by postgraduates when they engaged in online education. Based on the outcomes, the researches recommend developing any virtual reality applications for online learning including the features that the student's desire for an effective learning experience. [Nafrees et al. \(2020\)](#) conducted a

survey by using 310 of undergraduates at the South Eastern University of Sri Lanka. Based on the outcomes, the researchers confirmed that most of the undergraduates of the Arts stream prefer to have online education, as because most subjects do not have practical. Also students emphasized that they are getting enough support from the academic staff in online education and online education allow them to easy access to subject materials. In a study undertaken by [Rathnakara \(2023\)](#) using 332 undergraduates studying at Management faculties of non- state universities in Sri Lanka identified certain issues in online education during COVID-19 pandemic. Lack of student participation, lack of face-to-face contacts, internet connectivity, and technological concerns were some of the main issues of online education as encountered by the Management undergraduates of non-state universities in Sri Lanka. By the way, they have pointed out some positive impacts of online education. The most significant benefit as raised by the respondents was the ability to work flexible hours. [Mufassirin et al. \(2023\)](#) found a significant association between the time spent on social media and students' performance during the pandemic. The researchers emphasized that overblown social media use, leading to addiction were the main drawbacks that significantly negatively affects to academic performance of the students. The researchers carried out this quantitative cross-sectional survey by using 570 respondents from nine state universities in Sri Lanka.

Methodology

The total population of new entrants registered for the academic year 2022/2023 of Dental Sciences faculty of University of Peradeniya was selected for the study. In order to obtain forthright, independent, and

anonymous answers, a three-page structured questionnaire made by using Google Forms was administered among the research population during their library orientation program conducted in February 2023 and it was administered via Email and WhatsApp communication modes. The questionnaire consisted of both open and closed ended questions. Out of the 84 female and 33 male students who registered as new entrants in the Dental Science library, only 112 students attended the library orientation program. Hence, the final research sample comprised 112 respondents. The Statistical Package for the Social Sciences (SPSS) version 23 was utilized to calculate frequencies, percentages, tabulations, and other statistical measures.

A Brief Introduction to the Faculty of Dental Sciences (FDS) of University of Peradeniya

The faculty of Dental Sciences of University of Peradeniya considered the pioneer institution which plays a leading role in Dental Science education in Sri Lanka. The Dental School was founded in 1943 as an extension of the Department of Dental Surgery within the faculty of Medicine at the University of Ceylon, Colombo. When the faculty of Medicine at Peradeniya was established in 1961, the Dental School also became an academic department within the faculty. Consequently, the Bachelor of Dental Sciences degree began to be awarded by the University of Ceylon, Peradeniya. In 1980, the Dental School was divided into five distinct academic departments and by October 1986, it achieved the faculty status. At present the FDS comprised 07 Academic Departments, 05 Units & 02 Centers. By 2023, the undergraduate population of the faculty was 456 and the total academic staff population was 61 ([University of Peradeniya, 2024](#)). Although several faculties of Medicine exist in Sri Lanka, the faculty of Dental Sciences at the University of

Peradeniya was the country's sole institution dedicated exclusively to dental education until 2021. The University of Sri Jayewardenepura was established a new Dental faculty, marking its ninth faculty and becoming the second dental faculty in the country ([University of Sri Jayewardenepura , 2024](#)).

Results and Discussion

Demographic Information and Response Rate

As all administered online questionnaires could be collected at the end of the library orientation program, the response rate was 100%. Of the one hundred and twelve respondents (112), eighty (71.42%) were female and thirty-two (28.57%) were male. The majority of the students (90.7%) represented in the 21-24 age group and rest of them (9.3%) were in the 17-20 age group.

Availability of User Accounts on Social Networking Sites

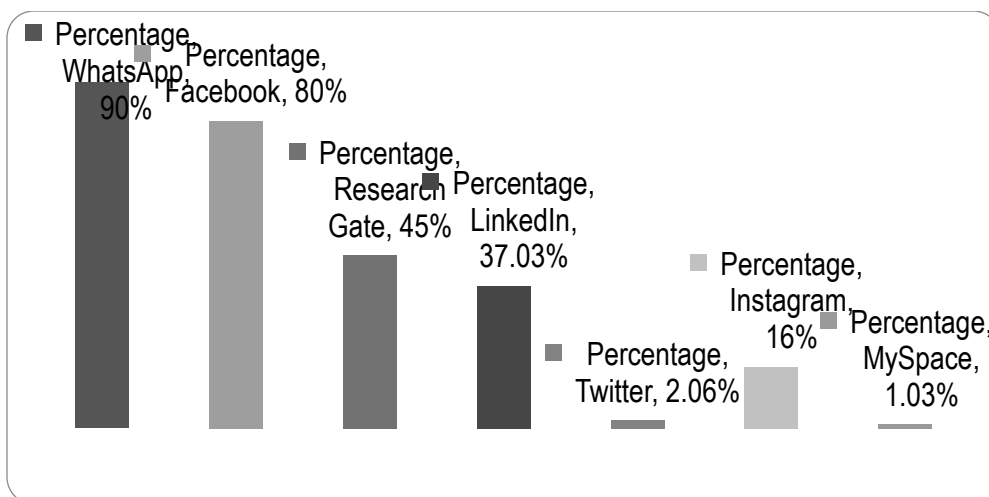
Respondents were asked to state whether they are maintaining user accounts on social networking sites. According to results revealed, WhatsApp was the most popular Social media platform used by the vast majority of Dental science undergraduates (90%), whereas Facebook (80%) was the second most favorite SM platform among the new entrants. ResearchGate (45%), LinkedIn (37.3%), Twitter (18.7%) and Instagram (16%) were in the third level category of preference. Availability of user accounts on Twitter (2.6%) and Myspace (1.3%) was very low.

Beside this, the faculty instructed all students to familiarize themselves with the Zoom platform, as it would be used for delivering online lectures. Therefore all undergraduates were having engaged in online education via the

Zoom online platform during the CORONA outbreak. None of the respondents had an account on Flickr. Accordingly, WhatsApp and Facebook were the most popular social media platforms among the Dental Science new entrants in the academic year 2022/23. Eighty percent (80%) of respondents reported keeping their social media accounts secure by restricting access to authorized friends and family, thereby ensuring privacy and control. On the other hand, 20% of respondents indicated that they are not concerned about the privacy and security of their social media accounts, hence anybody can view and post on their accounts without getting prior approval and restrictions. The majority of respondents (62.3%) indicated that they have not included their parents in their list of fans but 37.7% mentioned that they have retained their parents.

Figure 01:

Availability of User Accounts on Social Networking Sites

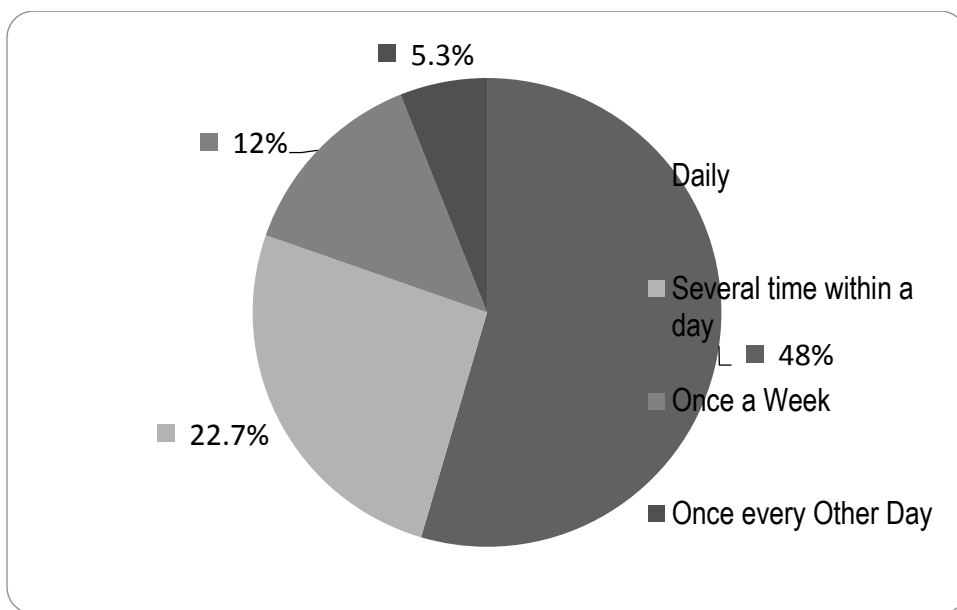


Frequency of Visit Social Media Accounts

In terms of visiting and posting on SM accounts, forty-eight percent (48%) of respondents tend to open their accounts daily basis while 22.7% visit their accounts several times a day. Twelve percent of respondents (12%) open their accounts once a week and 5.3% open accounts in once every other day. With regard to posting and sharing on social media accounts, 58.7% of respondents expressed that they rarely post and share on their accounts. Twenty-four percent (24%) of respondents post on their accounts once a week. About 10.7% of respondents post and share on their accounts once a day while only 1.3% of the respondents post and share many times a day. However, 2.7% expressed that they do not like at all to post on their account

Figure 02 :

Frequency of Visit Social Media Accounts



Purpose of Using Social Media

Respondents were asked to reveal the purposes of using social media. Results show that, majority of first year undergraduates of the faculty of dental Sciences use social media for entertaining purposes (81%). Sixty five percent of them (65%) use them for searching the scientific and academic information related to their subject matters.

Table 01:

Purpose of using Social Media

Purpose of Using Social Media (Top five reasons)	Number	Percentage (%)
Entertainment	91	81%
Scientific & Academic Information	73	65%
Sports Related Information	27	24%
Current Affairs	22	20%
Political/Economic/Business Information	7	5%

Another 24% of members like to view sports related information on social media. Twenty percent (20%) of respondents use social media to access local and international news, current affairs, and similar content, while another 5% of respondents liked to access political and business information through social media.

Using Social Networking Sites for Learning Information during CORONA Outbreak

The primary goal of this study is to explore how new entrants of the Faculty of Dental Sciences used various social networking sites for information activities, specifically for learning purposes, during the COVID-19 pandemic. Since the closure of the university and libraries, students had

force to explore the alternative information avenues to satisfy their information needs, specifically related to their academic programs.

It is evident that, not only in Sri Lanka but in the global context, social media exist and perform a leading role as an alternative information provider during such a hard situation of the CORONA outbreak. Hence, like many other countries, most of the undergraduates of Sri Lankan universities were also compelled to access these platforms not only for merely entertainment activities but also for the academic purposes. According to results revealed, 65% members expressed that they had been extensively used social media for searching information relating to their academic programs.

Table 02:

Use of Social Networking Sites for Learning Information during CORONA Outbreak

Use of Social Networking Sites for Learning Information during CORONA Outbreak (Top five activities)	Number	Percentage (%)
Viewing Video Clips on YouTube	49	44%
Discussing subject matters with peers using online Chat Consoles	36	32%
Exchange Lecture notes, Handouts & Study materials with friends	24	21%
Making video calls for Academic Purposes	05	04%
Exchange ideas with Teachers and Tutors using WhatsApp, Facebook Messenger etc.	05	04%

By the way, 35% of respondents said that they had not even an idea about using social media for academic information or learning activities. Of

the respondents, who have used social networking sites for learning information during CORONA outbreak, 44% expressed that they access YouTube for viewing video clips in relation to their academic programs. Another thirty two percent (32%) of respondents had used online available Chat consoles e.g. Messenger on Facebook, WhatsApp etc. for sharing ideas with peers in relation to educational and subject matters. Twenty one percent (21%) of students had used social media to exchange the lecture notes, handouts and assignments etc. with their friends. Less number of respondents (4%) had used social media for making video calls for academic purposes and another 4% of them had used it as a platform to exchange ideas with their teachers and tutors eg; Messenger on Facebook and WhatsApp, when it needed further clarification of lectures delivered via Zoom.

Positive and Negative Impacts of Social Media

The present study offers insights into how respondents perceive both the advantages and disadvantages of social networking sites. According to key findings; a large majority, 88% of respondents believe that social media platforms helps them to maintain a better relationships with their friends. Of the respondents, 43% considered that social media as a good platform for maintaining better relationships with family and close relatives.

Table 03:

Positive and Negative Impacts of Social Media

Positive Impacts of Social Media		
Impact	Number	Percentage
Social networking sites helps to maintain better relationships with peers	99	88%
Social media is a good platform for maintaining better relationships with family and close relatives	48	43%
Sports	27	24%
Best and easiest way to get involved in social activities	36	32%
Effectively use social media as a platform to market and publicize cultural events to interest groups and engage in activities performed by others.	18	16%
Easy to involve in political activities through social networking sites	07	06%
Negative Impacts of Social Media		
Impact	Number	Percentage
maintaining social media accounts is time-consuming matter	74	66%
Social media behavior adversely affects in ability to focus on the studies	31	28%
Social media is one of the reasons for breakdown social relationships.	05	04%

Another 32% of respondents believe that social media is the best and easiest way to get involved in social activities. This could include joining groups or participating in events related to shared interests or causes. About 16% of respondents have effectively used social networking platforms to market and publicize of their cultural events among the interest groups and engage in same activities performed by others. A smaller percentage, 6%, of

respondents believed that they can involve in political activities through social media. Some negative impacts of social media were also highlighted by the respondents. Of them, the most significant negative impact is that 66% of them believe that maintaining social media accounts can be time-consuming. Approximately 28% of respondents are in a view that social media behavior adversely affects their ability to focus on the studies. This implies that social media can be a distraction from academic responsibilities for a substantial portion of respondents. A few number of (4%) of respondents indicated that social media is one of the major reasons for the breakdown of their social relationships.

Conclusion and Recommendations

Findings of the study confirmed that, most of the Dental science new entrants of University of Peradeniya have an adequate awareness and enough technical competencies in operating the different kind of social media platforms and their potential for higher educational activities. They are familiar with various kinds of social media platforms and their functionalities. In compared to other countries in Asia and the West, even though numerous types of social media platforms available in the modern information context, so far only a few types of social media platforms are popular among young adults in Sri Lanka i.e. Facebook, WhatsApp, Instagram etc. This global picture of social media behavior of young adults was further confirmed by the findings of this study. Even though social media has many potential for learning activities, the findings indicate that a relatively significant number of students were not aware of its importance and relevance for educational activities. Further, the findings confirm that, majority of Dental Science new

entrants primarily use social media for entertainment and recreation activities. During the COVID-19 pandemic, even alternative information sources were needed, it appears that social media was not widely recognized or utilized for educational purposes by students. The majority of new entrants seem to prioritize the use of social media for entertainment rather than for accessing educational content or features available on these platforms. Based on these findings, it can be suggested for educational institutions and policy makers in Sri Lanka to explore ways to promote the educational potential of social media platforms among students. This could involve initiatives in raising the awareness of available educational resources and encourage their use for learning purposes. In addition to that, understanding which specific social media platforms are popular among students can inform targeted educational strategies and interventions.

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