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A Bibliometric Analysis of Global Scientific Literature on Substance Abuse among School Students Based on PubMed Database (1991-2021)

K. Murugathas[1]

Abstract

The purpose of the study was to carry out a bibliometric analysis of the global scientific literature on substance abuse among school children to understand the global research trend on the subject. Bibliographic data of journal articles related to the study topic published during 1991-2021 were retrieved from PubMed database. Data were analyzed using the Bibliometrix R package and MS Excel. The study identified annual growth of publication trends, top authors, leading institutions, Core journals, most contributing countries, and the country collaboration in the research activities on this subject. A total of 3,326 records were selected for the analysis. The annual growth of publications was increasing in trend. Lowry Richard from USA was the most contributing author based on the highest number of publications. The USA was the most productive country publishing the highest number of articles (2408 articles) and the highest international country collaboration with 49 countries all over the world. The University of California was the leading institution (874 articles) in this study.

[1] Deputy Librarian, University of Jaffna.
Email: komathym@univ.jfn.ac.lk https://orcid.org/0000-0002-7252-0342

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The study identified that the journal titled ‘Addictive behaviors’ was found to be the top journal with the highest number of publications (118 articles) on this subject. The study provides the current status and development of research in the field.

Keywords: bibliometric analysis, substance abuse, drug abuse, school students

Introduction

American Psychological Association describes substance use disorder as a "complex condition in which there is uncontrolled use of a substance despite harmful consequences" (Psychiatry.org (n.d.)). Before 2013, there were two separate categories called substance abuse and substance dependence. The Diagnostic and Statistical Manual of Mental Disorders V (DSM-V) published in 2013 removed these two and replaced them with one category called substance use disorders. According to DSM-V-TR (2022), there are ten classes of substances that could lead to substance use disorder which are "alcohol; caffeine; cannabis; hallucinogens; inhalants; opioids; sedatives; hypnotics; stimulants; tobacco and other substances" (American Psychiatric Association, 2022). These substances can cause death both directly and indirectly. Directly, drug overdose could lead to death. Indirectly, substance usage is the underlying main cause of many diseases that lead to death.

In the year 2019, globally there were 583,000 deaths directly and indirectly due to substance use disorders (World Health Organization, 2019). According to the World Drug Report 2021, globally there were about 275 million people using drugs in the year 2020, and 36 million people were suffering from substance use disorders (United Nations Office on Drugs and Crime (UNODC), 2021). Substance use disorders are not limited to any specific age group. With regard to drug prevalence rates, substance use disorders are three or four times higher among youth than the general population in many countries due to adolescence being the most vulnerable growth period prone to substance use (United Nations, 2001). The main reason for this is the experimental and risky nature of adolescence.

According to the American Addiction Center, 35% of twelfth-grade students used marijuana (National Institute on Drug Abuse (NIDA), (n.d.)). Among middle school students in the USA, 570,000 were using E-cigarettes in 2018 compared to 60,000 students in 2011, a sharp increase from 0.6% to 4.9% (Cullen et al., 2018). However, the National survey on drug abuse among US students highlighted that there was an unusual decline in substance use in all grades of school students between 2019 and 2021 due to the COVID-19 pandemic effect (Miech et al., 2022). Authorities should give the utmost importance to implementing effective prevention programs for drug abuse in all grades including pre-school (Belcher & Shinitzky, 1998). These programs done in preschool and kindergarten have been shown to reduce cannabis usage by between 7 and 23 percent. A study done on 21-year-old young adults in the USA showed that cannabis usage was lower among the students who participated in kindergarten and preschool preventive programs than the ones who didn't but had a similar background (UNODC, 2015). Policymakers need to consider the research findings to develop an effective plan for these programs.

Bibliometric analysis is a quantitative way of analyzing published scientific literature on a specific subject. It identifies trending subtopics, prominent researchers, productive institutions, most contributing countries, productive information sources that publish research literature, collaborative relationships among countries and researchers, emerging themes, etc. As it provides an overall picture of the scientific production, the analysis guides the researchers to identify gaps in research on a subject and to plan for future research activities. Bibliometric analysis is done on various medical topics to understand the trend in research activities on the specific topic. Some studies would be bibliometric analyses on health informatics (Binkheder et al., 2021),

breast cancer, (Özen Çınar, 2020), hypertension (Devos & Menard, 2019), income and cardiovascular disease (Ding et al., 2020), and Covid-19 (Chahrour et al., 2020).

Some bibliometric studies were carried out related to substance abuse; for example, Bibliometric analysis of substance use disorders in Arab countries (Sweileh et al., 2014); Genetic factors of substance-related disorders (Wang et al., 2021); twenty years analysis on Illicit drug addiction (Khalili et al., 2018); substance use disorder and treatment (Tran et al., 2019); Drug abuse in India; (Azmi & Abbas, 2018); and Publications on Opioids (Azmi & Abbas, 2018). However, based on the knowledge of the author, no bibliometric study was conducted on the specific topic of substance abuse among school children. As substance abuse among school children is a global threat, it is important to carry out a bibliometric analysis on this topic to identify the research productivity in this area. The analysis will be useful to provide a better understanding to the researchers, policymakers, and other general public about the research trend on substance abuse among school children and to plan for future research activities.

Objective

The study aimed to explore the global trend in the research literature on substance abuse among school children between 1991 and 2021 based on the journal articles indexed in the PubMed database. Specific objectives of the study were to reveal the trend in publication growth, and to identify the prominent researchers, productive countries, leading institutions, and the leading core journals publishing scientific articles pertaining to substance abuse among school children. Further, the study analysed the research collaboration among countries all over the world on this subject.

Methodology

The PubMed database was used to retrieve global research publications related to substance abuse among school children. PubMed is a free biomedical database comprised of more than 30 million citations and abstracts of global publications developed and maintained by the National Center for Biotechnology Information at the US National Library of Medicine (PubMed, 2022). PubMed was chosen because it provides extensive coverage of quality literature in health and life sciences including articles from both established and emerging journals. This comprehensive coverage ensures that researchers have access to a wide range of relevant publications for the analysis. Further, PubMed is freely accessible to researchers worldwide, making it an inclusive and cost-effective resource for conducting bibliometric analysis.

The data collection was done with keyword search to identify all scientific publications related to the study topic during the period between 1991 - 2021. The period was considered based on the number of publications indexed in the PubMed database on this study topic and there were many incomplete records available in PubMed before the year 1990. A comprehensive search strategy was developed to retrieve full coverage of the records to achieve the objectives of the study. The entry search terms for the study were selected by consulting several sources without missing important records and avoiding false record retrievals. Medical Subject Headings (MeSH) list established by the National Library of Medicine; USA was referred to get the accurate search terms. Previous studies (Khalili et al., 2018; Sweileh et al., 2014; Tran et al., 2019; Wang et al., 2021) related to substance use disorders were also used to select the relevant search terms. The list of search terms was finalized through a discussion with a senior medical

librarian, who is an expert in searching PubMed database. Though we use specific search terms to retrieve the data, PubMed automatically adds all relevant MeSH terms to the search [PubMed, 2022.].

Advanced search method was applied and all key search terms related to substance use-related disorders were entered with the 'OR' operator and searched in 'All Fields' (Query 1). Then, query 2 was performed with the search terms "school students" OR "school children" OR "school education". Query 1 and query 2 were combined with an 'AND' operator. To get only publications related to school students, query 3 was combined with the 'NOT' operator to avoid "university students" OR "college students". As the study was defined during the period from 1991 -2021, the publication date was limited from the 01st of January 1991 to the 31st of December 2021. To increase the accuracy of the search results, the publication type was restricted only to journal articles. Table 1 shows the details of the search query. Data were retrieved from the PubMed database on the 15th of November 2022 and data retrieval was completed on the same day to avoid any discrepancies due to the database updates.

The publications of all languages were included in the study.The absence of duplicate records was confirmed with the support of MS Excel. For this, the retrieved data were exported in CSV format. All the records were retrieved with the abstracts and manually checked one by one to exclude the irrelevant records related to the study topic and the records without required bibliographic information (n=556).

Table 1

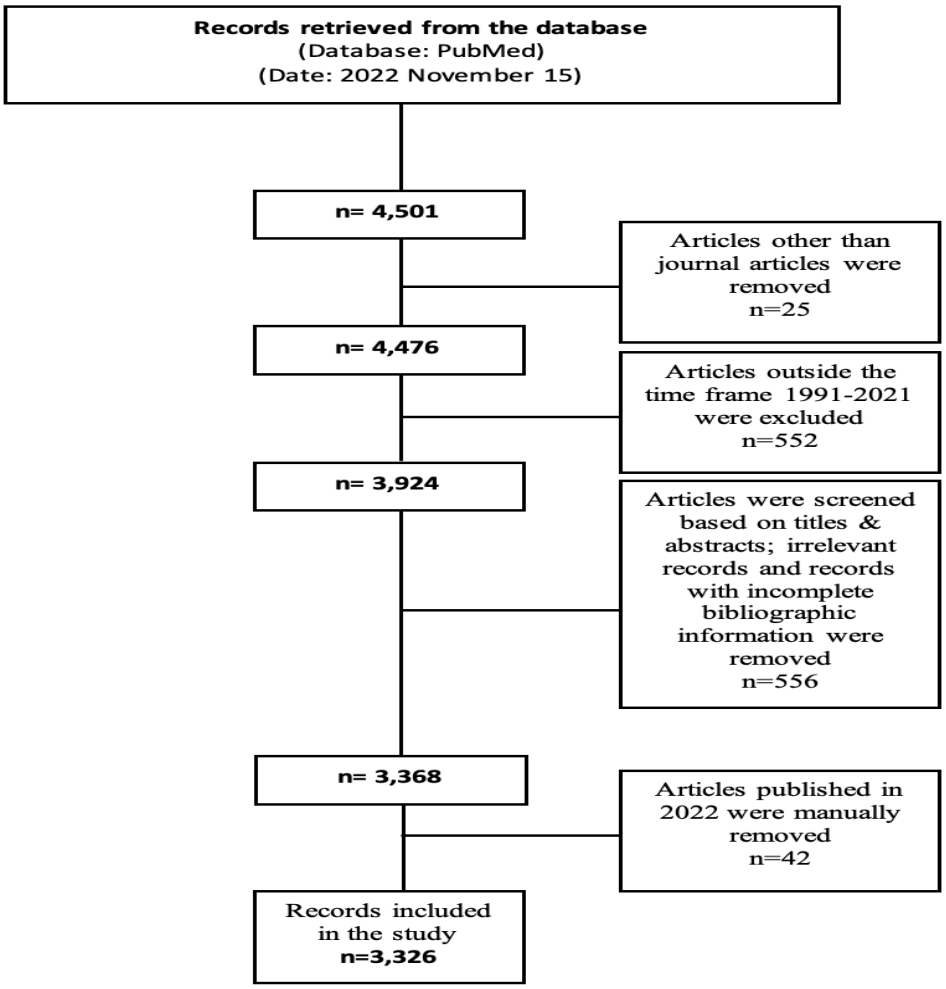
Details of the search query

Search	Query	Results
#1	((((((((((((((substance abuse) OR (substance use disorders)) OR (substance related disorders)) OR (substance dependence)) OR (drug abuse)) OR (drug dependence)) OR (drug addiction)) OR (drug related disorders)) OR (drug habituation)) OR (narcotics)) OR (alcoholism)) OR (tobacco)) OR (illicit drugs))	1,752,071
#2	((((((((((((((substance abuse) OR (substance use disorders)) OR (substance related disorders)) OR (substance dependence)) OR (drug abuse)) OR (drug dependence)) OR (drug addiction)) OR (drug related disorders)) OR (drug habituation)) OR (narcotics)) OR (alcoholism)) OR (tobacco)) OR (illicit drugs)) AND ((("school children") OR ("school students")) OR ("school education")))	4,605
#3	((((((((((((((substance abuse) OR (substance use disorders)) OR (substance related disorders)) OR (substance dependence)) OR (drug abuse)) OR (drug dependence)) OR (drug addiction)) OR (drug related disorders)) OR (drug habituation)) OR (narcotics)) OR (alcoholism)) OR (tobacco)) OR (illicit drugs)) AND ((("school children") OR ("school students")) OR ("school education"))) NOT (("university students") OR ("college students"))	4,501
#4	((((((((((((((substance abuse) OR (substance use disorders)) OR (substance related disorders)) OR (substance dependence)) OR (drug abuse)) OR (drug dependence)) OR (drug addiction)) OR (drug related disorders)) OR (drug habituation)) OR (narcotics)) OR (alcoholism)) OR (tobacco)) OR (illicit drugs)) AND ((("school children") OR ("school students")) OR ("school education"))) NOT (("university students") OR ("college students"))) AND ("Journal article"[Publication Type])	4,476
#5	((((((((((((((substance abuse) OR (substance use disorders)) OR (substance related disorders)) OR (substance dependence)) OR (drug abuse)) OR (drug dependence)) OR (drug addiction)) OR (drug related disorders)) OR (drug habituation)) OR (narcotics)) OR (alcoholism)) OR (tobacco)) OR (illicit drugs)) AND ((("school children") OR ("school students")) OR ("school education"))) NOT (("University students") OR ("College students"))) AND ("Journal article"[Publication Type])) AND (("1991/01/01"[Date - Publication] : "2021/12/31"[Date - Publication]))	3,924

Though the publication date was limited to 2021, there were some publications with the publication year 2022, due to the online publications being published in 2021 while the hard copies were being published in 2022. These records were manually excluded (n=42). Figure 1 shows the selection process of the data. Ethical approval was not required for the study, because it involved only the secondary data.

Figure 1

Flow chart of data retrieval used in the analysis.



Bibliometric analysis was performed using the Bibliometrix R package named 'Biblioshiny' (Aria & Cuccurullo, 2017). The retrieved data (n=3,326) was exported to the R package in PubMed format. MS Excel was also used for the analysis of this study. Figures were developed using MS Excel and R package. Core journals were identified using Bradford's Law (Sudhier, 2010).

Results and Discussion

Basic information about the data

The total number of records on substance abuse among school students during 1991 -2021 retrieved from the PubMed database based on the selection methods stated was 3,326, which were published in 927 sources. A total of 11,254 authors wrote these articles. Among these, 188 (05.6%) articles were sole-authored publications, and 3,138 (94.3 %) articles were multi-authored publications. On average, the number of co-authors per document was 4.69, which was approximately 5 authors per document. Further, a total of 4,967 author keywords were identified in this analysis. The average age of a document was 12.1 years and the annual growth rate of articles was 4.97%. The majority of the articles were published in English language (n=2950, 89.53%), followed by Spanish (n= 70, 2.12%); Chinese (n= 39, 1.18%); Japanese (n=26, 0.79%) and the rest of the articles were in many other languages (6.38%).

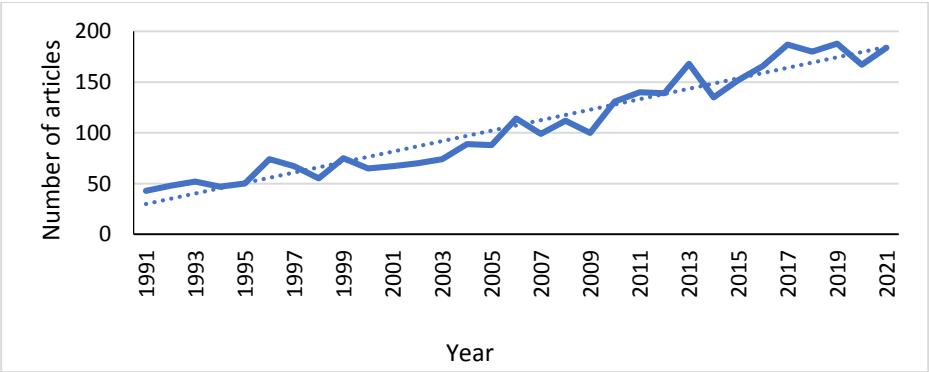
Growth of annual scientific research publication

Figure 2 illustrates the overall trend in the growth of global research publications on substance abuse among school students over the years during the study period. The annual growth of research publications was increasing in trend over the years, though there were small fluctuations in growth. There

were 576 articles published between 1991 and 2000, 944 articles between 2001 and 2010, and 1431 articles published between 2011 and 2021. The highest number of publications (n=188) was in the year 2019 and the lowest number of publications (n=43) was in the year 1991.

Figure 2

Growth of global research publications on substance abuse among school students from 1991 to 2021.



Contribution of prominent authors

The top twenty prominent authors related to substance abuse among school children were selected based on the number of articles published during the study period. As PubMed doesn't provide the number of citations, Prominent authors were selected based on the number of publications. Lowry Richard from USA was the prominent author contributing the greatest number of publications (n= 40) related to the study topic. It was followed by Kann Laura (n=37) from USA; Sussman Steve (n=31) from USA. Among the top twenty, 12 authors were from USA (Table 2). It is highlighted that Karl Peltzer from South Africa was included among the top twenty authors who published

15 articles. The study revealed that among the total of 11,254 authors, a major proportion (97.7%) of authors (10,991 authors) wrote less than 5 articles each.

Table 2

Details of the top twenty most productive authors

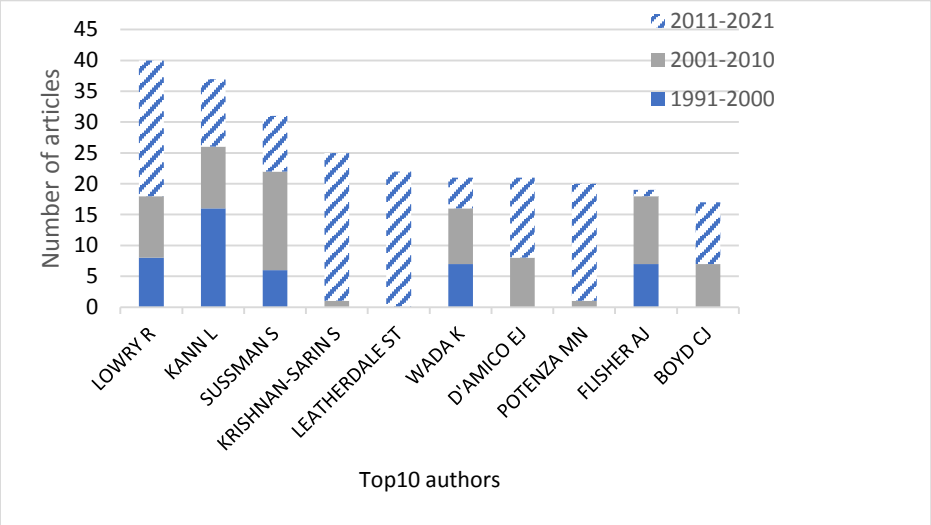
Rank	Author	Number of articles	Country
1	Lowry Richard	40	USA
2	KannLaura	37	USA
3	Sussman Steve	31	USA
4	Krishnan-Sarin Suchitra	25	USA
5	Leatherdale Scott T	22	Canada
6	Elizabeth J D'amico	21	USA
7	Kiyoshi Wada	21	Japan
8	Marc N Potenza	20	USA
9	Alan J Flisher	19	Norway
10	Carol J Boyd	17	USA
11	Sandra A Brown	16	USA
12	Hayley A Hamilton	16	Canada
13	Kiyozumi Suzuki	16	Japan
14	Henri Chabrol	15	France
15	Adam M Leventhal	15	USA
16	George CPatton	15	Australia
17	Karl Peltzer	15	South Africa
18	Jo Anne Grunbaum	14	USA
19	Renee M Johnson	14	USA
20	Sean Esteban McCabe	14	USA

Figure 3 illustrates the analysis of the publication growth of the top ten authors categorized in three time periods. Among the top ten authors, Lowry R, Kann L, Sussman S, Wada K, and Flisher AJ had been working in this research area constantly throughout the study period. Fifth-ranked author

Leatherdale ST from Canada was involved in this research area only from 2011-2021.

Figure 3

Publication growth of top ten authors in three time periods.



Productive country

Analysis of the research contribution of countries on substance abuse among school children was carried out based on the number of articles published during the study period. Publications retrieved from PubMed database with at least one author's affiliation mentioned were considered for the analysis. Table 3 provides the rank list of the top twelve productive countries. USA was the most productive country with the highest number of scientific outputs of 2,408 articles. It was followed by China (561 articles); Australia (447 articles); Canada (421 articles). China was the 9th ranked country with 36 publications during 1991-2000; then it was ranked as the 5th country with 188 publications during 2001-2010; it was ranked as the 2nd most productive country next to USA with 2,730 publications during 2011- 2021.

The study indicated an increasing trend in the involvement of research activities on this subject field by researchers from China.

Table 3

Ranked list of top 10 countries (1991-2021)

Rank	Country	Number of Articles
1	USA	2408
2	China	561
3	Australia	447
4	Canada	421
5	Italy	279
6	Iran	189
7	South Korea	149
8	Japan	148
9	Germany	139
10	Brazil	127
11	India	122
12	Nigeria	120

Leading institutions

Leading institutions involved in this research topic were analyzed based on the names of institutions mentioned with author affiliation in the PubMed database. The top twenty leading institutions involved in research activities related to substance abuse among school students were displayed in table 4. University of California was the most popular leading institution publishing the highest number of research articles (n=874) during the study period. It was followed by the Division of Adolescent and School Health (n= 714); then the University of Southern California with 680 publications. Except

for the sixth-ranked University of Auckland from New Zealand, all other institutions among the top ten were from USA.

Table 4

Ranked list of top 10 Institutions (1991-2021)

Rank	Institutions	Number of Articles	Country
1	University of California	874	USA
2	Division of adolescent and school health	714	USA
3	University of Southern California	680	USA
4	Columbia University	607	USA
5	Yale University school of medicine	410	USA
6	University of Auckland	405	New Zealand
7	Centers for disease control and prevention	389	USA
8	University of Michigan	381	USA
9	Florida international university	378	USA
10	Johns Hopkins Bloomberg school of public health	361	USA

Publications published during the periods 1991-2000, 2001 - 2010, and 2011 – 2021 were analyzed and the top 20 institutions were ranked for each period. The University of California was the leading institution during the periods 1991-2000(60 articles) and 2011- 2021(649 articles), whereas the Division of Adolescent and School Health was the leading institution during the years 2001-2010 with 188 publications.

Productive sources

Core journals on substance abuse among school students were identified based on Bradford's Law. According to Bradford's law, the sources are classified into three zones as zone 1, zone 2, and zone 3. Bradford's Law is used to identify the core journals in a particular subject area categorized in zone 1; nuclear zone (Zhang et al., 2022).

Zone I has the top 25 core journals, which published research articles on substance abuse among school children. The study identified 25 most productive journals among a total of 927 journals. The top 25 journals published a total of 1,114 articles among the total of 3,326 articles. 'Addictive behaviors' was found to be the top leading journal publishing the highest number of articles (n=118) on substance abuse among school children. The ranked list of top ten journals based on the number of publications is displayed in Table 5.

Table 5

Ranked list of core journals publishing more articles.

Titles of Journals	Rank	Number of articles	Cumulative Frequency	Zone
Addictive behaviors	1	118	118	Zone 1
The Journal of adolescent health	2	97	215	Zone 1
Drug and alcohol dependence	3	88	303	Zone 1
Substance use & misuse	4	86	389	Zone 1
The Journal of school health	5	83	472	Zone 1
BMC public health	6	58	530	Zone 1

Addiction	7	53	583	Zone 1
Journal of drug education	8	53	636	Zone 1
American journal of public health	9	40	676	Zone 1
International journal of environmental research and public health	10	37	713	Zone 1

Research collaboration among countries

Figure 4 illustrates the research collaboration on the study topic among various countries during the period 1991 - 2021. The relationship between the two countries was analysed if the two countries had at least one research collaboration. The intensity of the blue color reflects the amount of research collaboration. The higher the intensity of the blue color, the higher the frequency of research collaboration.

The USA had the greatest number of research in 49 countries all over the world. It was followed by Canada, Italy, Australia, and Germany with 24, 21, 19, and 15 countries respectively. Twenty-six countries had collaborated with less than five countries on substance abuse among school children; Seven countries had collaborated with five to ten countries, while another seven countries had collaborated with more than ten countries.

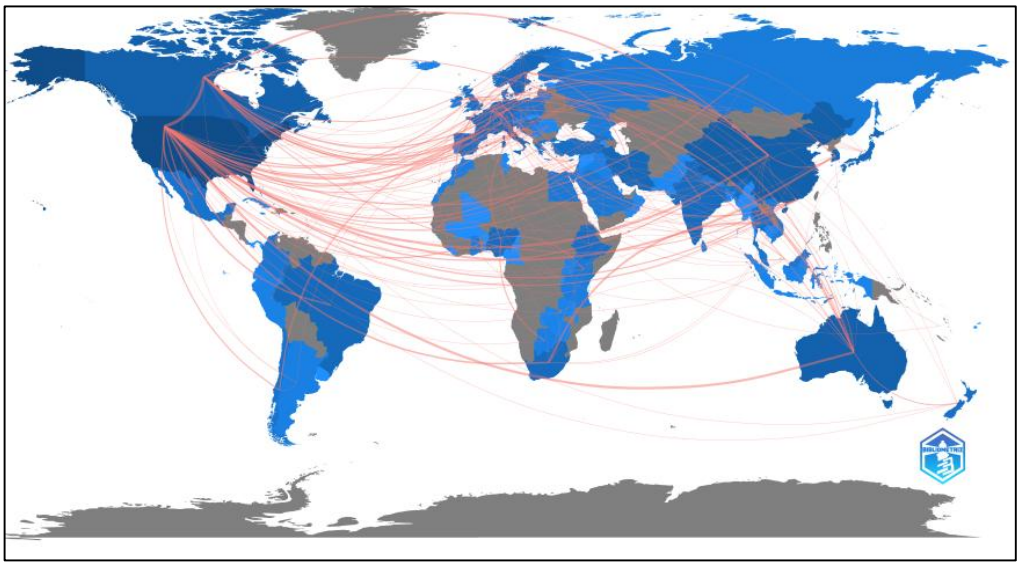
Discussion

Substance abuse among schoolchildren is a common problem in many countries. Bibliometric analysis of 3,326 articles retrieved from PubMed database on substance abuse among school children during the period 1991 -

2021 provides many insights about the trends in research activities on this subject. The global trend in the growth of publications was increasing from 1991 to 2021 except for small fluctuations in some years. Significant progress is noticed in the annual growth of research publications on this subject.

Figure 4

World map on research collaboration among countries.



In terms of author analysis, 94 % of the articles were multi-authored research papers indicating that researchers preferred collaborative research in the field of substance abuse among school children. The study analyzed the prominent authors actively involving research activities on this subject. The findings will support the researchers in identifying collaborators, reviewers, and mentors for their research activities. Among the top twenty authors, authors from USA were leading in research contributions on this particular topic. The publication growth of the top ten authors was analyzed in three

periods from 1991 to 2021, with only five authors involved in research activities on substance abuse among school children in all three periods. The fifth-ranked author named Leatherdale Scott T from Canada was involved in research publications only during the last period 2011 – 2021. The fourth-ranked author named Krishnan-Sarin Suchitra and the eighth-ranked author named Marc N Potenza also wrote only one publication each during the period from 2001-2010 and a greater number of publications during the last period 2011-2021. It indicates that new researchers are attracted to and actively involved in the field of substance abuse among school children.

Based on the country analysis, the USA was the most productive country, publishing the highest number of publications. It was followed by China. The majority of the publications were from high-income countries. Among the top twenty productive countries, 13 countries were high-income countries, and 6 countries were middle-income countries. It is highlighted that Ethiopia, which is a low-income country, was ranked 18th position with 72 articles on substance abuse related to school children. The United Kingdom was not included in the top twenty productive countries. In contrast, in a bibliometric study carried out based on the Scopus database, the United Kingdom was the second-ranked productive country related to scientific production on illicit drug addiction (Khalili et al., 2018). The leading institution related to this research activity was University of California, which had contributed the highest number of publications than any other institution. Among the top ten leading institutions, nine institutions were from USA. The study highlighted that USA is undoubtedly the dominant country performing research activities on substance abuse among school children.

Literature on substance abuse among children is published in a wide range of journals. The study identified core journals publishing articles on substance abuse among school children. This was done with the aim of guiding librarians, researchers, and other people who are interested in accessing information related to substance abuse among school children. The top three journals publishing articles on substance abuse among school children during 1991- 2021 were 'Addictive behaviors' (118 articles), 'The Journal of Adolescent Health' (97 articles), and 'Drug and alcohol dependence' with 88 articles. Identified keywords will be useful to future researchers to easily access information related to the study subject.

It is important to analyze the research collaboration among different countries. USA has the highest research collaboration with 49 other countries with 133 research publications. USA has the highest research collaboration with Canada having 18 research articles, followed by China and Australia, each having 10 research publications. USA was followed by Canada as the country with the second highest country collaboration, having collaborated with 24 countries with 34 publications, and Italy has collaborations with 21 countries with 27 publications. International collaboration in research activities increases the productivity and visibility of the research findings.

There are a few limitations in this study. The study findings are based on articles indexed only in the PubMed database. There are other databases indexing important research articles that are missing from the PubMed database. Citation analysis could not be performed as PubMed does not allow citation analysis. The findings of the study can be used to compare with future research studies on substance abuse among school children using publications indexed in other databases.

Conclusion

Bibliometric study on the global scientific literature on substance abuse among school children highlighted important facts of research trends in this field during 1991-2021. The study concluded that the USA was the most dominating country, contributing research on this topic. The study identified the prominent authors, institutions, productive information sources, and international country collaboration. The findings of the study are useful to guide the research community involved in research activities related to the field of substance abuse among school children. As substance abuse among school children creates serious threats in society, researchers should play a key role in promoting more research activities in this subspeciality to prevent school children from substance abuse.

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Health Literacy among Undergraduates in Selected Faculties of Eastern University, Sri Lanka

S.G. Singhawansa[1], T.Kiruthya[1], R.D.S.Shashikala[1], D.E.W.T.R.R.Abeyrathna[1] and S. Santharooban[2]

Abstract

A healthy life is a wealthy life. To be healthy, everyone has to understand the basic health information that is needed to make appropriate health decisions, which can aid them in avoiding illness and safeguarding their health. In this context, the necessity of health literacy which is a type of information literacy is being considered. Health literacy is the understanding and use of health information effectively to make appropriate decision making. The study aimed to evaluate the health literacy level of undergraduates of Eastern University, Sri Lanka, and the factors influencing health literacy. A cross-sectional study was carried out among undergraduates in selected faculties of Eastern University, Sri Lanka. A validated standard questionnaire called "Health Literacy Instrument for Adults (HELIA)" was adopted to collect online data from 1085 individuals. The data were analyzed using descriptive statistics and binary logistic regression. The results revealed that the mean score of overall health literacy is 65.7±13.5% which ranges between somewhat inadequate to sufficient ranks. The analysis considered the five domains of health literacy. Accordingly, a significant proportion ($p<0.05$)

[1] Faculty of Health-Care Sciences, Eastern University, Sri Lanka

[2] Deputy Librarian, Faculty of Health-Care Sciences, Eastern University, Sri Lanka
Email: santharoobans@esn.ac.lk https://orcid.org/0000-0003-1984-875X

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of undergraduates had adequate literacy skills for understanding health information (67.4%), and access to health information (73.7%), while the majority had a limited level of literacy for domains of reading (53.7%) and appraisal (84.1%). However, there is no significant deviation ($p>0.05$) between adequate and limited levels in the domain of decision-making/behavioural intention. The difference between the proportion of adequate (50.8%) and limited levels (49.2%) in overall literacy is not significant ($p>0.05$). The binary logistic regression proved that the health literacy of undergraduates is influenced by faculty, alcoholic habits and doctor's advice ($p<0.05$), while age, gender, family income, family members who work in the healthcare field, academic year, respondents' perceptions of their health, and smoking habits, do not influence on health literacy.

Keywords: Health Literacy, HELIA, Information Literacy, Undergraduates

Background

A healthy life is a wealthy life. To be healthy, everyone has to understand the basic health information that is needed to make appropriate health decisions, which can help them to prevent and protect their health from various situations and properly manage their health conditions. In general, the understanding of health information and its application is termed health literacy.

Health literacy is the term used to describe the ability to engage with health information and services (WHO, 2013), also health literacy is defined as it is being linked to literacy and entailing people's knowledge, motivation, and competencies to access, understand, appraise and apply health-related

facts to make decisions in day-to-day life. Health literacy is essential to improve the quality of an individual's life, prevent illness, and promote health (WHO, 2013) and it provides a harmonious relationship between healthcare professionals and patients to make decisions. Lack of health literacy leads to poor hygiene, which leads to communicable diseases, and also poor knowledge of disease condition, management, follow-up care, and home care, which cause bad prognosis for non-communicable diseases. During the pandemic of COVID 19, the awareness of the public on the correct use of health literacy skills was necessary for the success of treatment and prevention of further spreading.

There was a rapid increase in the level of health literacy, but also there is a gap in achieving a higher level of health literacy. It has been observed that even well-educated people have limited health literacy because of a lack of familiarity with medical jargon and their body physiology. Even in the developed nations, the health literacy is not beyond the satisfactory level. European health literacy survey reported that almost half of the people 47.6% surveyed in Europe, have limited health literacy, and in Spain, this percentage was higher at 58.3 (Osborne et al., 2013). In Spain and France, research was conducted among science and health sciences faculty students. The Study findings indicated that 93% of the students had insufficient health literacy (Juvinyà-Canal et al., 2020).

It is the responsibility of healthcare professionals to educate or improve the health literacy of people (Mishra, 1990). Developed countries get better health education than the developing countries. For example, in European countries, even medical officers prescribing the medications educate the clients about indications, contraindications, adverse effects, and drug compliances, and also clients are engaged to get knowledge about their health

conditions. But in South East Asian countries the medical officers prescribe the medications without educating the clients. The clients rarely know their health status and lack the desire to engage with health professionals. Local data on the knowledge of correct health literacy is essential to understand the situation in a given country and to aid in identifying strategies to be implemented.

With the view of implementing a health literacy programme in tertiary education, the present study surveyed health literacy among the undergraduates of Eastern University, Sri Lanka (EUSL). Undergraduates are considered a well-educated population, which constitutes the future generations of the country. Since health literacy is an emerging global trend, it is essential to know their knowledge of health literacy skills in Sri Lanka, so that appropriate strategies can be made to increase awareness and create responsible citizens.

General Objective

Study the health literacy among undergraduates of selected faculties in EUSL.

Specific Objective

1. To analyze the awareness of self/own health management
2. To identify the ability to engage in health information
3. To identify the factors contributing to health literacy

Literature Review

The terms information literacy and health literacy were started simultaneously in 1974. The phrase health literacy was used by S.K. Simonds in a paper titled Health Education as Social Policy in March 1974 (Simonds, 1974). The phrase information literacy was coined by Paul G. Zurkowski in a report submitted to the National Commission on Libraries and Information Science in November 1974 (Zurkowski, 1974). After the introduction of the phrase health literacy, there originated several definitions for health literacy (Cross, 1995; Ratzan et al., 2000; Sorensen, 2013). From these definitions of health literacy, the following important points can be summarized:

- Ability to access health information.
- Appropriate decision-making.
- Knowledge and understanding of individuals.
- Use of decisions in disease prevention, health promotion, and health protection.

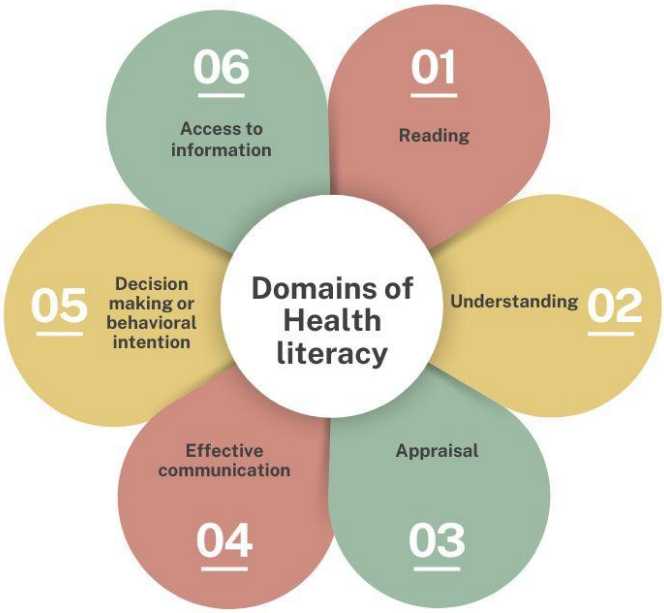
These points can be considered as domains of health literacy. However, there are several works of literature which indicate different domains. Shaukat and Naveed (Shaukat & Naveed, 2021) reported three domains of health literacy. The three domains are healthcare, disease prevention, and health promotion. Under each domain, the researchers consider the ability to assess, understand, interpret and evaluate, and decisions making. Parker (1995) developed a tool called the Test of Functional Health Literacy in Adults (TOFHLA) and this tool reports only three domains such as reading, comprehension and numeracy skills. However, Tavousi et al. (2020) reported that there are five domains such as reading, access to information, understanding, appraisal, and decision-making or Behavioral intention and using these domains, Tavousi et al. (2020) developed a tool to measure the health literacy, that is Health Literacy Instrument for Adults (HELLA). Reading includes reading educational

materials, medical records, written instructions and laboratory testing. Access to information means ability to identify information sources and access the health information related to health. Understanding means ability to understand drug labels, hospital guidelines, doctor's instructions and explanations. Appraisal is the ability to evaluate health information on internet, TV, friends & relatives and communication of trusted information to others. Decision –making or behavioral intention means experience and ability to manage situations with own understanding and awareness (Tavousi et al., 2020). These dimensions can be used as assessment tools for health literacy. These dimensions are more comprehensive compared to other tools and they can be used as assessment tools for health literacy. The domains reported by different authors can be pictorially represented in the following diagram (Fig1).

With the availability of different tools to assess health literacy levels, there are several works of literature which report the health literacy assessment among different levels of people. Few studies evaluated undergraduates' health literacy. Studies reported that health science-related students had better levels of health literacy than the students who follow other subjects (Juvinyà-Canal et al., 2020) and even among health science-related students, medical students excelled in health literacy than the paramedical students (Morris et al., 2017) since the knowledge is provided through the curriculum. In contrast, there is some literature which reports that health science-related students (both medical and paramedical) have limited knowledge of health literacy (Ozen et al., 2019; Urstad et al., 2020; Zhang et al., 2016).

Figure 1

Domains of health literacy (Developed by authors)



There are limited studies in health literacy in Sri Lanka but no studies among undergraduates in Sri Lanka. However, a study conducted among school teachers revealed that 6.4% excellent, 61.2% sufficient, 31.5% problematic, and 1% inadequate levels of health literacy, and the researchers concluded that limited health literacy was a considerable problem among school teachers (Denuwara & Gunawardena, 2017). In 2020, another study was carried out among the working-age population in Sri Lanka about a person's ability to understand and use health information through electronic sources. From the research, their conclusion was E-health Literacy Scale could measure health literacy as well as knowledge and ability to use electronic instruments (Gunasekara & Fernando, 2020).

It is very essential to be aware of factors affecting health literacy because it helps to minimize the negative impact of health issues, increase public health services & and provide positive health outcomes. There are several literatures which report the factors influencing health literacy. The socio-economic variables such as age, gender, nationality, race, social support, culture, social environment (Bodur et al., 2017; Chu-Ko et al., 2021; Mao et al., 2020; Rababah et al., 2019), education-related factors such as educational level, learning skills, communication skills, academic performance, health knowledge, exposure to video games, health education courses, year of study, a field of study (Bodur et al., 2017; Mao et al., 2020; Rababah et al., 2019) influences the health literacy. Studies also report that exercise also influences health literacy (Chu-Ko et al., 2021; Rababah et al., 2019). Smoking, alcohol consumption and history of chronic diseases also influence health literacy (Chu-Ko et al., 2021; Rababah et al., 2019).

Mao et al. (2020) report that according to their study, students who are women, urban residents, senior class students, well performance at school, have health education, highly educated parents, single child family income, have less exposure to video games, having a medical background, had a higher health literacy level. A study was conducted on Palestinian University students to assess health literacy and its associated factors. The results show a gender difference that revealed female students, whose fathers had high school education, working mothers, and living with their families had higher health literacy scores but the female students with moderate to high distress levels had lower health literacy scores. Also, male students who received medical checkups more frequently searched for more sources for health-related information, had higher self-reported health status had higher health literacy

but their distress level was not significantly associated with male students (Sarhan et al., 2021).

While various studies have addressed the factors influencing health literacy, it is important to note that these findings cannot be universally applied, as many of them are specific to particular localities or contexts. In the case of Sri Lanka, a notable gap exists in the information available regarding the health literacy of its citizens and the factors that influence it.

Methodology

A cross-sectional study was carried out among undergraduates in selected faculties of Eastern University, Sri Lanka. Participants were undergraduates of the first, second, and third year from the Faculty of Commerce & Management, Faculty of Science, Faculty of Agriculture, Faculty of Arts & Culture, Faculty of Technology, and Faculty of Health-Care Sciences. A validated standard questionnaire called "Health Literacy Instrument for Adults (HELIA)" (Tavousi et al., 2020) was used with minor modifications in wording to suit the Sri Lankan context. The tool consists of thirty-three (33) numbers of statements with a Likert scale response to measure the five domains such as reading, access to information, understanding, appraisal, and decision-making or behavioural intention. Additionally included demographic details, academic characteristics (faculty, year of study), own perception about healthiness, smoking and drinking habits, advice of the doctor and personal prescription. The sample size was 1107 at a 95% confidence interval at a precision of 2.5% (Krejcie and Morgan, 1970). The pilot study was conducted among fifteen students and internal consistency was ensured using Cronbach Alpha (>0.7). The health literacy score was

calculated using the method proposed by Tavousi et al.(2020). The score was ranked as inadequate (0-50%), somewhat inadequate (50.1-66%), sufficient (66.1-84%) and excellent (84.1-100%) and the former three ranks were considered as limited level health literacy and later two ranks were considered as an adequate level of health literacy (Pelikan et al., 2019; Tavousi et al., 2020). The data were analyzed using descriptive statistics and Binary Logistic Regression. Statistical Package of Social Sciences 26 (SPSS v. 26) were used to enter and analyze the data. Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Health-Care Sciences, Eastern University, Sri Lanka (E/2022/14).

Results

The investigators received 1086 responses out of 1107 sample. Therefore, the response rate was 98%. The mean age of the respondents was 22 (the youngest age was 20 and the oldest age was 27). The summary of the demographic profile of the respondents is given in Table 1. The majority of undergraduates (96.4%) perceived that they were in good health and a majority of them did not have smoking (97.7%) and alcoholic habits (98.7%).

Table 1

Demographic profile of respondents

Factors	**Levels**	**Frequency (n = 1085)**	**Percentage (%)**
Gender	Male	410	37.8
	Female	675	62.2
Parent's Highest Education Level	Before ordinary level	292	26.9
	Up to ordinary level	324	29.9
	Up to advance level	269	24.8
	Diploma level	72	6.6
	Graduated	128	11.8

Family income >100 000	<25 000	488	45.0
	26 000 – 50 000	348	32.1
	51 000 – 75 000	137	12.6
	76 000 – 100 000	59	5.4
	>100 000	53	4.9
Faculty	Faculty of Commerce & Management	213	19.6
	Faculty of Agriculture	43	4.0
	Faculty of Art & Culture	430	39.6
	Faculty of Technology	37	3.4
	Faculty of Health-Care Science	135	12.4
	Faculty of Science	227	20.9
Year of Study	First Year	588	54.2
	Second Year	326	30.0
	Third Year	171	15.8

1. Awareness of self-health management

Awareness of self-health management was measured through two health literacy domains: understanding skill and decision-making/behaviour intention. The ability to comprehend health information is an essential aspect of self-health management. Individuals must possess the skills necessary to interpret medical terminology, understand treatment options, and grasp the implications of their health conditions. Decision-making/behavior intention reflects individuals' willingness and readiness to take action based on their understanding of health information. It was aimed to assess the individuals' proactive involvement in managing their health by analysing the domains such as understanding and decision making/behaviour intention.

The understanding skill has been measured by seven criteria. Those criteria include understanding the recommendations for a healthy diet, explanations about illness, the meaning of medical forms, hospital guidelines,

drug information labels, and investigation reports. The decision-making/behavioural intention domain was examined with twelve statements that pertain to the actions/decisions of individuals with health concerns both in the normal period and during illness. The average awareness scores for these two domains are presented in Table 2.

Table 2
Awareness of self-health management

Level of Literacy	Rank of Awareness	Proportions of Domains	
		Understanding (%)	Decision-making/behavior intention (%)
Adequate	Excellent	27.6	11.5
	Sufficient	39.8	35.9
Limited	Somewhat inadequate	20.1	29.7
	Inadequate	12.5	22.9

The difference between the proportion of adequate and limited literacy levels was compared using a binomial test. The results revealed that there is a significant difference between the proportions of adequate and limited levels of understanding (p=0.000), while there is no significance for decision-making (p=0.101). As such, the majority had adequate literacy skills for understanding health information (67.4%), while there is no significant deviation in the decision-making/behavioural intention between the proportion of adequate and limited levels.

2. Ability to engage in health information

In this section, three aspects of health literacy such as reading health information, access to health information, and appraisal, have been assessed. These three domains consist of skills or abilities to deal with the health-related information. Hence these three domains were considered as ability to engage in health information. The skill of reading health information consists of four

statements that include reading general health educational materials, written instructions from doctors, medical forms and leaflets, and instructions about laboratory tests. The skill has been assessed using four statements. The skill of access to health information consists of six statements that include finding health information from different sources, about healthy eating, mental health, a specific disease, and the harmful effects of tobacco, smoking, and alcoholism. The skill for the appraisal of health information consists of four statements that include evaluating health-related information on the Internet, broadcast on television and radio, assessing the accuracy of health-related recommendations, and communicating trusted health information to others. The findings are presented in Table 3.

Table 3

Ability to engage in health information

Level of Literacy	**Rank of Awareness**	**Proportions of Domains**		
		Reading health information (%)	**Access to health information (%)**	**Appraisal of health information (%)**
Adequate	Excellent	14.4	28.4	0.0
	Sufficient	31.9	45.3	15.9
Limited	Somewhat inadequate	19.0	14.0	34.6
	Inadequate	34.7	12.3	49.5

The binomial test revealed that there was a significant difference between the proportion of adequate and limited health literacy levels for all three domains ($p<0.05$). The majority of participants had an adequate level of literacy for the domain of access to health information (73.7%), while the

majority had a limited level of literacy for domains of reading (53.7%) and appraisal (84.1%).

3. Overall health literacy

The mean score of overall health literacy is 65.7±13.5%, which is a somewhat inadequate level. The overall health literacy levels of undergraduates can be summarized in Table 4. The binomial test revealed that there is no significant difference in the proportion of adequate and limited literacy levels (p=0.627) and it implies that both categories of students are more or less equal in proportion.

Table 4

Overall Health Literacy

Level of Literacy	Rank of Awareness	Proportions of Overall Health Literacy (%)
Adequate	Excellent	8.7
	Sufficient	42.1
Limited	Somewhat inadequate	35.9
	Inadequate	13.4

4. Factors Influencing the health literacy

The factors influencing the level of health literacy were examined through binary logistic regression. The age, gender, monthly income, family members' occupation in the health sector, faculty, academic year, respondent's perception about his/her healthiness, smoking habits, alcoholic habit, physician advice and self-management for illness were used as independent variables. Among the independent variables, faculty, alcoholic habits and

physician advice influence the health literacy of undergraduates. The results are summarized in Table 5.

Table 5

Factors Contributing to Health Literacy

Factors	Odd Ratio (OR)	Significance (P Value)
Age	0.969	0.645
Gender		
Male	1.097	0.515
Female	1	
Socio economic status		
< 25,000	1.551	0.186
26,000-50,000	1.802	0.073
51,000-75,000	1.758	0.111
76,000-100,000	1.527	0.292
>100,000	1	
Family member work in a health-related field	0.726	0.131
No	1	
Yes		
Faculty		
Faculty of Commerce & Management	0.611	0.016*
Faculty of Agriculture	0.425	0.018*
Faculty of Arts & Culture	0.802	0.244
Faculty of Technology	0.365	0.013*
Faculty of Health Care-Science	1.154	0.550
Faculty of Sciences	1	
Year of Study		
First Year	1.105	0.710
Second Year	1.149	0.535
Third Year	1	
Do you think you are healthy?		
No	0.727	0.371
Yes	1	

Do you have a smoking habit?		
No	0.351	0.140
Yes	1	
Do you have an alcoholic habit?		
No	3.348	0.044*
Yes	1	
When you seek medical attention due to illness, how will the doctor react		
Simply prescribe drugs only	0.332	0.000*
Prescribe drugs for you and clarify your illness	0.400	0.000*
Explain, provide advice about your illness, and prescribe drugs	1	
If I feel any mild illness,		
I will manage myself	0.775	0.131
Directly go to the hospital	1	

*P value <0.05: Statistically Significant

When compared with the students from the faculty of science, the students from the Faculty of Commerce and Management, Faculty of Agriculture, and Faculty of Technology are more likely to have lower Health Literacy. There was no significant difference between other faculties. The person who does not have alcoholic habits tends to be more likely (OR 3.3458) to have higher health literacy than the person who has alcoholic habits. Physician advice greatly influences health literacy. When compared to the respondents who frequently receive, physician advice on illness, its prevention, and administration of prescribed drugs, respondents who received only drug prescriptions and drug prescriptions with information about illness from the physician tend to have lower health literacy.

Discussion

Even though the mean score of overall health literacy is 65.7±13.5%, which ranges from somewhat inadequate to sufficient rank, there is no significant difference between the proportions of adequate (50.2%) and limited levels (49.8%). Since two domains such as understanding and access were at adequate levels, while two domains such as reading and appraisal were at limited levels and decision-making is equal in proportion, the overall literacy is equally distributed between adequate and limited levels. When all the domains of health literacy are at adequate levels, the condition can be considered acceptable. However, when important domains are at a weaker level, the overall health literacy at 65.7±13.5% cannot be deemed satisfactory. When considering reading about health information, the majority of them (53.7%) have limited health literacy due to poor reading habits. However, the majority have an adequate level of skill for accessing health information (73.7%) and understanding health information (67.4%). Nowadays, most undergraduates seek to acquire health information due to influence of the social media and the internet. In the context of the free flow of information, the assessment of health information is crucial to prevent unnecessary health complications arising from poor decisions. However, a significant majority of undergraduates (84.1%) exhibit a limited level of proficiency in appraising health information, and 52.6% are similarly limited in the domain of decision-making. This indicates that despite having access to health information, undergraduates lack the skills to evaluate it effectively.

Several studies reported that age influences health literacy. Chu-Ko et al. (2021) reported that health literacy changes with age, depending on the population type. Additionally, Rababah et al. (2019) discovered that age had an impact on health literacy. However, in contrast, age and health literacy did

not appear to be correlated in the present study. This may be because the study sample was undergraduates, who are more or less in the same age cohort.

Some literature indicates that gender has an impact on health literacy. The study conducted by Chu-Ko et al. (2021) reports such association. The literature reports that there is a strong association between gender and health literacy (Mao et al., 2020; Rababah et al., 2019; Sarhan et al., 2021). However, when comparing the results of the present study, which was conducted among Eastern University undergraduates, no statistically significant association between gender and health literacy could be identified. Young men and women both have greater control over their health due to the Corona pandemic, which might be a reason.

Chu-Ko et al. (2021) reported that health literacy among adults was more influenced by family income than other factors. Mao et al. (2020) study also discovered health literacy was influenced by the income of single-child families. The present study did not find any connection between socioeconomic level and health literacy.

According to a study by Mao et al. (2020), there was a strong relationship between academic performance, majors, and school type. The year of study and field of study were also found to be substantially related to health literacy by Rababah et al. (2019). Turkey nursing students participated in the study, and it was discovered that fourth-year students' had higher health literacy than first-year students (Ayaz-Alkaya & Terzi, 2019). However, the present study found a substantial correlation between faculty and health literacy. However, there was no clear correlation between health literacy and academic year.

In the present study, there was a significant association between faculty and the health literacy of undergraduates. Faculty of Science and

Faculty of Health Care Sciences students pay close attention to their health because their academic work is heavily based on science and the functioning of the human body, while other faculties such as the Faculty of Commerce & Management, Faculty of Agriculture, and Faculty of Technology, do not base their curricula on human science. Due to this, there are some knowledge gaps between them.

According to the study by Chu-Ko et al. (2021), smoking and drinking alcohol were both associated with health behaviours in the adult population. Additionally, a Jordanian study discovered a significant link between smoking and health literacy (Rababah et al., 2019). However, the present study discovered that among undergraduates at Eastern University, Sri Lanka, there was a statistically significant relationship between alcohol intake and health literacy. However, there was no connection between smoking and health literacy level. People who do not drink have a greater understanding of the effects alcohol has on their health, due to these effects, they encourage people to quit alcohol usage and pay attention to their health.

The main role in the health field is played by doctors. Most of the time, when dealing with any disease, moderate or severe, many of us think about and seek medical guidance. Sometimes, especially in the adult population, they require much more care from the doctor. Additionally, seeking medical guidance is crucial to recovering from an illness or improving a person's general health. When we go to take medications, it will not improve our health literacy if the doctor merely prescribes medication without any clarification. Patients may also believe that there is no need for clarification and that the prescription is sufficient. It is generally expected that the physician should explain to the patients about the particular health issue or how it is progressing, provide suggestions on how to stop it from happening again, such as dietary

restrictions, or how one can recover from the sickness, and provide the medication with the necessary explanation on its administration and side effects, and necessary precaution to avoid side effect. Therefore, this kind of reaction from the doctor is crucial and beneficial for increasing the patient's health and health literacy. This was proved in the present research that those who received full explanation or guidance from doctors had the highest level of health literacy than others who received only a prescription and no explanation or guidance. The doctor's response to the patient's health condition appears to have a stronger impact on the population's levels of health literacy. Better explanations from the doctor also increase patients' level of satisfaction with them.

Conclusion

The purpose of the study was to evaluate the level of health literacy among the undergraduates of Eastern University, Sri Lanka. Health literacy was analyzed based on five domains such as reading, understanding, access, appraisal and decision-making/behavioural intention. The study found the majority had adequate literacy skills for understanding health information (67.4%), and access to health information (73.7%), while the majority had a limited level of literacy for domains of reading (53.7%) and appraisal (84.1%). However, there is no significant deviation between adequate and limited levels in the domain of decision-making/behavioural intention. According to the overall health literacy, both limited (49.2%) and adequate levels (50.8%) are more or less equal in proportion. The mean score of overall health literacy is 65.7±13.5% which ranges between somewhat inadequate to sufficient ranks. However, the undergraduates are weaker at reading, appraisal, and decision-making domains of health literacy. Concerning the factors, influencing health literacy, faculty, alcoholic habits and doctor's advice influence health literacy,

while age, gender, family income, family members who work in the healthcare field, academic year, respondents' perceptions of their health, and smoking habits, do not influence on health literacy.

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Information Seeking Among Law Undergraduates at the University of Peradeniya: Identifying Barriers and Proposing Strategies

W.R.N. Fernando[1] and W. R. W. M. A. U. Weerakoon[2]

Abstract

This study investigates the information barriers faced by final-year law students at the University of Peradeniya, Sri Lanka, aiming to assess both personal and external barriers and propose improvements to law-related resources and services. The study utilized the entire population of fourth-year law students, consisting of 50 students, and employed structured questionnaires, resulting in a 72% response rate. It identified personal barriers such as time constraints, limited familiarity with library resources, discomfort in using the OPAC and lack of information literacy skills. Additionally, there were external barriers such as the absence of current legal materials and digital resources in the library. The research underscores strategies to alleviate these barriers by providing more up-to-date legal materials, expanded electronic

[1.] Senior Staff Assistant, Main Library, University of Peradeniya, Peradeniya
Email : rodneyniranjan@gmail.com

[2.] Senior Assistant Librarian, The Open University of Sri Lanka, Kandy Regional Center, Polgolla
Email ; auwee@ou.ac.lk https://orcid.org/0009-0002-7575-5291

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resources, increased computers and internet facilities, and information dissemination through mobile technologies, thereby fostering a more conducive environment for academic success. The study also suggests resource and service improvements as a response to the major personal barrier of time constraints faced by students.

Key words : Information barriers, Information access, User needs, Legal education, Legal information

Introduction

Library users face various barriers and hindrances when seeking information. In addition to the provision of information services and facilities, librarians should strive to identify and eliminate whatever barriers which prevent readers from accessing information. These barriers may emanate within or without the user and in the form of cognitive, physical, and immaterial obstacles. They may hinder, delay or prevent access to information and weaken quality information behavior.

The current study is an attempt to identify barriers faced by undergraduates when using an academic library for seeking information. The cohort was final year (4^{th} year) law students at the University of Peradeniya in Sri Lanka (UoP). The main goal of the study was to find out what difficulties these students face when looking for information and to suggest ways to overcome these problems.

The University of Peradeniya, is one of the leading and largest residential Universities in Sri Lanka. From 1950 to 1965 the University possessed a Law Faculty until the Faculty was transferred to the University of Colombo. After a very long standstill, the University of Peradeniya re-entered the legal education domain. The Department of Law was established in 2009 and offers a unique four-year LLB Degree which has an interdisciplinary approach towards legal education. The degree has a strong social justice orientation with a focus on the role of law in addressing social problems. In this context, the library is tasked with the mission to make this effort successful through the provision of needed resources and services.

Literature background of the study

Exploring the information-seeking behavior of law students is crucial for understanding the challenges they face in accessing and utilizing information resources effectively. This literature review critically examines several studies conducted in different countries, focusing on the experiences and barriers encountered by law students when searching for information in both print and electronic formats.

Ossai's (2011) case study of law students at the University of Benin in Nigeria highlighted difficulties in locating appropriate information sources and emphasized the role of libraries in addressing these challenges through effective information literacy programs. Additionally, it highlights the phenomenon of "library anxiety" among students, suggesting a need for supportive and user-friendly library environments.

Ogba (2013) shed light on the challenges faced by Nigerian law students, including limited internet resources, difficulties in identifying relevant materials, and a lack of knowledge regarding reliable sources. These findings underline the significance of addressing infrastructure deficiencies and enhancing information literacy skills among law students.

Kadli and Hanchinal's study carried out in 2015 in an Indian university highlighted the proficiency of law students in accessing legal databases but also identified challenges such as information overload and deficiencies in search skills in the online environment. This emphasizes the importance of structured training programs to optimize information utilization among students.

Das and Jabab's findings in 2017 in Bangladesh, reaffirms the predominance of online sources among law students but highlights concerns regarding the currency and availability of information. The study emphasizes the importance of addressing issues such as the lack of open-access sources and unfamiliarity with search strategies and, highlight the need for comprehensive strategies to improve access to up-to-date and reliable information resources.

The existing literature on the information-seeking behavior of law students in Sri Lanka indicates a noticeable gap in local studies addressing this aspect, which could hinder the identification of potential barriers within the process.

Information seeking behaviors of local law students were studied in a few occasions. Wijetunge and Alahakoon (2019) examined the information-seeking trends among law students entering two universities in Sri Lanka, advocating for well-planned support programs to aid students as they commence their undergraduate studies. Gunasekera's survey on students' usage of academic libraries in 2010 at the University of Peradeniya and, Wijetunge and Manatunga' s study carried out in 2015 on law students at the University of Colombo offers some insights into library utilization but does not delve deeply into the specific needs and preferences of law students. Recent studies by Fernando and Weerakoon (2022a, 2022b) shed light on the information usage patterns among law undergraduates at the University of Peradeniya, with regard to purpose of seeking information, access frequency and, types of resources preferred by law students, emphasizing the importance of understanding students' preferences regarding electronic and printed resources for library collection development.

Only a very few studies address the issue on barriers to information seeking of law students. Karunarathna (2015) identifies barriers such as insufficient workstations, slow internet speed, and a lack of computer skills hindering access to e-resources, particularly at the Open University of Sri Lanka. Dayananda and Jayawardhana (2018) contributed to this discourse by exploring the information needs and behavior of law students at the Sri Lanka Law College, offering insights into the unique challenges faced by this group.

While existing studies offer valuable insights into the information-seeking behaviors and associated challenges of law students in Sri Lanka, it is crucial to note that the literature lacks a comprehensive examination of the barriers faced by students and the potential role of libraries in addressing these challenges. The current research is an attempt to address this gap with the aim of enhancing the overall information-seeking experience for law students.

In addressing barriers to information, library professionals must first identify and understand the diverse types and typologies of these barriers. Swigon (2011) proposed a universal typology consisting of four groups: (1) Barriers connected with personal characteristics, such as lack of awareness, skills, or time, as well as psychological resistance to technology or asking questions; (2) Interpersonal barriers, including a lack of assistance from individuals who serve as primary or secondary information sources; (3) Environmental barriers, encompassing legal, financial, geographical, political, and cultural factors; and (4) Barriers associated with information resources, which can be further categorized into obstacles within libraries (e.g., insufficient resources, unfriendly rules), those imposed by authors and publishers (e.g., information overload, language dominance), and challenges in utilizing the internet (e.g., technical issues, information overload). It's essential to recognize that information barriers often overlap and are

interconnected. For instance, library-related barriers may manifest across all groups rather than solely within the domain of information resources. This understanding underscores the complexity of addressing information barriers comprehensively.

Statement of problem and significance of the study

Reviewing of similar or related literature pertaining to this study has shown that law students face multiple barriers and challenges in information seeking which falls under the types discussed by Swigon 2011. Failure to consider user needs and address barriers within the library may result in students feeling disconnected from library services. Therefore, it's important for libraries to pay special attention to resolving these issues to support students in their information-seeking efforts.

A knowledge gap regarding the barriers and challenges faced by law students does exist in the local context as discussed in the literature review section. Thus, the current study will be the first comprehensive study on assessing barriers to information seeking of law students in UoP. Despite the general perception that information provision and services are satisfactorily being made by the library to the 4th year law students, the inquiry will assist the library management to realize the degree of satisfaction of readers, the barriers they come across, their reactions, and strategies in face of these barriers and challenges. It will also provide useful information to make better decisions to improve law-related resources and services.

With the main aim of identifying the difficulties faced by final year law students in the University of Peradeniya, the study underpinned the following specific objectives.

1. To determine the information requirements and service requirements anticipated by 4 th year law students in UoP,
2. To find out personal and external barriers faced by them when seeking information

Research Methods

This study focuses on 4th-year undergraduate of the Department of Law at the University of Peradeniya, in the year 2020. The entire batch consisted of 50 students. Since the number is small, the entire population was considered to ensure the highest level of accuracy. As the main library houses the law collection, the study focused on the use of the main library only. Data collection was primarily conducted using a structured questionnaire distributed online via "Google Forms". The questionnaire primarily focused on assessing the barriers while reserving a question to asses student's needs. The questionnaire was prepared based on the typologies of barriers as identified by Swigon (2011). Selected typologies were categorized under two main themes as personal barriers and external barriers. Data collection achieved a robust response rate of 72%, with 36 out of the 50 targeted respondents participating in the study. Data were analysed using Microsoft Office Excel 2007 and descriptive statistics were presented in graphical or tabulated form.

Results and Discussion

1. Information requirements and service requirements anticipated by law students

External barriers related to information seeking often involve challenges associated with accessing information resources. To gain a better understanding of these external barriers, which will be elaborated on later, the

study sought to identify students' anticipated information needs from the library. The majority of requests falls into the categories outlined in Table 1.

The findings revealed a strong need for current legal material (89%). Further, it suggest that students prefer more online resources such as databases for information needs (83.3%) , but there is also a growing trend towards using social media for information access (55.6%). This is an indication of the increasing importance of emerging technologies in their information engagement as extensively reviewed by Limas (2020) highlighting the changing information needs and behaviors of undergraduates in the contemporary society.

Other than the major findings, students expressed a need for automated, efficient, and flexible reader services (9, 6.3%), which encompassed improved customer-friendly service, better communication, and flexible rules. Some students also requested legal materials in the Sinhala language (2, 1.4%) and remote access to e-journal databases provided by the library (not shown in Table 1).

Table 1

Information Requirements and Service Requirements Anticipated by Law Students

User Requirements	Number of responses	%
Provision of more current legal materials	32	88.9%

Provision of electronic resources and online legal databases	30	83.3%
More computers with high-speed internet facilities	23	63.9%
Provision of government publications	23	63.9%.
Provision of academic and other information through mobile technology (WhatsApp, Viber, Instagram, etc.)	20	55.6%

Academic libraries have long been essential to the academic success of undergraduates. However, with the influence of emerging technologies and other socio-cultural factors, libraries must adapt to remain relevant. While many libraries have made strides in updating their physical and virtual spaces and expanding online databases, there remains a need for a deeper understanding of undergraduates' everyday information needs and behaviors.

2. Personal barriers to information seeking

Table 2 shows in a descending order the personal barriers identified by respondents. The primary barrier identified is the lack of time (75%), which is a significant hindrance to regular library visits. This aligns with the findings by Fernando (2021) study on information seeking of law students at the Peradeniya University main library which reveals that 47% visited the library only when an information need arise, some visited once a week (19%), others several times a month (14%) or occasionally (11%). Only 6% visit the library

on a daily basis indicating that the busy schedules of students may not allow for habitual library use.

Overall, the other personal barriers faced by students were recorded in low percentages (<50%), which indicates the relatively minor impact they may have in comparison to the primary barrier identified. However, it is crucial to consider the other responses as well, as 'even seemingly minor' barriers can collectively contribute to a student's overall educational experience and success.

A proportion of 36% of participants reports that they are not comfortable in using the library online catalogue / OPAC. This is disappointing since the online catalogue is one of the easiest ways to find library resources in printed format.

Table 2

Personal Barriers to Information Seeking

Personal factors	Number of responses	%
Lack of time to seek information and use the library	27	75.0%
Not comfortable in using the library online catalogue / OPAC	13	36.1%
Lack of information searching skills and strategies	11	30.6%
Lack of knowledge on available law resources in the library and elsewhere	8	22.2%

Lack of knowledge on how to begin a search in the library	7	19.4%
Not confident enough to select information most appropriate to information need	6	16.7%
Lack of language skills	2	5.6%
Special needs student (differently able student)	2	5.6%
Not sure how to evaluate information sources.	1	2.8%

Furthermore, the findings reveal that a noteworthy proportion of students (22%), lack knowledge about available law resources in the library indicating that they may not be fully aware of the broader range of resources available in the library.

According to Fernando and Weerakoon (2022a), the UoP library houses a rich collection of law related information sources under 6 major collections (general, reference , Ceylon room and three special collections) which are recognized as either 'very important' or 'important' by law students. However, 8.4% of the students were completely unaware of two special collections in the library. The availability and location of the library resources in all collections can be easily retrieved from the OPAC. Hence, students require training to use the OPAC without feeling anxious.

Information literacy (IL) is an essential skill for undergraduates. The findings indicate that a relatively small number of students believe they lack certain important IL skills. For instance, 30% of students reported a lack of information searching skills and strategies, 19.4% expressed a lack of knowledge on how to initiate research in the library, and 16.7% indicated a

lack of confidence in selecting the most appropriate information for their needs.

According to the findings it can be assumed that approximately 70% of the students are knowledgeable or at least believe they are competent in information searching. As Karas and Green (2008) observed, undergraduates often exhibit overconfidence in their ability to locate information and assess its credibility. This observation was further supported by Kim et al. in 2014, who noted that while the availability of digital resources has expanded undergraduates' access to information, they still lack some fundamental information literacy skills.

It was reported that 19% of students lack knowledge on how to initiate library research. Nevertheless, students have the option to seek assistance from the library's academic staff for research-related matters. It's intriguing to examine whether students actually reach out to the staff and, if not, why they refrain from doing so. This is a topic worthy of further exploration. However, as indicated in Table 3, a mere 2.8% of students expressed dissatisfaction with the support provided by library staff. Various reasons may contribute to students' reluctance to seek help. As McAfee (2018) noted, library anxiety can cause users to feel alienated and disconnected from library culture and staff.

Accuracy and relevance of information is a must in the legal profession, therefore law students who are learning to be professional need to ensure the information, they gather is accurate and reliable. Given that 16% of students lack the skill to select the correct material and 2.8% lack information evaluation skills, the library can contribute to enhancing their information evaluation skills through user education programs.

Only 5% have reported language barriers, but it's important to focus on improving the language skills of students who need assistance. Similarly,

despite the small number of differently-abled students (5%) in line with UNESCO SDGs, the library should investigate the needs of these students as well.

Martzoukou et al. (2022) highlights that barriers to information seeking by law students may encompass disparities in digital competences, such as differing levels of proficiency in utilizing digital tools and media for academic purposes. Furthermore, it emphasizes that digital citizenship mindsets, including attitudes and behaviors related to information literacy and digital wellbeing, can significantly impact students' ability to effectively seek and utilize information in their legal studies. The current study also suggests that personal barriers identified, may closely intertwined with the specific information-seeking habits and preferences of law students. Therefore, alleviating these barriers should be done through tailored support and guidance to enhance their library usage and information-seeking skills.

3. External barriers to information seeking

External barriers or challenges encountered when seeking information especially within the library environment were considered in the study. Table 3 shows the list of barriers revealed by student responses.

Accordingly, a majority of the respondents (80%) mentioned that lack of adequate law related information as the major challenge. The inadequacy of material is further aggravated by the fact that available materials are not current (66%).

The findings from Table 1 of the current study indicate that 83.3% of students are eagerly anticipating the availability of electronic resources and online legal databases. This finding is further supported by the discovery that

50% of the population perceives the absence of a digital library containing legal material as a challenge.

Availability of law journals were accepted as adequate by a majority. However, 66% have identified that latest journals are not available. Journals are very important resources for a profession-oriented education. Especially the importance of journals to law students was shown the study by Fenando and Weerakoon's (2022b) study which reported the preference for e- journals as very high (91.7%). The same study revealed a high usage of electronic information resources by law students of UoP, with e-books, local law websites , E-case summaries, foreign law websites, and E- judgments and E-newspapers were preferred by a majority (>60%) while academic databases were the least used (50.0%).

Table 3

External Barriers to Information Seeking

External factors	**Number of responses**	**%**
Lack of adequate law related information resources (print/online)	29	80.6%
Available law related materials are not current	24	66.7%
Inadequate law related reference tools (Encyclopedia, dictionaries, bibliographies etc.) and reference books	6	16.7%
Absence of electronic / digital library containing legal related materials	18	50.0%

Inadequate number of law journals (print/online)	17	47.2%
Non-availability of latest law related journals (print/online)	24	66.7%
Lack of adequate computers for students' use and lower bandwidth /internet speed	14	38.9%
Law related materials are not in the right places or not well arranged	9	25.0%
Infrastructure (Seating facilities, fans, ventilation, lighting,) is not sufficient	9	25.0%
Library opening hours and circulation hours are not flexible	5	13.9%
Library staff are not supportive	1	2.8%
The library does not offer enough information skills training sessions	3	8.3%

However, earlier studies carried out at UoP reveled different results. For example Gunasekara (2010) states that 78% of the respondents were unaware of the electronic journal services provided by the UoP main Library. Further, Premarathne (2017) state that only 36% Final year Arts undergraduates use electronic resources. The changes in preferences as indicated in the current study shows the growing tendency of the contemporary undergraduates to use online resources.

Respondents also have mentioned that lack of computers for students' use and lower bandwidth /internet speed (39%) as a barrier. This too is a common barrier in the Sri Lankan university libraries. According to

Karunararthna (2014) , the main barrier for 52% of the students for seeking e-resources on Law was insufficient workstations with adequate bandwidth.

4. Proposed strategies to overcome the barriers

Based on the outcomes of the study, the problems perceived by a majority of students are considered as notable barriers thus strategies to alleviate them were formulated.

Insufficient law-related information resources, whether in print or online and outdatedness of available material present a barrier. To address this, it is suggested to acquire relevant and up-to-date information resources to enhance the collection while maintaining a balance between the two formats. In doing so it is important to liaise with students and faculty.

To address the issue of non- availability of latest law journals, the library could explore the possibility of acquiring specialized law-related e-journal databases and other resource databases such as LexisNexis, Westlaw, Legalpedia, Law Journal Online, Compulaw, Hein Online, Law Pavilion, and Find Law within the allocated budjet.

The absence of an electronic or digital library containing legal-related materials poses a barrier. To overcome this, it is recommended to establish a digital library or load the institutional repository with sufficient local law-related materials. This can be achieved by purchasing e-books, e-case summaries, e-judgments, and other law-related e-resources.

To cater to the smaller proportion of users lacking information literacy skills, it is advisable to train staff members in the reader services division to comprehend various user behaviors associated with library anxiety and related factors. This training should equip them with the knowledge and skills needed to effectively assist and support such students.

To address the main personal barrier reported by students, which is the lack of time to use the library due to busy study schedules and other commitments, the library can implement several strategies.

Firstly, offering extended library hours, especially during peak study periods, can provide students with more flexibility to access resources. Additionally, providing remote online access to library resources and databases allows students to utilize materials remotely, saving time on commuting to the physical library.

Introducing mobile library services or book delivery options can further accommodate students' busy schedules by allowing them to request materials and have them delivered to their preferred location on campus. However, it will be challenging to initiate this service with limited staff, financial matters and by-laws in the university system.

Furthermore, promoting time management and study skills workshops can help students better organize their schedules and make the most of their available time for library use. Overall, a combination of these strategies can help alleviate the time constraints faced by students and encourage greater utilization of library resources despite their busy schedules.

Conclusions

The findings from this study shed light on the major and minor barriers faced by law undergraduates in their information-seeking journey, both internal (personal) and external. The main internal barrier reported by students is the time constraints. In addition, lack of familiarity with library resources, discomfort in using the OPAC and deficiency in information searching skills, were identified as minor barriers. External barriers are inadequacies in the part of the library. The major was related to information resources particularly due

to the inadequacy of current and up-to-date resources in the library. The absence of modern law-related journals and a digital library with legal materials further compounds the challenge.

In light of these findings, strategies were proposed to address these barriers to information seeking. These include enhancing information resources by acquiring up-to-date materials in both print and online formats, providing specialized law-related databases, and establishing a digital library or loading the institutional repository with local law-related materials. Staff training on user behaviors and library anxiety can assist students lacking information literacy skills. Extending library hours, providing remote access to resources, and introducing mobile library services or book delivery options can accommodate students' busy schedules. Additionally, promoting time management and study skills workshops can help students better organize their schedules for library use. Moreover, recognizing the students' preference for mobile technology and social media as communication channels could enhance information dissemination to the students. Implementing these strategies can alleviate barriers and encourage greater utilization of library resources among students

Recommendations

Strategies proposed by the study which are discussed in the text can be applied as recommendations

Further studies

The survey can be extended to all study levels of the Law undergraduate degree programme at UoP to identify barriers at each level. This extension would offer a comprehensive understanding of the evolving challenges students face throughout their academic journey,

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Library Instruction Sessions on Awareness of Plagiarism Among University Students: A Case Study

C.N.D. Punchihewa[1] and A.D.B. Kumara[2]

Abstract

This study investigates the effectiveness of library user education programmes in enhancing students' awareness and understanding of seven types of plagiarism. The focus was on three distinct groups of students: undergraduates at two different levels (level I and level III) and postgraduates. The methodology employed a structured questionnaire to collect data via a survey approach before and after the library instruction sessions. To facilitate data collection, an online survey was created using Google Forms, streamlining the process of reaching out to participants.

Results demonstrate that the library user education programs significantly contributed to the enhancement of students' comprehension of plagiarism. Notably, Word-for-Word and Mosaic plagiarism were well comprehended across all student groups, indicating the effectiveness of the educational interventions for these types.

[1] Senior Assistant Librarian, University of Moratuwa
Email: nishanp@uom.lk https://orcid.org/0000-0002-8261-8001

[2] Senior Assistant Librarian, University of Moratuwa
Email: buddhin@uom.lk https://orcid.org/0000-0003-1269-5252

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While the majority of plagiarism types indicate considerable improvement following the instructional sessions, the study highlights the importance of tailored approaches for addressing challenging areas. Educators are encouraged to prioritize comprehensive and targeted strategies to maximize the outcomes of plagiarism and referencing in education.

Keywords: *User education, Plagiarism, Referencing*

Introduction

As literature explains, plagiarism occurs when people reproduce someone else's work without acknowledging the original author and the source. The Concise Oxford Dictionary claims that the Latin word "plagiarise" which means "kidnapper" is the origin of the term "plagiarism." Further, it explains plagiarism as "the action or practice of taking someone else's work, ideas, etc., and passing it off as one's own: literary theft" (Oxford University Press, 2020).

The problem of plagiarism, which is generally understood as any kind of academic fabrication, has a significant negative impact on academia. Using someone else's work without their consent or substituting words or ideas from their work without citing the original author are two examples of academic plagiarism. According to the literature, plagiarism is widespread among students, researchers, and academic staff in many academic institutions worldwide.

Today, many academic institutions have highlighted plagiarism as one of the severe challenges that must be addressed. Plagiarism was documented in Western nations as early as the 1600s, according to Hansan (2003, cited in Ali et al., 2012). Previously, plagiarism was mostly limited to printed resources in libraries or other people's assignments. As a result of the difficulty in locating relevant information from countless printed resources in libraries, mechanical copying was a time-consuming process.

Information is constantly being added to meet these intricate information requirements because there is such a high demand for it in today's information-driven society. People's methods for gathering information have

changed significantly as a result of the enormous advancement of technology. Due to the rapid advancement of digital communication technologies, many conventional methods of information gathering have been hampered.

As a result, the Internet has emerged as the most widely used resource for meeting the various informational needs of members of all social strata, including academics, researchers, students, etc. Many people can take advantage of a variety of educational opportunities available on the Internet. Students now have quick and convenient ways to gather information, thanks to the information technology industry's rapid and ongoing change. Students no longer need to learn how to conduct traditional research because they can instantly and with little to no effort "Google" the information or resources they need. On the other hand, a lot of academic institutions have developed ways to give their students access through online databases to a variety of electronic journals, newspapers, magazines, and other e-documents.

It is not a problem to use the Internet to find research information. The students are expected to use these electronic documents honestly and ethically. Many students, however, have been known to just copy and paste content from these sources into their papers and pass it off as their work without crediting the original author or source (Chao et al., 2009). Growing instances of plagiarism are directly related to the advancement of information technology. Because of how simple it is to access the Internet, plagiarism has become a significant issue, as Pondayi and Rodreck (2012) noted.

User Education Programmes at University of Moratuwa

The Library University of Moratuwa currently offers several user education programmes that consider the patrons' current information needs

and make use of the most cutting-edge technologies. The key lessons that contribute to lowering the prevalence of plagiarism among students are those on plagiarism and referencing.

At the 458th Senate meeting held on 22nd August 2017, it was decided to implement plagiarism checking compulsory for the theses and dissertations of all PG degrees including those of taught courses and for the final year research project according to the request made by the Quality Assurance Division of University of Moratuwa. A common procedure for all the departments of UOM was approved at the 476th Senate for checking the plagiarism of all PG theses and dissertations and introduced with effect from 1st February 2019.

Therefore, to produce high-quality research outputs, participants in the "Introduction to Plagiarism" session should gain a thorough understanding of plagiarism and techniques for avoiding it. As the university requires checking all the research publications for plagiarism using the anti-plagiarism programme ‘Turnitin’, this session is essential for all undergraduate and postgraduate students before they submit their research publications and other assignments. The "Referencing for Research" session enables the students to understand these referencing styles clearly through real-world examples because the university has adopted the APA and IEEE referencing styles. The purpose of these hands-on lessons was to allow students to recognize and evaluate various kinds of quotations, paraphrases, and citations to determine whether or not they had plagiarized in some of their writing.

Plagiarism and referencing awareness programmes were conducted mainly targeting three specific groups: undergraduate students of level-I, undergraduate students of level-III and postgraduate students. The primary

goal of the plagiarism and referencing awareness programs for level-I undergraduate students was to educate participants on the fundamentals of referencing and plagiarism. It is critical to teach the fundamentals of research writing to freshmen when they begin their academic careers at the university. Generally, at the University of Moratuwa, most of the undergraduate students begin preparing for their final year research and report writing at level III. At this point, these students must have extensive awareness of plagiarism and referencing in order to prepare a high-quality final-year research report. As thesis preparation is a mandatory requirement for postgraduate students, they must also be well-versed in plagiarism and referencing in order to produce a high-quality thesis.

Objectives of the Study

The effect of library training sessions on enhancing students' understanding and awareness of plagiarism has not been extensively studied at the University of Moratuwa, despite the recognized problems with plagiarism. Therefore, this study aims to investigate the impact of library training sessions on students' understanding of plagiarism. The research provided here attempts to address the lack of plagiarism awareness by evaluating it, measuring the efficiency of library education sessions, and identifying potential weaknesses in existing programs. Results of the study offer research-based proof and specific suggestions for educators to create focused approaches for preventing plagiarism and promoting academic integrity.

This study aims to ascertain how undergraduate and postgraduate students at the University of Moratuwa understand different types of

plagiarism and the influence the library instruction sessions have had on their knowledge of plagiarism.

- To find out the awareness of students towards plagiarism.
- To explore the understanding of the students on various forms of plagiarism

Literature Review

Prior research on student plagiarism was done in English-speaking nations. In 1964, a sizable study was conducted, in which 5000 students from various American universities took part. According to the study, 75% of students used plagiarism in their papers at least once (Bowers, 1964, as cited in Tsertsvadze & Khurtsia, 2020). Numerous other studies in the area of plagiarism used this study as their foundation.

Plagiarism, in its broadest sense, is the non-credited use of the thoughts and opinions of one author by another. There are four different types of student plagiarism: stealing information from multiple sources, buying a ready-made paper from the proper service provider, completely appropriate use of another person's work, copying portions of other works into one's work and paraphrasing without citing the relevant source (Tsertsvadze & Khurtsia, 2020).

According to Tackett et al., (2010), the number of instances of plagiarism decreased by 77% at the Midwestern AACSB-accredited College of Business after commercial plagiarism detection software was combined with academic sanctions. Additionally, they have emphasized the causes of students' unethical writing during their studies. They claim that when students

are under time pressure or are dealing with personal issues, they have the propensity to steal information from the Internet and incorporate it into their writing without giving proper credit. Unintentional plagiarism is facilitated by ignorance of citation guidelines, as stated by Tsertsvadze and Khurtsia (2020). According to them, getting a better grade, a boring course, peer or parent pressure and disobedience or disrespect toward the administration are the motivating factors for intentional plagiarism.

Implementing a detecting mechanism has not eliminated plagiarism, as noted by Batane (2010). He contends that it is critical to pinpoint the true causes of student plagiarism and that students need to be reminded of the importance of academic integrity as well as how to alter their attitudes toward learning. This was further supported by Biggam and McCann's (2010) research at a Scottish university's business school. They claimed that even though plagiarism-detection tools like Turnitin were able to lower the students' similarity scores, the caliber of their writing had not increased.

An individual who possesses inadequate knowledge of plagiarism may continue to plagiarize unintentionally. But according to Ajiboye et al. (2020), ignorance is the main reason for the plagiarism of students and researchers. Further, they have highlighted that poor knowledge of citation and referencing styles has led to an increase in plagiarism. Time constraints are another factor that causes plagiarism issues among students. Many students and researchers may be persuaded into plagiarism by presenting others' work due to the short deadlines for submissions. The other factors cited by Ajiboye et al. (2020) include a lack of strict penalties for violators and the absence of a reliable system to detect plagiarism. A person with insufficient knowledge of plagiarism may still commit unintentional plagiarism.

Similar research by Kodikara and Kumara (2015) revealed a significant degree of plagiarism among University of Moratuwa research students. Considering that most of the students were very young (between the ages of 21 and 30), e-books and journals were the most widely used information sources for their research projects. Researchers identified eight factors that contribute to plagiarism. One of the main conclusions of the study was that there was a lack of understanding of plagiarism, as well as a lack of necessary skills, institutional issues, easy access to network resources, pressure from time restrictions, individual attitudes and lack of resources.

The research by Amin and Mohammadkarimi (2019) highlighted Turnitin as a useful tool for preventing plagiarism. However, they have emphasized the significance of better educating of students about plagiarism and the capabilities of Turnitin software before the students' submissions. Burke (2004) explained how librarians might reduce student plagiarism by creating motivated activities rather than relying solely on detection. According to her, librarians ought to focus on educating students about plagiarism cases and the best ways to avoid them. Therefore, instruction sessions in libraries on citation and plagiarism are essential for preventing student plagiarism. As a librarian at the Long Island University C.W. Post Campus, Madray (2007) described various types of activities she carried out to prevent plagiarism. She has created special seminars for the faculty on how to avoid plagiarism and spot it when it occurs, which helps the professors evaluate the work of their students. The students were given various opportunities to participate in workshops on referencing and plagiarism. For particular student groups, special sessions were scheduled in the faculty classrooms. Additionally, plagiarism was covered in the library instruction programme, and the fundamentals of plagiarism were covered during the freshman orientation. At

the awareness programmes, the university's policies on plagiarism and its consequences were also highlighted.

According to Mansoor et al. (2022), there are a number of reasons, such as ignorance, peer pressure, the influence of technology, and cultural variations, that contribute to academic misconduct by students. They have noted that one of the main causes of the rise in plagiarism cases among students is their lack of knowledge—or ignorance—about research ethics. Stress among researchers that results in intentional plagiarism is largely caused by laziness or poor time management, as well as pressure from competitive academic environments. Researchers have also looked into how educational cultures affect how seriously Asian and Western students take plagiarism. According to the researchers, students were more inclined to copy from the Internet than from printed materials because of the ease and speed with which they could obtain knowledge using the cut and paste method.

Research Design

After considering seven (07) plagiarism behaviours among students at one department of the Faculty of Business Studies of a New Zealand university, Walker (1998) attempted to create a guideline to represent the various types of plagiarism. The Sharm paraphrasing, Illicit paraphrasing, Verbatim copying, Recycling, Ghost writing, Purloining and other plagiarism were the seven types of plagiarism behaviours identified by Walker (1998) in his study. This manual was provided as a tool for the university academic staff members to recognize the various forms of plagiarism encountered by the students.

Further, Turnitin, one of today's premier organizations, has developed plagiarism detection software that compares the similarities between student work and its extensive database of other online sources, including publications and other works by students. A global survey with 900 secondary and higher education instructors was conducted by Turnitin in 2012, which led to the introduction of a plagiarism spectrum with ten (10) different types of plagiarism behaviours (Turnitin, 2012). After taking into account both conventional forms of plagiarism and emerging trends, Plagiarism Spectrum 2.0 is a more developed version of the types of plagiarism presented by Turnitin in 2020, with twelve (12) plagiarism behaviours (Turnitin, 2021).

After comparing the results of the studies conducted by Turnitin (2021), Curtis et al. (2013), Turnitin (2012) and Walker (1998), authors complied seven most prevalent types of plagiarism to serve as the foundation for the instrument used to measure the student's comprehension of plagiarism at the University of Moratuwa. Those seven types of plagiarism used in the current study are shown in Table 1. Previous studies have referred to the same type of plagiarism under various names. The terms used to define the seven types of plagiarism in this study were taken from Turnitin (2021) and Turnitin (2012) because they were the most recent versions.

Table 1

Types of Plagiarism

Types	Definition
Word-for-Word Plagiarism	Copying and pasting entire content without proper acknowledgement of the source
Paraphrase Plagiarism	Rephrasing an original idea without proper acknowledgement of the source

Self-Plagiarism	Using one's own previously published or submitted work without giving credit
Mosaic Plagiarism	Combining sentences or passages from various sources without using quotation marks or citation
Re-tweet Plagiarism	Directly copy text from a source and make small changes without proper acknowledgement of the source
Hybrid Plagiarism	A combination of perfectly cited sources and copied passages with no quotation marks or proper citations
Aggregator Plagiarism	Includes proper citations to the sources and the quotation marks where needed but the paper contains almost no original work of the writer

Methodology

In this study, a structured questionnaire was employed to collect data using the survey approach. The questionnaire was created to gather demographic data, evaluate the students' awareness of plagiarism and assess their knowledge and understanding of the different types of plagiarism.

There were 21 multiple-choice questions on the survey instrument. Questions 1 to 6 were used to gather demographic data. With questions 7, 8 and 9, awareness of plagiarism was evaluated. It was determined whether respondents understood the seven types of plagiarism listed in Table 1 through questions 10 to 21. Google Forms was used to create an online survey because sending emails to participants was much simpler. For the right responses to the questionnaire, a total of 25 marks were awarded. At the time they submitted the online survey, participants could see the grades they had received.

This study included all students who attended awareness sessions on both plagiarism and referencing from July 30, 2021, to March 31, 2022. A pre-test and post-test survey was administered to the University of Moratuwa undergraduate and postgraduate students who took part in plagiarism and referencing awareness programmes throughout the period under study. Both tests had the same questions, options and sequence. The purpose of the pre-test was to determine whether students had a fundamental understanding of plagiarism. The goal of the post-test was to evaluate the effectiveness of the sessions on referencing and plagiarism. Before starting the lesson on plagiarism awareness, the students were given a questionnaire to complete (pre-test). After the lesson on referencing, the students were given the same questionnaire to complete (post-test). The results of both tests were recorded.

Multivariate, nonparametric and parametric statistical methods were used to analyze the data using the statistical programme SPSS 21. The analyzed data were represented using tables, line graphs, pie charts and bar graphs.

Results

Demographic Details

The pre-test questionnaire was completed by 970 students, while the post-test questionnaire was completed by 413 students. As a result, 289 students who responded to both surveys were included in the study.

Table 2

Distribution of the Participants by the Faculty

Gender	Faculty				Total
	Architecture	Business	Engineering	Information Technology	
Female	45 (26.0%)	11 (6.4%)	92 (53.2%)	25 (14.5%)	173(100.0%)
Male	13 (11.2%)	10 (8.6%)	77 (66.4%)	16 (13.8%)	116 (100.0%)
Total	58 (20.1%)	21 (7.3%)	169 (58.5%)	41 (14.2%)	289(100%)

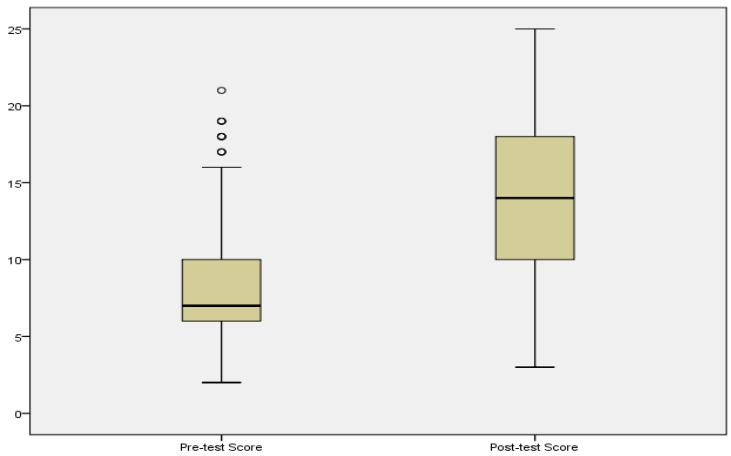
The study included 78 (27.0%) postgraduate students and 211 (73.0%) undergraduate students. In terms of gender, there were 116 male students (40.1%) and 173 female students (59.9%). Table 2 displays the distribution of the participants by faculties. As there are more engineering students at the University of Moratuwa than in any other faculty, it is evident that the majority of students in the study population (58.5%) are engineering students.

For responding to the 15 questions in the questionnaire on plagiarism, a total of 25 points were awarded. Figure 1 displays the distribution of the two test results. It reveals that the mean post-test score (13.49) of the study is higher than the mean pre-test score (8.29). This unequivocally proves that after the library sessions, students' awareness of plagiarism has improved. A paired

sample t-test (t=-18.164, df = 288, sig. (2-tailed) =0.000) further confirmed that there was a statistically significant difference between the two tests.

Figure 1

Boxplot of the Pre-test and Post-test Marks



Awareness of Plagiarism

To ascertain the student's level of awareness of plagiarism, three questions were included in the survey. The first question was, “Have you ever heard the word plagiarism?” Although the majority of participants were familiar with the term "plagiarism" before the library session, 2.4% of students had never heard it before.

In the pre-test, 74.7% of students correctly responded to the question, "What is plagiarism?" After the library session, 85.5% of the students answered the same question correctly. The results of the paired sample t-test (t = -4.006, df = 288, p = 0.000) revealed that students' understanding of plagiarism has improved as a result of attending the library session.

Furthermore, 78.9% of students on the pre-test and 92.7% of students on the post-test correctly responded to the third question about the

consequences of plagiarism. It indicates that following the library sessions, students had a clearer awareness of the consequences of taking someone else's work. A paired sample t-test (t = -5.135, df = 288, p = 0.000) confirmed its significance.

Table 3 displays the mean value of pre-test and post-test results of the study for awareness of the consequences by the participants. After participating in the library's plagiarism and referencing sessions, both undergraduate and postgraduate students demonstrated a clear awareness of the implications of plagiarism. Furthermore, the Paired Samples T-Test results revealed a significant difference between pre-test and post-test for undergraduate students' awareness of the consequences of plagiarism.

Table 3

Student Awareness of the Consequences of Plagiarism

Consequences of Plagiarism	Mean		n	Paired Samples Test		
	Pre-test	Post-test		t	df	Sig. (2-tailed)
Undergraduate Students	0.76	0.92	206	-4.869	205	0.000
Level-I	0.74	0.95	84	-3.802	83	0.000
Level-III	0.77	0.90	122	-3.259	121	0.001
Postgraduate Students	0.87	0.95	78	-1.755	77	0.083

Understanding of Plagiarism Types

Table 4 and Table 5 compare the study results of undergraduate and postgraduate students for the seven types of plagiarism administered before and after the library sessions. According to the study findings, the library sessions have improved both undergraduate and postgraduate students' understanding of all types of plagiarism.

Undergraduate students' understanding of seven different types of plagiarism before and after participating in library sessions, has been compiled in Table 4. For simpler comparison of the seven categories, one mark was granted for an accurate response. According to the findings, undergraduate students have displayed an improved understanding of the seven types of plagiarism after attending the library sessions.

Post-test results have indicated that undergraduate students had a better grasp of Self-plagiarism (0.92) with the highest mean value than other types. On the other hand, they have indicated the lowest mean value of understanding for Aggregator plagiarism. Furthermore, the Paired Samples T-Test demonstrated that undergraduate students' understanding of Self-plagiarism, Re-tweet plagiarism, Word-for-word plagiarism, Mosaic plagiarism and Aggregator plagiarism has improved significantly (Table 4). Even though undergraduates' knowledge of the seven types of plagiarism improved following the library instruction sessions, there was no significant difference in their grasp of Paraphrase plagiarism and Hybrid plagiarism.

Table 4

Undergraduate Students' Understanding of Various Types of Plagiarism

Types of plagiarism	Mean		n	Paired Samples Test		
	Pre-test	Post-test		t	df	Sig. (2-tailed)
Self-Plagiarism	0.65	0.93	206	-8.076	205	0.000
Level-I	0.61	0.95	84	-6.615	83	0.000
Level-III	0.68	0.93	122	-5.231	121	0.000
Re-Tweet Plagiarism	0.7559	0.9005	206	-5.666	205	0.000
Level-I	0.7619	0.9226	84	-4.031	83	0.000
Level-III	0.7459	0.8893	122	-4.197	121	0.000

Word-for-Word Plagiarism	0.5994	0.7652	177	-8.626	176	0.000
Level-I	0.6111	0.7083	72	-3.345	71	0.001
Level-III	0.5905	0.8095	105	-8.675	104	0.000
Paraphrasing Plagiarism	0.6964	0.8214	27	-2.260	26	0.032
Level-I	0.7353	0.8529	17	-1.725	16	0.104
Level-III	0.6000	0.7500	10	-1.406	9	0193
Mosaic Plagiarism	0.6022	0.7482	133	-6.803	132	0.000
Level-I	0.6346	0.7115	52	-2.217	51	0.031
Level-III	0.8564	0.7778	81	-7.043	80	0.000
Hybrid Plagiarism	0.7708	0.8125	47	-0.850	46	0.399
Level-I	0.7250	0.8000	20	-1.000	19	0.330
Level-III	0.7963	0.8333	27	-0.570	26	0.574
Aggregator Plagiarism	0.11	0.33	206	-6.626	205	0.000
Level-I	0.18	0.38	84	-3.639	83	0.000
Level-III	0.07	0.30	122	-5.375	121	0.000

As indicated in Table 5, postgraduate students' understanding of all seven types of plagiarism has improved after participating in the library sessions. Furthermore, postgraduate students' knowledge on Word-for-Word Plagiarism and Mosaic Plagiarism differs significantly. Postgraduate students, like undergraduate students, had the lowest mean value for understanding of Aggregator plagiarism (0.37).

Table 5

Postgraduate Students' Understanding of Various Types of Plagiarism

Types of plagiarism	Mean		n	Paired Samples Test		
	Pre-test	Post-test		t	df	Sig. (2-tailed)
Self-Plagiarism	0.88	0.94	78	-1.070	77	0.288

Re-Tweet Plagiarism	0.8910	0.9359	78	-1.222	77	0.225
Word-for-Word Plagiarism	0.5486	0.7153	72	-5.958	71	0.000
Paraphrasing Plagiarism	0.8438	0.8750	16	-0.565	15	0.580
Mosaic Plagiarism	0.5543	0.7065	46	-4.041	45	0.000
Hybrid Plagiarism	0.7424	0.7727	33	-0.571	32	0.572
Aggregator Plagiarism	0.21	0.37	78	-2.703	77	0.008

The results of a one-way ANOVA comparing three student groups (level-I undergraduates, level-III undergraduates and postgraduates) by type of plagiarism are shown in Table 6 along with the mean values of the post-test and pre-test result difference. According to the results, students' understanding on seven types of plagiarism has improved following the plagiarism and referencing workshops.

Table 6

Means of the post-test and pre-test result difference and one-way ANOVA results comparing UG Level I, UG Level III and postgraduate students.

Type of plagiarism	UG Level-I		UG Level-III		Postgraduate		df	F	Sig.
	M	N	M	N	M	N			
Consequences	0.1800	100	0.1406	128	0.0656	61	2	1.186	0.307
Word for Word	0.0930	86	0.2117	111	0.1875	56	2	5.844	0.003
Re-Tweet	0.1500	100	0.1406	128	0.0164	61	2	3.108	0.046
Paraphrasing	0.1000	20	0.1250	12	0.0170	12	2	0.296	0.745
Mosaic	0.0645	62	0.1867	83	0.1974	38	2	5.377	0.005
Hybrid	0.1250	28	0.0172	29	0.0417	24	2	1.833	0.167
Aggregator	0.1900	100	0.2188	128	0.1967	61	2	0.102	0.903

There are significant improvements in Word-for-word plagiarism and Mosaic plagiarism among the three groups of students. However, improvement in Word-for-Word and Mosaic plagiarism is substantially smaller among undergraduate level-I students than in the other two student groups.

Discussion

The results of the present study suggest that library user education programmes on plagiarism and referencing have increased the students' awareness and the understanding of plagiarism. Clearly, some forms of plagiarism (Word-for-Word plagiarism and Mosaic plagiarism) were well understood by all three students' groups. Examining the results for understanding of plagiarism, there was a statistically significant impact of the library user education programmes on plagiarism and referencing among both undergraduates and postgraduates.

According to study results, there were four plagiarism types (Word-for-Word, Mosaic, Re-Tweet and Aggregator) which has shown a statistically significant impact by the library user education programmes on undergraduate students. Both level-I and level-III undergraduates have well understood these four forms of plagiarism after completing the library instruction sessions. Same as the undergraduate students, after attending the library sessions, postgraduate students' awareness and understanding of all seven types of plagiarism has increased. This was further proved for Word-for-Word Plagiarism and Mosaic Plagiarism with statistically significant differences.

Despite overall improvements in awareness and understanding, a challenge was observed in relation to the Aggregator plagiarism type. Both undergraduates and postgraduates indicated the lowest mean scores for Aggregator plagiarism in post-test results. This suggests a need for more

focused teaching methods and dedicated time allocation for plagiarism and referencing sessions to effectively address this specific type of plagiarism.

Conclusion and Recommendations

The results of the study indicate that library user education programmes on plagiarism and referencing are effective in increasing both students' awareness and understanding of plagiarism. It is recommended that the wider and regular use of library instruction sessions on plagiarism for teaching academic integrity be in conjunction with more effective strategies.

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An empirical introspection of the library website from user perspectives: resource gateways versus Web Content Management Systems (WCMS) in higher educational institutions

M. A. L. Silva,[1] T. Ramanan,[2] and D. C. Kuruppu[3]

Abstract

Library websites being the virtual or digital facet of any library it is paramount to constantly evaluate and enhance the interface with necessary resources and services. In this regard, this study was carried out to analyze a range of opinions and feedbacks from stakeholders of a university library, which has published the links to subscribed databases, training guides, reference services, and research support services on its website. Due to the restrictions on mobility by economic crisis and Corona pandemic, library users heavily relied on digital interfaces to share and retrieve information. In this regard, a survey was carried out to explore the demand and desire of the library users as whether the library website satisfies them or does it need redesigning. Convenient sampling technique was employed where hundred and fifteen (115) users had responded to semi-structured questionnaires. Data extracted were analyzed using the Pearson Chi-square test, one-way ANOVA, and one sample Wilcoxon sign rank test. Majority (33.3%) of the students of the

[1] Senior Assistant Librarian, University of Colombo Email: anusilva@lib.cmb.ac.lk https://orcid.org/0000-0001-9345-7509

[2] Senior Assistant Librarian, Faculty of Technology, University of Colombo Email: ramanan@lib.cmb.ac.lk https://orcid.org/0000-0003-1344-843X

[3] Acting Librarian, University of Colombo Email: kuruppu@lib.cmb.ac.lk https://orcid.org/0000-0003-0763-0497

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Faculty of Science were using the library website more frequently than the students of other faculties. Responses showed that the Training Guides (Mean=4.00; SD = ±0.926) and past-paper portals (Mean=3.96; SD = ±0.989) accessed via the library website were useful. The chi-square test revealed a significant relationship of faculties with article requests (p=0.037) and adequacy of website information for academic work (p=0.036). Similarly, the level of students has a significant relationship with Selective Dissemination of Information (p=0.048); usefulness of the training guides (p=0.022); adequate research support (p=0.026); and effective organization of information (p=0.003). Overall responses revealed that the Library website is highly user-friendly (Mean=3.90; SD = ±0.909). One-way ANOVA revealed a significant relationship between the resourcefulness of the website and the respondents' overall satisfaction with the information received from the library website (p=0.021). These results evinced that the library website must comply with users' expectations and needs. Students' opinions and feedback emphasized on the need for updating the website through a benchmark of other library interfaces. FAQ section and Chat bot were a few suggestions made by the users.

Keywords: *Library Resources, Web Content Management Systems (WCMS), Website Evaluation, User Satisfaction*

Background of the Study

Libraries stay relevant to the fast-changing digital times by adapting themselves with state-of-the-art resources and cutting-edge technologies. Their survival in the waves of transformation in education, especially in higher educational institutions, is strongly determined by how 'closer' they are to stakeholders. Hence, the authors carried out a questionnaire-based survey across the library user communities of selected faculties, and based on the findings, they put forward their proposals for embracing a total web content management system (WCMS) to cater to the users. The library website of the University of Colombo continues to evolve with all the necessary resources to maintain its *status quo* as the 'number one' state university in the country in spite of current financial challenges.

It is natural that people go about their business in the networked society since the Internet has become an essential commodity as nearly 5.5 billion Internet users have been recorded in World Internet User Statistics (2022) as cited in He and Huang (2023). This has obviously increased the use of websites and electronic resources worldwide. Websites are one of the most effective instruments to retain customers by frequent interactions which increase their satisfaction (Tahir & Mushtaq, 2015) with respective goods and services. In similar vein, the libraries are no exception to this effect. From catalogue data to institutional repositories to journal databases, the library websites serve as resource gateways for stakeholders, thus user perspectives should be reflected in their designs and functionalities (Swe & Yang, 2021).

It has been observed that resources retrieved and services enjoyed from library websites have increased more than ever due to the recent crisis situations, namely COVID-19 pandemic and politico-economic downfall of Sri Lanka. Nevertheless, structure and style of library websites more or less

continue to stay as they were during the periods what people called 'normal days.' In a recent survey, it was found that users are highly satisfied only with library catalogue, past examination papers and electronic databases accessed through the websites (Amarasekera & Marasinghe, 2020). In an ever-changing digital world library users may expect even more dynamic web interfaces to exploit information although they are satisfied with existing web-based resources and services.

The Library of the University of Colombo declared its digital presence by launching its first-ever website in 2001 since satisfying users' expectations conventional services was not sufficient. Since launching the website, the library has continued to develop content and interactions with stakeholders (Silva, 2015). Over the years the library website evolved steadily, and in 2013 the website was re-designed to provide new services to the patrons. At present, the library website has become a platform that provides a wide-spectrum of digital resources and services including Online Public Access Catalogue (OPAC), eBooks, journal databases, library tutorials, research support services and many more (http://www.lib.cmb.ac.lk). In this regard, regular updating, monitoring and evaluation are essential prerequisites for library websites to provide effective and efficient interface for users to tap information without any barriers. Despite the necessity of assessing the library website based on user perspectives there was no surveys carried out to do so since 2013 (Silva & Wijayaratne, 2015).

Therefore, the Library intended to analyze the feedback of its users of different faculties and genres, so that it can decide whether to refurbish or redesign the existing website or to create an entirely new interface more likely to be a Web Content Management System (WCMS). When the scale and complexity of library websites increase (Velasquez & Evans, 2018)

transformation of services through new access policies is inevitable (Bashorun et al, 2021), thus, more resources could be made available to cater to a wide range of library users (Cox & Brewster, 2020). All this improvement is justified only by the comments, needs, and feedback from stakeholders of the Library, especially from students.

Objectives

The study was conducted to objectively evaluate the Library's website as opposed to the perspectives of library user communities of the University of Colombo so that the digital interface of the library will be improvised. Alongside, the following are the specific objectives:

- To assess the effectiveness of resources and services provided by the library website;
- To evaluate the user comments on the existing website design; and
- To investigate the relationship between user proclivity and website resourcefulness.

Study Methods and Analysis

This study was initiated with a pilot survey with selected respondents of faculties of arts, education, science, law, and graduate studies. Later, with the validated questionnaire the survey was expanded to the faculties of management, nursing, and technology. Based on the literature the website usability can possibly be evaluated using ISO 9241-11, which encompasses attributes such as effectiveness, efficiency and user satisfaction that are predominantly measured by user perceptions (Arthana, Pradnyana, & Dantes, 2019). Researchers devised a criteria based on ISO standards and previous literature for structuring the questionnaire to draw data on relevant elements.

The library serves a wide spectrum of user communities, nevertheless, the pilot survey mainly focused on undergraduates, which was a limitation of this study. Convenient sampling technique was employed in the pilot survey and fifty (50) users (who regularly visit the library website) were administered via emails with semi-structured questionnaires (Google Form). Data extracted from the pilot survey were descriptively analyzed using Pearson Chi-square test and one way ANOVA. Based on the pilot-survey's findings the data collection tool was validated to execute the actual survey to cover even wider range of subjects that used the library website. In this regard, convenient sampling technique was employed, and subjects were manually administered with questionnaires, where 115 responses were finally received with two reminders. Number of responses was low due to the country's condition at the time of the survey. Data from the final survey were quantitatively analyzed using Chi-Square and one-sample Wilcoxon signed-rank test (applied with Rosenthal test to check the effect size of significance). Single-sample Wilcoxon signed-rank test (one tail) was performed at 95% Confidence Interval (CI) by considering the hypothetical median as 3. Respondents' overall satisfaction was analyzed using Multiple-linear Regression to prove the variability of data used in the survey. Analyzed data were statistically interpreted and discussed alongside the existing literature in the following sections.

Resources and Services from Library Website

Library websites serve as resource-gateways to the patron communities and librarians keep in touch with their users regardless of time and space limits. Consequently, students' feedback on information resources and services availed via websites is paramount to assess the effectiveness of websites. Single-sample Wilcoxon signed-rank test (one tail) was performed

at 95% CI by considering the hypothetical median as 3. The output indicate that the majority of the responses are significantly higher than three ($p<0.05$), i.e. observed median is higher than the hypothetical median. In other words, responses remained more towards higher end of scoring. In order to test the magnitude of the differences, the effect size (r) was calculated. As a result, ILL, Plagiarism, Smart classroom and Facebook are with lower effect size (Table 1).

Table 1:

Responses on Resources & Services accessed via Library Website

Resources & Services via the Library Website	SD*	D*	M*	A*	SA*	Mean	P-Value	r†
Easy access to OPAC	1.7%	13.0%	28.7%	40.9%	15.7%	3.56	0.000	0.50
Enjoying ILL	5.2%	14.8%	45.2%	27.0%	7.8%	3.17	0.032	0.17
24/7 access to E-Resources	4.3%	4.3%	35.7%	39.1%	16.5%	3.59	0.000	0.50
Library news being good source	3.5%	6.1%	22.6%	46.1%	21.7%	3.77	0.000	0.59
Institutional Repository is useful	2.6%	1.7%	28.7%	49.6%	16.5%	3.78	0.000	0.65
Library training guides	0.0%	7.0%	26.1%	44.3%	22.6%	3.83	0.000	0.68
Index helps selecting articles	0.0%	6.1%	27.8%	52.2%	13.9%	3.74	0.000	0.68
Online Fine Payment - convenient	0.0%	11.3%	47.8%	32.2%	8.7%	3.38	0.000	0.43
User friendly access to past papers	3.5%	9.6%	18.3%	38.3%	30.4%	3.83	0.000	0.59
Selective Dissemination of Info. (SDI)	0.0%	7.0%	37.4%	42.6%	13.0%	3.62	0.000	0.60
LMS-based services	1.7%	3.5%	18.3%	46.1%	30.4%	4.00	0.000	0.72
Library Helpline	0.0%	14.8%	22.6%	42.6%	20.0%	3.68	0.000	0.58
Information on new resources	0.9%	7.0%	36.5%	41.7%	13.9%	3.61	0.000	0.58
Document Supply Services (DSS)	0.9%	11.3%	39.1%	34.8%	13.9%	3.50	0.000	0.48
Videos tutorials	1.7%	8.7%	40.9%	34.8%	13.9%	3.50	0.000	0.48
Plagiarism checking – helpful	5.2%	7.0%	38.3%	44.3%	5.2%	3.37	0.000	0.37
Quick access to library handbook	0.0%	7.0%	35.7%	41.7%	15.7%	3.66	0.000	0.62
Info. on using smart classroom	4.3%	12.2%	43.5%	30.4%	9.6%	3.29	0.001	0.28

Links to British Council resources	4.3%	7.8%	37.4%	40.0%	10.4%	3.44	0.000	0.41
Research Support Services	1.7%	8.7%	36.5%	42.6%	10.4%	3.51	0.000	0.50
Facebook activities – links	4.3%	10.4%	39.1%	36.5%	9.6%	3.37	0.000	0.35
Sufficient info. for academic work	0.9%	5.2%	27.0%	47.8%	19.1%	3.79	0.000	0.67
Meaningfulness organization of info.	3.5%	1.7%	33.0%	42.6%	19.1%	3.72	0.000	0.59
Currency of information	1.7%	7.8%	30.4%	46.1%	13.9%	3.63	0.000	0.57
Trustworthiness & accuracy	1.7%	3.5%	29.6%	49.6%	15.7%	3.74	0.000	0.65
Special-need students	1.7%	10.4%	27.0%	42.6%	18.3%	3.65	0.000	0.55

* SD – Strongly Disagree; D – Disagree; M – Neither agree nor agree; A – Agree; SA – Strongly Agree
† Effect size

According to the above Table, all the responses with respect to library resources and services were significant from the hypothetical mean. However, it is important to measure the size of that significance, thus effect size was also derived to interpret the results. For example, when the effect size is low the responses are accumulated around the hypothetical mean and when the effect size is high the significant responses are farther from the mean. In this sense, ILL and services rendered through Smart Classroom have very low and low effect sizes, respectively, which means those services need to be given wider marketing importance. Conversely, institutional repository, article delivery and training tutorials have strong effect size. Overall, as Table 1 shows, most of the services gained positive attention from student communities, thus those resources need to be high profiled on the website.

Factors Influencing the Use and Choice

In his doctoral study, Alotaibi (2020) found that students' preference of information sources are determined by a number of factors such as intent of users, domain knowledge, and social influence. Therefore, student's stream of study, level of the program, and digital literacy skills will influence how

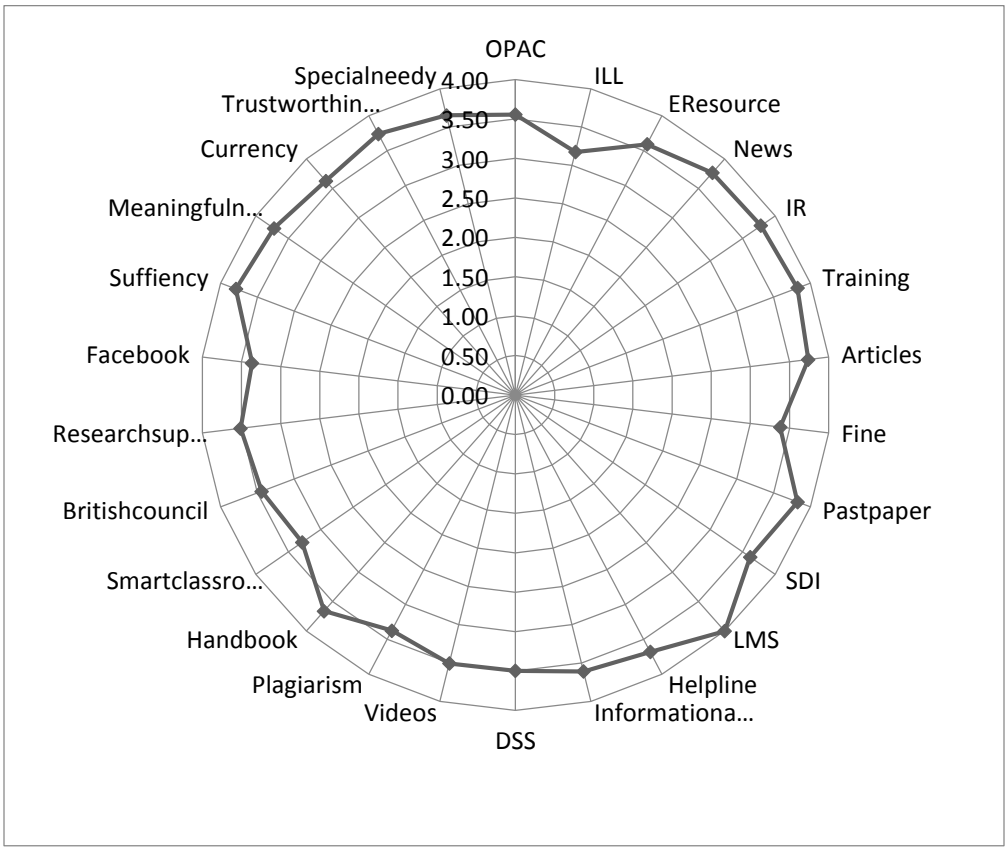
frequent and far they exploit the resources and services rendered by the library website. In the pilot survey, the authors found certain interesting phenomena, such as library website was more frequently (33.3%) visited by the students of the Faculty of Science although more than 75% of the respondents comprised Faculty of Arts.

Moreover, the study found that students often visit the library website when they get experienced in their level of study, i.e. final level of students (42%) frequently consulted the resources from the library website. Second highest (25%) frequency of using the library website was reported from the students of Law Faculty. It is obviously the faculties of studies have an influence on the usage of resources and services received from the library website.

Further to the above discoveries, 64% of the respondents were using the Library website at least 2 - 3 times a month and 58% were skilled to use computers (computer efficacy) and 56% were confidently Internet literate. Cross tabulation revealed that students having high skills of computer efficacy (40%) and Internet literacy (30%) do visit the Library website occasionally 2 - 3 times per month. These findings implicitly show that students with high computer/Internet efficacy may depend on other sources of information rather than relying heavily on the library website. This could attribute to redesigning the library website to attract potential users. Meanwhile, respondents also stated that the Library Management System accessed via the library website is useful for their studies (Mean=4.02; SD =± 0.869) and the Training Guides provided by the website are also considerably beneficial (Mean=4.00; SD =± 0. 926). Furthermore, the respondents indicated the past-paper database availed through the library website is user-friendly and valid (Mean=3.96; SD =± 0. 989).

Figure 1

User perception on resources and services



When it comes to Selective Dissemination of Information (SDI) services, Pearson Chi-Square revealed a significant relationship of faculties with article requests (p=0.037) and adequacy of library website information used for academic work (p=0.036). Similarly, the year of study showed a significant relationship with journal articles being received to personal emails (p=0.048); usefulness of the training guides (p=0.022); adequacy of research support (p=0.026); and meaningful organization of information (p=0.003). Thus, stream and year of study determines the usage metrics of the library website. Moreover, Pearson Chi-Square revealed a significant

relationship of Interlibrary lending (ILL) with the frequency of using the Library website (p=0.004) and access to e-resources (p=0.026), separately. This may infer that the more students visit the library website the more their demands grow.

Responses to open-ended questions included proposals such as to update the past papers database accessed via the library website, to display the recommended reading material, and to increase the availability of textbooks and articles in local languages through the library website. Therefore, more resources are required to be added to the existing library website.

Design and User Satisfaction

It is paramount that resources and services are required to be accessed via effectively accessible website design. Based on the ISO 9241-11 standards of evaluation there are a number of elements or features an effective website must contain. All the aspects of the website evaluation derived significant relationships. Accordingly, the respondents stated their feedback on a 5-point Likert scale as shown below in Table 2:

Table 2

User satisfaction with design factors

Factors	SD*	D*	M*	A*	SA*	Mean	P value	$r^{\dagger}$
User friendly	1.7%	9.6%	20.9%	40.9%	27.0%	3.82	0.000	0.62
Attractiveness	2.6%	10.4%	27.8%	38.3%	20.9%	3.64	0.000	0.53
Colour	1.7%	8.7%	27.8%	46.1%	15.7%	3.65	0.000	0.57
Uncluttered	0.9%	3.5%	30.4%	48.7%	16.5%	3.77	0.000	0.68
Familiarity	0.0%	7.0%	26.1%	53.0%	13.9%	3.74	0.000	0.68
Quick links	0.9%	3.5%	20.9%	47.8%	27.0%	3.97	0.000	0.73
Font styles	0.9%	2.6%	23.5%	51.3%	21.7%	3.90	0.000	0.73
Screen length	1.7%	6.1%	25.2%	49.6%	17.4%	3.75	0.000	0.63
Navigation	1.7%	7.0%	20.9%	59.1%	11.3%	3.71	0.000	0.64

Labels	2.6%	3.5%	33.0%	45.2%	15.7%	3.68	0.000	0.59
Information	0.9%	6.1%	34.8%	44.3%	13.9%	3.64	0.000	0.60
Language	0.9%	7.0%	27.8%	48.7%	15.7%	3.71	0.000	0.63
Simple narrative	0.9%	3.5%	33.9%	51.3%	10.4%	3.67	0.000	0.66
Compatibility	0.9%	10.4%	26.1%	47.8%	14.8%	3.65	0.000	0.59
Uniformity	0.0%	8.7%	38.3%	40.9%	12.2%	3.57	0.000	0.57
Smartphone access	0.9%	2.6%	27.8%	48.7%	20.0%	3.84	0.000	0.70
Content list	6.1%	9.6%	32.2%	34.8%	17.4%	3.48	0.000	0.39
Images	0.9%	6.1%	28.7%	55.7%	8.7%	3.65	0.000	0.65

* SD – Strongly Disagree; D – Disagree; M – Neither agree nor agree; A – Agree; SA – Strongly Agree

† Effect size

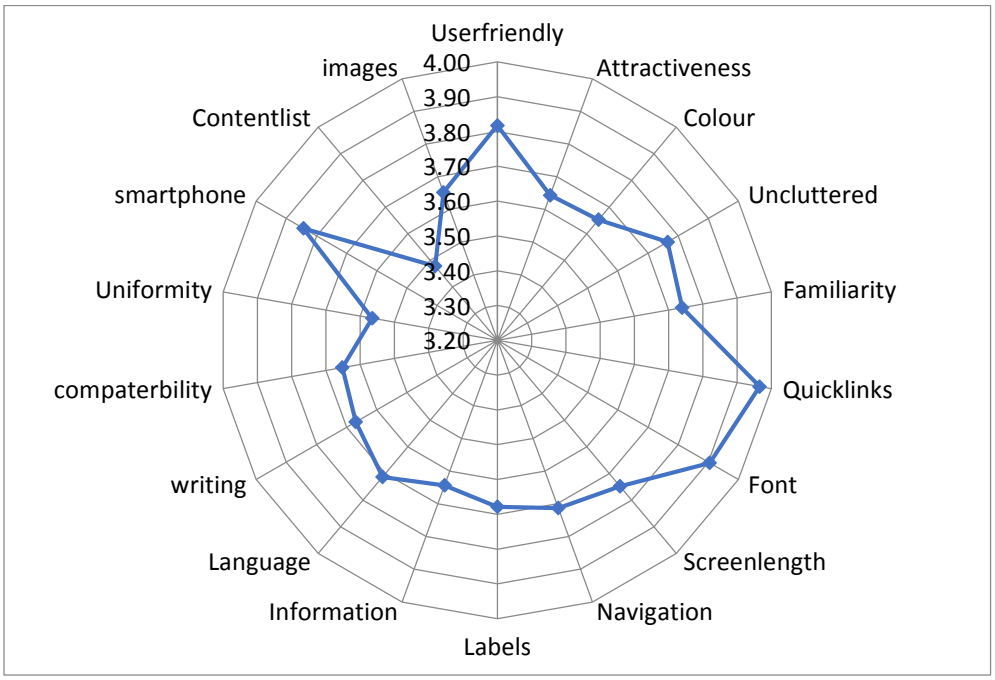
It is highly commendable that the library website is highly user-friendly as it has strong effect size. Similarly, tidiness, familiarity, quick links, information provided, font style used, easy navigation, access via smartphones, and images appear on the library website have strong effect size meaning they are positively perceived by the respondents. Meanwhile, attractiveness, colours used, compatibility and uniformity of the website have moderate effect size, that showed that those areas need further improvement. However, students' response revealed that the content list on the website has low effect size, which means more content is demanded by the user communities.

Furthermore, the study indicated that the quick links appeared on the website were valuable for the patrons to have access to the resources/ services (Mean=4.02; SD =± 0.845), and the font styles and sizes used were apprehending/readable (Mean=3.94; SD =± 0.767). In general, the respondents said that the Library website is highly user-friendly (Mean=3.90;

SD =± 0.909). However, this pilot survey will expand to probe further into user aspirations with respect to website design and navigation.

Figure 2

User perception on website design



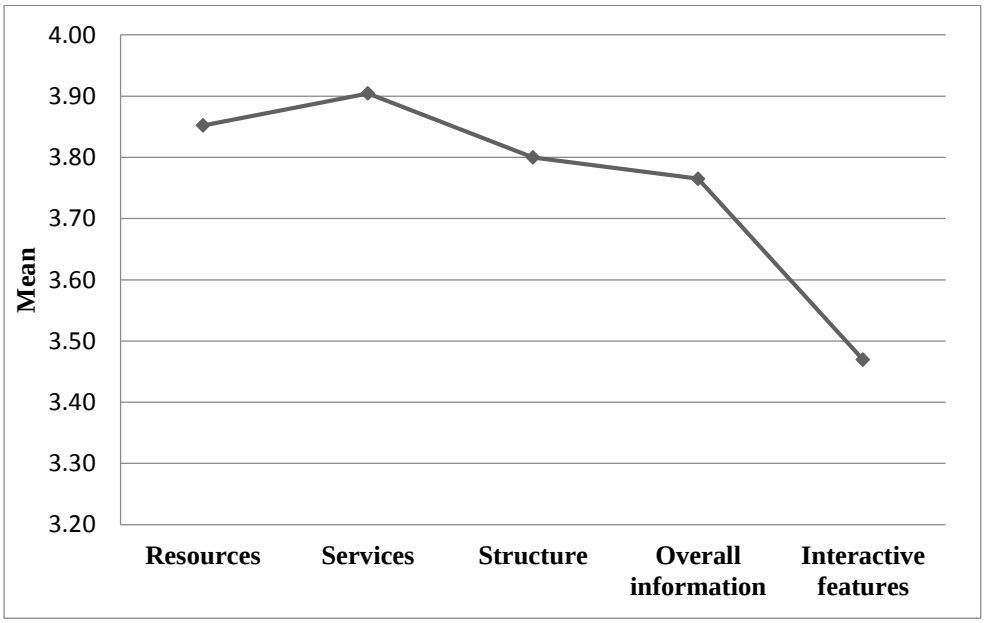
Pearson Chi-Square revealed a significant relationship of the year of study with colours used in the website (p=0.000) and the use of meaningful link labels (p=0.022). Post-hoc test revealed a significant difference between first and second year students (p=.0.033) with regard to the colours used in the website. Therefore, the year of study may have an influence on inclining toward the attractiveness of the website.

Substantial number of respondents were satisfied with the services provided by the library website (Mean=3.94; SD =± 0.913) and the overall structure/design of the library website (Mean=3.90; SD =± 0.839). One-way ANOVA revealed a significant relationship of resourcefulness of the website

and the respondents' overall satisfaction towards the information received from the library website (p=0.021). Furthermore, One-way ANOVA showed a significant association between the design of the library website and the respondents' overall satisfaction towards the structure of the website (p=0.017). Hence, the library website needs to be kept aligned to users' expectations.

Figure 3

User satisfaction levels



In similar vein, Pearson Chi-Square revealed a significant relationship between respondents' overall satisfaction with the services provided by the website as opposed to the academic years (p= 0.036). Furthermore, Post-hoc test revealed a significant relationship towards the overall satisfaction and web services amongst the undergraduates studying in the third academic year and first year (p=0.003); second year ((p=0.016) and fourth year (p=0.025).

Moreover, the respondents' Internet literacy showed a significant relationship with services received through the library website (p= 0.007) and the overall structure/design of the website (p= 0.000). Therefore, users with higher Internet literacy may expect better volumes and quality of information from library websites.

Overall Satisfaction of Library Website Resources

Respondents have expressed relatively a high level of their overall satisfaction with the library website and its resources. Their responses were significant and showed strong effect size for resourcefulness, services received, and structure of the website. Overall information provided by the library website has moderate effect size, whereas 'interactive features of the website' has low effect size, making those areas to be attended.

Table 3

Overall satisfaction of Library Website

	SD	D	M	A	SA	Mean	P value	*r*
Resources	0	2.6%	29.6%	47.8%	20.0%	3.85	0.000	0.725553
Services	0	5.2%	25.2%	43.5%	26.1%	3.90	0.000	0.710572
Structure	0	3.5%	35.7%	38.3%	22.6%	3.80	0.000	0.674179
Overall information	0	2.6%	35.7%	44.3%	17.4%	3.77	0.000	0.69078
Interactive features	0	13.9%	38.3%	34.8%	13.0%	3.47	0.000	0.46854

* SD – Strongly Disagree; D – Disagree; M – Neither agree nor agree; A – Agree; SA – Strongly Agree

† Effect size

In order to analyze the influence of resourcefulness and website design on the overall satisfaction multiple linear regression was performed. In this model, dependent variable was the overall satisfaction and the independent variables were resourcefulness and design of the library website. The results revealed that both independent variables significantly and positively influenced the overall satisfaction of the library website ($p=0.000$, adjusted R^2 was 0.471). Therefore, resourceful content and effective structure of the library website is crucial for attaining maximum satisfaction from users.

Need for the Web Content Management System (WCMS)

In a systematic review, Ashiq et al., (2022) found out that libraries had to instantly transform during pandemic to serve their patrons, which pushed libraries toward new roles on platforms such as video streaming, social media, and micro-blogging in addition to regular websites. These changes were triggered from the users' end and their requirements. Answering to open-ended questions regarding the resources and design, respondents revealed that they were not aware of the presence of or access to many valuable resources and services provided via the library website. The students ardently proposed adding more resources and services in a sense of personalized approach. Thus, results of the study suggest developing a Web Content Management System (WCMS) provided the feedback and proposals made by the respondents strongly incline towards a highly interactive and versatile web interface of the Library of the University of Colombo. Library websites are mere platforms of conveying information and other resources to their users, on the other hand content management systems (CMS) are directly handled and customized constantly by librarians.

Therefore, growing demand for more dynamic and interactive contents insists that libraries adopting WCMS. Many studies in the developed world discovered that web authoring tools of academic libraries were not adequate to manage the contents to the satisfaction, however the choice of such tools lies in the hands of the parent institution (Connell, 2013), hence, the continuous evaluation of library websites would help academic institutions to make stern decisions. Connell (2013) continues that managing WCMS by libraries requires special expertise and skills for intermittent customization as per demands. He and Huang (2023) state that over the past decade the number of libraries adopting WCMS has increased. Factor *et al*. (2023) found that content management systems provided effective platform for sharing information, research and learning during pandemic lockdown, thus CMS have enhance communication between libraries and users. With ever-growing amount of presence of artificial intelligence tools the libraries are obliged to enlighten their patron with more credible resources and proactive services. Therefore, the library websites are in urgent need of transformation to stay relevant to a highly diversified user community.

Conclusions

As part of the quality assurance task, the libraries execute regular inspections and assessment of how effective their websites are. Growing digital presence of both users and content creators it is essential to keep the electronic interface up-to-date and enticing to cater to patrons more with all potential resources and services. Recent financial crisis and pandemic challenges pushed both libraries and users to depend more on online platforms of interactions. This survey results may not emphasize on a serious changeover in the library

website design and resource presentation, nevertheless, it is apparent that user satisfaction relies on the service quality and design of the library website. It is therefore derived from the findings that the library website needs to be redesigned into a more dynamic and versatile platform of multitudinal interactions. In other words, library's digital interface needs to be constantly customized to cater to Gen Z user communities that heavily rely on digital contents rather than using traditional library material. In this regard, the Library may include Ask a Librarian and/or Chat bot to keep a 24/7 assistance to the users. The website may develop an FAQ section with usual queries and answers. Since LibGuide is popular in the western world, the Library can incorporate such platforms into its website to enhance the blended learning activities. Therefore, library websites need to transform from resource-gateways into WCMS for more dynamic and lively services.

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Learning Landscapes in Post-Pandemic Context: A Comprehensive Study on Online Education at University of Jaffna, Sri Lanka

U. Latha[1] and I.M. Lakshman[2]

Abstract

This study examines the challenges and opportunities of online learning preferences, and the constraints undergraduate students face, emphasizing the need for comprehensive research tailored to the Sri Lankan institutional context of higher education. Employing a dual methodology, this study meticulously examines socio-economic factors underscoring their influence on online learning experiences at the University of Jaffna. The binary outcome analysis exposes significant influences of various explanatory variables. These findings underscore the importance of considering these factors, specifically the academic year and stream, when integrating online learning into alignment with the Sri Lankan higher education framework. The study proposes recommendations for a blended learning approach with varying proportions of online components tailored to academic years, streams, and socio-economic contexts. In conclusion, this research offers a sustainable

[1] Senior Assistant Librarian, University of Jaffna, Sri Lanka
Email: ulathanki@gmail.com, ID: https//orchid.org/0000-0002-9364-9014

[2] Professor, Department of Sociology, University of Colombo, Sri Lanka
Email: ireshalakshman@soc.cmb.ac.lk ID: https//orchid.org/0000-0001-8709-0958

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solution to the challenges posed by resource scarcity and increasing demand in the unique context of the Sri Lankan higher education landscape.

Keywords: Academic Streams, Academic Year, Online Education, Sri Lanka, University of Jaffna

Introduction

Online learning was introduced as a substitute for conventional classroom learning from 2020 to 2021 since all the academic sessions have reached a standstill due to the COVID-19 outbreak in Sri Lanka. Though online learning has been in practice as a supplementary in education, to a certain extent already, it was never considered a proxy for conventional learning. However, the Coronavirus has turned everything upside down, leading to a paradigm shift in Sri Lanka's education system. Online teaching and learning played a chief role in the contemporary context of higher education during 2020 and early 2021.

In light of the evolving landscape of the Sri Lankan government's national policy proposal on higher education and the escalating demand for advanced education each year, there has been a substantial increase in higher education intake (National Education Commission, Sri Lanka 2019). Unfortunately, the current infrastructure facilities and available resources are not in sync with this surge. Moreover, the capital allocated to develop the higher education system falls short of the requirements (British Council, 2021). This predicament is further highlighted by the economic downturn and inflation prevailing in the country. As a developing nation in Southeast Asia, Sri Lanka grapples with its unique challenges and setbacks. Given this scenario, the Sri Lankan higher education system must urgently identify a feasible and practical solution.

Incorporating a structured online teaching and learning platform into the Sri Lankan higher education system could address the infrastructure and resource inadequacies and challenges these institutions face, particularly those that cannot be instantaneously resolved. Therefore, this study has made an effort in scholarly exploration to lighten up the complex dynamics in vogue

and offer insights into undergraduate students' preference for online learning in the post-pandemic in the Sri Lankan context.

Review of Literature

The Coronavirus outbreak has made a drastic change in the lifestyle of the masses. Life in general and education, in particular, experienced a turnaround in teaching and learning in 2020. The standard traditional teaching methods have been replaced by online learning due to the COVID-19 pandemic (Hayashi et al., 2020; Maheshwari, 2021; Priyadarshana et al., 2022; Subashini et al., 2022; Ramanan & Ravikumar, 2023). After the closure of all educational institutions in March 2020 due to the COVID-19 pandemic, Sri Lanka swiftly transitioned to online tertiary education. Hayashi et al. (2020) mentioned that despite a lack of prior experience and training, nearly 90% of students actively participated in online education during this period. This may be because they did not have other options during the lockdown. On top of it, all internet service providers in Sri Lanka granted complimentary internet access to university servers till August 2020. Mainly, this change has influenced the educational sector in numerous ways.

The government plays a central role in Sri Lanka's higher education landscape, offering state institutions tuition-free bachelor's degree programs. However, this policy poses constraints on widening access to education for many. UNESCO's data reveals a gross enrolment ratio for tertiary education of 19.6% in 2018, which drops significantly when excluding external degree programs from the Sri Lanka Open University. This discrepancy highlights a gap between the growing demand for higher education and the government's capacity to meet it. Notably, International Labour Organization (2020) statistics indicate that 88% of youths in upper-middle-income countries have successfully continued their education through online platforms. Given these

challenges, championing online learning is a promising and sustainable solution for shaping the future of higher education in Sri Lanka.

Technology plays a significant role in enhancing the educational experience for undergraduate students. “Online learning is defined as learning partly or entirely over cyberspace, including online delivery of course materials and instructions, interactive online learning activities, presentations, and assessments” (Cavanaugh, 2001,; Maddux et al., 2010). Various factors influence undergraduate students' preference for online learning over conventional methods (Chau et al., 2021; Perera & Nalin, 2022). Some of these factors are related to the student's characteristics, such as their readiness for and familiarity with technology. Other factors include the availability of resources, technological experience, learning preferences, study habits, objectives, reasons, lifestyles, and personal attributes (Ninsiana et al., 2022). Considering all these factors, it becomes evident that students' preference for online learning is influenced by individual attributes, convenience and flexibility, availability of resources and interactive tools, and the ability to meet diverse learning styles. Numerous factors influence students' preference for online learning over conventional learning (Chau et al., 2021; Ramanan & Ravikumar, 2023). These factors can be categorised into socio-economic, personal, and technology-specific aspects. Socio-economic factors include financial constraints, access to technology and internet connectivity, and the availability of online learning resources. Personal factors include students' preferences and learning styles, motivation, and readiness for online learning (Wijaya & Khoiriyah, 2021). Technology-specific factors include the ease of use and accessibility of online learning platforms, the availability of technical support, and the overall quality of the technology used for online learning. These factors can influence a student's preference for online learning over

conventional learning (Xu & Mahenthiran, 2016; Kurdi et al., 2020; Wijaya & Khoiriyah, 2021). Furthermore, the interaction between these factors can vary among undergraduate students, as each individual has unique settings and preferences.

According to present Sri Lankan statistics, students prefer online learning well below 70%, but this was around 90% in conventional learning (Hayashi et al., 2020). In the present context, generally, most educational institutions have been obliged to continue their education virtually without examining the conditions necessary for effective online learning (Kaya, S., 2021; Muthuprasad et al., 2021 & Selvaraj et al., 2021). In the meantime, a report released in 2021 by Hootsuite, a leading social media management platform and Central Bank of Sri Lanka (2022) statistics, shows that 7.32 million individuals in Sri Lanka, 34% of the country's population, currently have an internet connection. This indicates that a considerable proportion of the country's population still lacks connectivity, and further, Ramanan and Ravikumar (2023) expressed their concern about the speed of internet connectivity. This could be considered one of the main hurdles faced by online education. In contemporary education, the rapid emergence of innovative technologies has presented a formidable challenge globally. These technologies are making their way into schools and higher education institutions, reshaping the educational paradigm. Concurrently, Subashini et al. (2022) underscore the pressing need for comprehensive investigations to unearth the underlying causes of constraints in E-learning and to craft effective and pragmatic solutions. The confluence of emerging technologies, the quest for student satisfaction, and the imperative to mitigate E-learning constraints form the backdrop for this research endeavour.

Students' participation is a crucial element, especially in higher education. The prime objective of higher education is to produce competent and employable graduates. The current question is, how will this 'new normal' (Norberg et al., 2011 & Nahed, 2021) mode of education help increase their competency when there is less student engagement with online learning? It was stated that the success of online learning is influenced by many factors, such as available technology, accessible platforms, online activities and assessments (Shuey, 2002; Wijekumar et al., 2006; Kurian et al., 2021 & Nahed, 2021). Furthermore, Maheshwari (2021) and Samsudeen et al. (2019) aptly observed that academic institutions must discern the factors influencing students' satisfaction and intention to engage in online learning. Therefore, finding a credible solution to this inadequacy is critical to accomplishing the prime aim of higher education in Sri Lanka.

Research Gap

Despite the growing emphasis on online pedagogy within Sri Lanka's higher education setting, a pronounced research gap persists, underscoring a critical need for a comprehensive understanding and resolution of challenges associated with implementing online education as a component. Recent studies (Hayashi et al., 2020) outline a conspicuous decline in student engagement in online learning compared to traditional methodologies, prompting inquiries into online education's constraints, efficacy, and acceptance. This noticeable gap is particularly pertinent in the context of higher education's predominant goal to nurture competent and employable graduates of Sri Lanka.

Moreover, the research gap addresses the inadequate examination of the settings requisite for effective online learning in the Sri Lankan context.

The report of DATAREPORTEL 2022 unveils that a mere 34% of Sri Lanka's population possesses internet connectivity, indicating a crucial obstacle to online education despite the advancements in an array of technology, including AI, smart classrooms, and digital libraries. The noticeable connectivity challenges raise concerns regarding the feasibility and inclusivity of the online learning component in Sri Lanka's higher education system.

Furthermore, the study identifies a void in the existing literature addressing the factors influencing students' participation probability and the key elements underlying the students' engagement in online learning. While the literature acknowledges the theoretical importance of blended learning, a research gap inadequately addresses the pivotal factors to be considered when integrating online education within the framework of blended learning in the Sri Lankan higher education context.

Objective

This research aims to comprehensively investigate Sri Lanka's higher education landscape by evaluating the effectiveness, constraints and conditions necessary for undergraduates to engage in online learning, specifically focusing on the University of Jaffna.

Specific Objectives

- To assess the preferences and constraints of online education
- Investigating necessary conditions for effective online learning
- Propose recommendations for seamless integration of online learning into the curriculum

Research Methods

This study centred around the University of Jaffna, explicitly targeting students across various academic disciplines, from agriculture to arts, engineering to management, and science and technology. The primary data collection phase unfolded between April and May 2022, utilizing an online questionnaire to gather information. In anticipation of a projected non-responsive rate of 75%, a rigorous stratified random sampling approach was employed to ensure the selection of a robust sample of a minimum of 15% undergraduates. This sample represents diverse degree programs, including Arts, Agriculture, Engineering, Management and Commerce, Technology and Science. According to the University of Jaffna administration statistics, these streams collectively encompass 7,858 undergraduates from 2017/2018 to 2020/2021, constituting 78.2% of the total undergraduate student population at the University of Jaffna, currently 10,048 students. The selection process prioritised a balanced representation from six disciplines across academic years. Invitations to partake in the survey were sent to 3000 randomly chosen students via email, accompanied by a detailed explanation of the survey's objectives and a request for written consent a cumulative response of 1270 was obtained, which represented 16% of the total student population.

To mitigate random noise and enhance the accuracy of the analysis, 18 samples were excluded from the dataset due to missing values and measurement errors. The final sample consisted of 1,252 observations. Data underwent scrutiny using descriptive statistics and the binary probit regression model. The binary response model was instrumental in analysing students' decisions regarding participation in online learning. The dichotomous nature

of the dependent variable suggests the suitability of either a probit or a logit model for the data analysis (Gujarati, 2003 & Liao,1994).

The binary response model (BRM) is represented as,

$Y_i = \{1\ if\ Y_i * > \tau, 0\ if\ Y_i * \leq \tau\}$. Where τ = a threshold generally assumed to be 0. As derived from the linear probability model, the probit model estimates the probability of observing an event y given x. This can be illustrated as follows

$\Pr(y = 1|x) = \Pr(y^* > 0|x)$

$\Pr(y = 1|x) = \Pr(x\beta + \varepsilon > 0|x)$

$\Pr(y = 1|x) = \Pr(\varepsilon > -x\beta|x)$

$\Pr(y = 1|x) = \Pr(\varepsilon, \leq x\beta|x)$

$\Pr(y = 1|x) = F(x\beta)$

$\Pr(y = 1|x) = F(\alpha + x\beta)$

Here, F represents the normal cumulative density function (CDF) illustrated as Φ in the equation, and α is the dispersion parameter in the nonlinear BRM. The BRM can predict

Pr (y= 1|x) values larger than one or smaller than 0. To remove this issue of y>1 or y<0, Pr (y = 1|x) must be transformed into a function that ranges from negative to positive infinity (-∞ to ∞).

The first step of the transformation is to change the probability into two odds in the equation. The explanation for transforming this into odds is that the odds illustrate how frequently a positive response (y = 1) occurs relative to a negative response (y = 0). This happens within the range from 0 when Pr(y = 1|x) =0 to 1 when Pr(y=1|x) =1. The probit model can then be constructed by choosing functions of βx that range from 0 to 1 and finally look like

$$\Pr(y = 1|x) = \int_{-\infty}^{x\beta} \frac{1}{\sqrt{2\pi}} exp\left[-\frac{t^2}{2}\right] dt = \emptyset(x\beta)$$

Scientific literature, especially within econometrics, commonly illustrates the probit model in the following form. $\Pr(y = 1|X) = \beta 0 + \beta nX + \varepsilon$. Here, P is the probability that the i^{th} student's decision to participate in the online learning at time t, 1 and 0 otherwise.

X vector of the explanatory variables and β vector of the coefficients to be estimated. β_0 is the Y-intercept, and $\boldsymbol{\varepsilon_{it}}$ is the stochastic component of the model at a particular time t. This research considers including 'different streams' as one of the explanatory variables in the model. This can be expressed as,

$$\frac{\Pr(y = 1|X)}{\Pr(y = 0|X)} = \frac{\Pr(y = 1|X)}{1 - \Pr(y = 1|X)}$$

$$\boldsymbol{Y_{it}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1}.stream + \boldsymbol{\beta_2}.gender + \boldsymbol{\beta_3}.acyear + \boldsymbol{\beta_4}.province + \boldsymbol{\beta_5}.location + \boldsymbol{\beta_6}.familymem + \boldsymbol{\beta_7}.familystud + \boldsymbol{\beta_8}.incomearner + \boldsymbol{\beta_9}.expense + \boldsymbol{\beta_{10}}.totaldata + \boldsymbol{\varepsilon_{it}}$$

In this model, $\mathbf{Y_{it}}$ is a categorical dependent variable, defined as if the undergraduate student's decision to participate in online learning then = 1 and 0; otherwise, $\boldsymbol{\beta_0}$ is the intercept, under the explanatory variables, the stream is a dummy variable coded as if Science stream=1 and 0 otherwise, the gender is a dummy variable treated as if female =1 and 0 otherwise, the academic year is categorical variable coded as first year=1, second year=2, third year=3 and fourth year=4 again the province of the undergraduate from is a string variable corded from 1 to 9, the location was coded as rural=1, suburban=2 and urban=3, number of students in the family, and number of income earners in the family were measured in numerical value, average monthly expense for

data for the student was measured in monetary units, average monthly data usage by the student measured in MB and ε_{it} is the stochastic component of the model. The data were analysed using the software STATA 15.

Results and Discussion

The findings are systematically interpreted through a dual lens of descriptive statistics and the qualitative response regression model analysis. This comprehensive approach provides a quantitative snapshot of the data and investigates the qualitative shades that underlie and enrich the numerical outcomes.

Descriptive Statistics

Regarding the descriptive statistics derived from the analysis of the online survey data, it is noteworthy that the distribution of respondents across gender and geographical locations comprehensively reveals the constraints and preferences of the students. Mainly, the survey sample demonstrates a gender disparity, with male undergraduates comprising only 33% of the total respondents, leaving the majority to their female counterparts. Undergraduate students from the University of Jaffna were represented from all nine provinces of Sri Lanka and reflected a more diverse and inclusive sample. Notably, the greater number of students, comprising approximately 36%, came from the Northern province, and the remaining 64% represented the other eight provinces of Sri Lanka. This geographic distribution underscores the university's capacity to attract students from various corners of the country, nurturing rich perspectives and experiences within its academic community. Examining the location of the students further revealed that a mere 20.9% of the participants represented urban residency, while another 28.4% resided in suburban areas, and a substantial 50.7% hail from the rural areas of Sri Lanka.

Furthermore, categorization based on the academic streams revealed a heterogeneity in representation. The survey gathered the most substantial response from the agriculture stream, with an impressive 37.4% representation. Science followed closely behind, contributing significantly with a response rate of 19.7%. In contrast, the technology stream exhibited the lowest response, comprising 10.25% of participants. Engineering, arts, management, and commerce streams demonstrated comparable response rates, accounting for approximately 18%, 14%, and 13% of the survey participants.

The academic streams, including arts, management, and commerce, were collectively categorized under the "Non-Science streams." Conversely, all other academic disciplines found their classification within the encompassing category labelled as the "Science stream." This streamlined classification system facilitates a more apparent distinction between the two primary academic distinctions, simplifying the analytical process and enhancing the interpretability of data related to academic streams. Of the 1252 respondents, 46.6% (583) belong to the non-science stream, showcasing a substantial presence. In contrast, the remaining 53.4% (669) fall under the science stream category, indicating a noteworthy representation from this academic domain.

The mean income earners within student households were 1.3, ranging from a minimum of 0 to a maximum of 5. Exceptionally, 1% of the students revealed a scenario of no income earners in their families, while a predominant 74% had a single-member income earner. Finally, 22% of the families reported having two income earners. This socio-economic insight manifests

the diverse financial contexts within which students navigate their academic pursuits.

For payment preferences, 54% of students opt for the prepaid plans, while 17% endorse the post-payment alternatives. Meantime, 29% of respondents preferred both options, reflecting a flexible approach to managing their digital expenses. Recognising the significance of these choices, particularly in the context of device preferences and payment methods, family income becomes the most crucial factor in crafting the online learning environment of the students. Notably, the influential role of income in shaping internet access and online learning participation probabilities is affirmed by Hayashi et al. (2020) and Subashini et al. (2022), emphasising the broader contextual relevance of these findings.

Qualitative Response Regression Analysis

In the binary response Probit regression, the chi-square probability value associated with the model, less than 0.01 (Prob > chi2 = 0.0012), indicated that all coefficients of the explanatory variables in the model collectively deviate significantly from zero. The pseudo-R^2 value of 0.2920 reveals that this model outperforms 29% over the baseline model by suggesting the efficacy of the chosen binary model. The Link test in STATA, exhibiting the test statistics of _hat (P>|z|= 0.006) and _hatsq (P>|z|= 0.859), indicated the correct specification of the model. The statistics imply that the Link test failed to reject the null hypothesis, affirming the correct specification of the model. Interpretation of Probit model outcomes commonly relies on predicted probabilities. Table 1 concisely presents these probabilities, standard errors and corresponding significance levels for the variables.

Table 1

Probit regression - Average marginal effects

```
Average marginal effects                        Number of obs     =      1,252
Model VCE    : OIM
------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     dstream |  -.0075072   .0277856    -0.27   0.787    -.0619659    .0469515
     dgender |  -.0552181   .0280913    -1.97   0.049**  -.1102759   -.0001602
             |
     dacyear |
  First year |    dropped
 Second Year |   .0414595   .0382702     1.08   0.279    -.0335487    .1164676
 Third  Year |   .0911283   .0328388     2.78   0.006***  .0267653    .1554912
 Fourth Year |  -.0364081   .0460614    -0.79   0.429    -.1266868    .0538705
             |
    dprovince |
     Northern |    dropped
North Central |   .0655835   .0480715     1.36   0.172    -.0286349    .1598018
North Western |   .0085096   .0433186     0.20   0.844    -.0763933    .0934125
      Eastern |   .0434719   .0445345     0.98   0.329     -.043814    .1307578
      Central |   .0281562   .0466846     0.60   0.546     -.063344    .1196563
 Sabaragamuwa |   .0412281   .0765498     0.54   0.590    -.1088068     .191263
          Uva |   .0067059   .0652879     0.10   0.918    -.1212561    .1346679
      Western |   .0124249   .0501961     0.25   0.804    -.0859576    .1108074
     Southern |  -.0992662   .0974334    -1.02   0.308    -.2902322    .0916997
             |
    dlocation |
        Rural |    dropped
     Suburban |  -.0423432   .0329187    -1.29   0.198    -.1068626    .0221762
        Urban |   -.077126   .0348205    -2.21   0.027**  -.1453729    -.008879
             |
    familymem |   .0009268   .0246479     0.04   0.970    -.0473823    .0492359
   familystud |  -.0323182   .0169746    -1.90   0.057*   -.0655878    .0009514
 incomearner  |   .0295976   .0135282     2.19   0.029**   .0030827    .0561124
      expense |   5.45e-06   .0000185     0.29   0.769    -.0000309    .0000418
    totaldata |  -.0005099    .000507    -1.01   0.314    -.0015036    .0004837
------------------------------------------------------------------------------
  Note: dy/dx for factor levels is the discrete change from the base level.
(*-significant at 10%, **-significant at 5%, ***-significant at 1% α levels)
```

Examining the predicted marginal values from the Probit model in Table 1 reveals statistically significant positive contributions to undergraduates' decisions to engage in online learning depending on the academic year (Prob > chi2 = 0.006) and the number of income earners in the family (Prob > chi2 = 0.029) of the student. Conversely, gender (Prob > chi2 = 0.049), students' living location (Prob > chi2 = 0.027), and the number of undergraduate students in the family (Prob > chi2 = 0.057) were found to have negative impacts on the probability of online learning participation. Notably,

the academic stream, provinces of origin, household size, monthly data expenses, and total monthly data consumption did not exhibit statistical significance in the model, indicating no discernible influence on the online learning participation probability among undergraduates at the University of Jaffna. It is worth mentioning that some variables were excluded from the analysis due to collinearity concerns.

Preference, Constraints and Adequate Conditions for a Sustainable Online Education

A compelling narrative unfolds in the technological preferences for online learning among undergraduates, transcending gender boundaries. Astonishingly, 63% of the student body exhibited an apparent inclination towards utilizing laptops as their primary tool for academic engagement, underscoring the centrality of this device in the contemporary educational landscape. Intriguingly, a mere 20% reported possession of personal computers, emphasizing a digital divide within the student community. This resonates with the findings of Hayashi et al. (2020), suggesting a consistent trend in prioritising laptops for optimal online learning experiences. In a notable disparity between preference and possession, a nominal 24.7% expressed a predilection for smartphones in online learning endeavours, yet a substantial 64% found themselves actively utilizing smartphones for educational pursuits. The remainder of the cohort expressed preferences for tablets and desktops, with a noteworthy subset opting for the versatility of multiple devices.

This elucidates the challenges students face in acquiring a preferred and convenient device for online learning. The discernible disparity in access

underscores the potential enhancement of online learning participation through pragmatic and sustainable measures to bridge this gap. Moreover, the acquisition of a device is inherently contingent upon the individual's financial capacity. Neglecting to address this aspect with due consideration may engender a substantial educational divide, impeding a noteworthy proportion of the student populace from accessing future educational opportunities due to economic disparities.

Table 2

Undergraduates' preference for different modes of learning

Preference	1st Choice	2nd Choice	3rd Choice
Blended	219	785	248
Conventional	885	205	162
Online	148	262	842

Table 2 delineates the preferences of undergraduate students regarding various modes of learning. Most of the sample, comprising over 70% (885 individuals), prefer conventional learning over online and blended learning modalities. Approximately 11% of respondents express a primary inclination toward online learning. Concurrently, following conventional learning as the primary preference, blended learning emerges as the foremost choice for students in both their first and second preferences. This prominence underscores a proclivity towards technological modalities, indicating an acceptance of online learning as an adjunctive mode. Considerations of accessibility and resource availability for educational endeavours inherently guide the articulation of preferences by students. Many researchers, Garrison and Kanuka, 2004; Masalela, 2009; Qiang, 2016; Kintu et al., 2017; Dziuban et al., 2018; Kara, 2021; & Subashini et al., 2022, advocate the blended

learning approach as a viable solution to address the resource scarcity crisis, aiming to meet the escalating demand for higher education within the specific context of Sri Lanka. Therefore, fostering online learning in the blended learning environment is imperative.

Table 3

A gender perspective on online learning

Online Learning	Male 0	Female 1	Total
No (0)	263	579	842
Percentage	63.22	69.26	67.25
Yes (1)	153	257	410
Percentage	36.78	30.74	32.75
Total	416	836	1,252

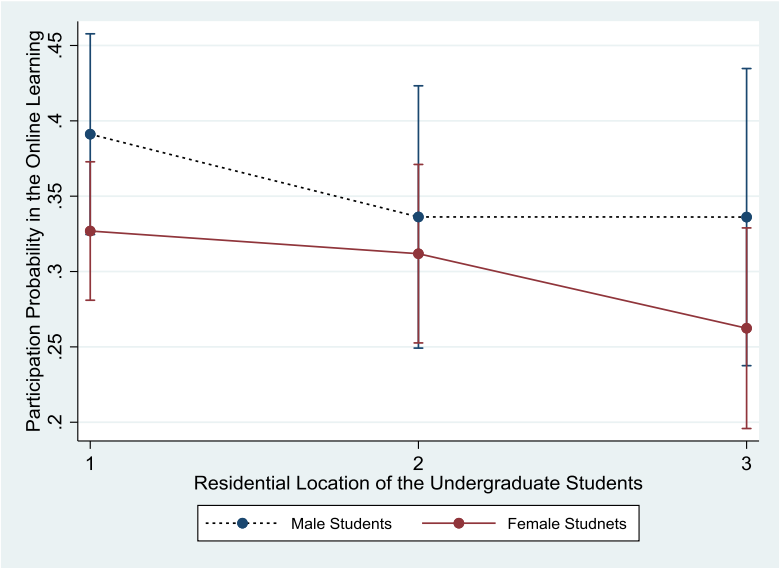
Table 3 presents a comprehensive examination of gender-related influences on the preference for online learning. The sample composition aligns precisely with university demographics, with approximately 67% comprised of female students and the remaining represented by males. Notably, the preference distribution reveals that while a significant percentage of both male (63.2%) and female (69.2%) students exhibit a reluctance toward online learning, male students (36.8%) express a relatively higher inclination compared to their female counterparts (30.7%).

In the probit regression analysis, the average marginal effect of gender on online learning participation (Prob > chi2 = 0.049) in Table 1 indicates a statistically significant lower participation probability for female students compared to their male counterparts at a 5% significance level. Figure 1 further elucidates the gender influence on the probability of online learning participation, revealing a notable preference for male students across locations. Irrespective of the location type, female students exhibit a notably

lower probability of participation. This could probably be due to the female students' preference for the conventional mode of education rather than the virtual means. The overall participation rate of the students from rural areas appears to be higher than that of individuals residing in suburban and urban areas, albeit with a maximum participation probability of just below 0.4.

Figure 1

Undergraduates' online learning participation probability with respect to gender and location (1: Rural, 2: Sub-urban, 3: Urban)



The study's sample, consistent with the Economics and Social Statistics of Sri Lanka annual report (2020), mirrors the national trend, with nearly 70% of the student population originating from rural areas. Our sample also corroborates this trend, illustrating that approximately 79% of the participants hail from rural and suburban areas. This underscores the potential to augment student participation in online learning by providing facilities and resources tailored to the unique challenges faced by students in rural areas.

Further, it is noteworthy that the average marginal effect (Table 1) of the number of income earners in the student's family (Prob > chi2 = 0.029) significantly elevates the probability of online participation. The selection of the number of income earners in the probit regression model as a proxy explanatory variable encapsulates the family's capacity and financial capability to support the procurement of necessary gadgets and data for online learning. This aspect is particularly salient in rural settings, where a prevalent pattern involves a singular breadwinner within families grappling with a higher dependency ratio.

Hence, the observed higher probability of online learning participation among rural students is attributed mainly to gender, limited logistical access, constrained household income, and reduced diversions in these regions. These findings underscore the need for targeted interventions to bridge the existing gaps in online learning participation, mainly based on constraints faced by the students concerning their location and gender in Sri Lankan rural contexts.

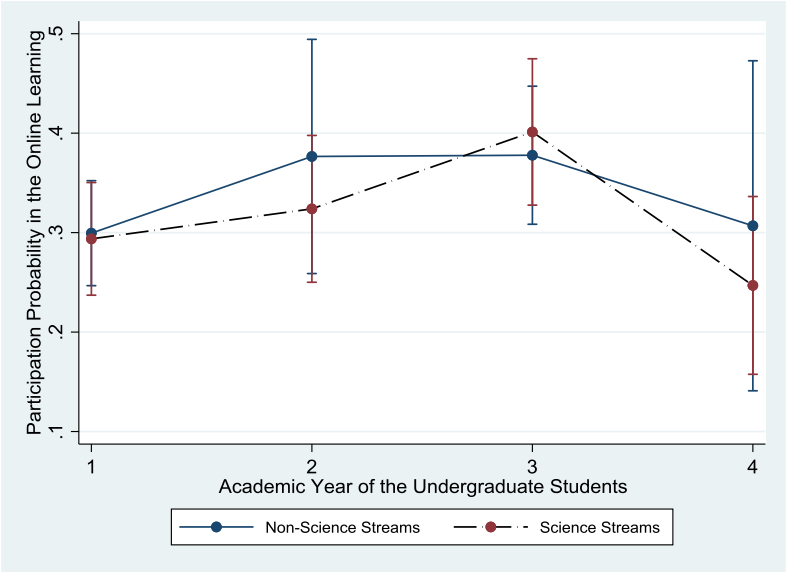
Table 4

Effect of undergraduates' stream on online learning

Online Learning	Science 0	Non-Science 1	Total
No (0)	385	457	842
Percentage	66.04	68.31	67.25
Yes (1)	198	212	410
Percentage	33.96	31.69	32.75
Total	583	669	1,252

Figure 2

Undergraduates' online learning participation probability with respect to their stream and academic year



The analysis derived from both Table 1 and Table 4 reveals that the academic stream of undergraduates does not significantly influence the probability of online learning participation. Irrespective of whether students are enrolled in science or non-science streams, their expressed participation probabilities exhibit a comparable pattern. However, a notable divergence in participation probabilities surfaces upon scrutinizing the student academic year data. The average predicted marginal value for the academic year, particularly for the third academic year, emerges as highly significant (Prob > chi2 = 0.006) at a 1% significance level. Figure 2 visually illustrates the discernible variations in online participation probabilities across different academic years. At the outset of the academic year, the participation probability for both streams is uniform at 0.3. Subsequently, distinct phases of probability elevation transpire for each stream, with the non-science stream exhibiting a more accelerated increase than their science stream counterparts.

The disparity in participation becomes particularly pronounced during the second academic year, possibly attributable to non-science students finding online participation more amenable due to a diminished emphasis on hands-on practical training components in their curriculum. Conversely, this trend undergoes a rapid transformation for science stream students in the third academic year, whose probability peaks at 0.4, surpassing that of the non-science stream. However, the fourth academic year witnessed a substantial decline in online participation probability for science stream students, reaching a minimum probability of nearly 0.25. A parallel trend is observed among non-science stream students, albeit at a slower rate. This analysis underscores how undergraduate students' preferences for online learning and participation probabilities exhibit slight variations across streams but are predominantly contingent on academic years.

Table 5

Mode of learning preference based on academic year

Mode of Learning	Academic Year of the undergraduates 1	2	3	4	Total
Online	55	26	56	10	147
Percentage	10.15	11.76	15.38	8.00	11.74
Conventional	395	147	252	92	886
Percentage	72.88	66.52	69.23	73.60	70.77
Blended	92	48	56	23	219
Percentage	16.97	21.72	15.38	18.40	17.49
Total	542	221	364	125	1,252

Table 5 systematically outlines the preferences of University of Jaffna undergraduate students for online learning, categorized according to their respective academic years, disregarding their specific academic streams. These percentages offer a preliminary framework for crafting a customized

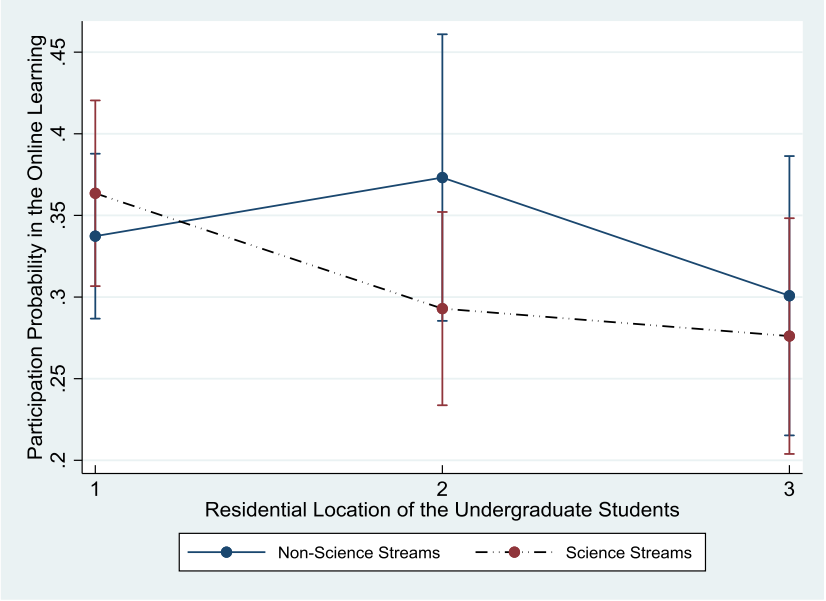
curriculum aligned with the academic year of undergraduates, acknowledging the substantial variations in their learning preferences and requirements.

Consequently, integrating online learning into higher education curricula, particularly adhering to blended learning principles advocated by numerous researchers and academics, necessitates meticulous consideration of the academic stream and, more critically, the student's academic year. The study underscores the imperative of precisely planning the inclusion of online learning components, suggesting that a substantial proportion must be blended with conventional education for sustained viability. It becomes evident that the blending percentage warrants careful consideration, varying considerably across disciplines and academic years in accordance with the weightage of hands-on practical components and other academic commitments, differing significantly based on the students' stream and academic year. Therefore, a flexible approach in determining the percentage of the online learning component is indispensable for achieving sustainable academic progress and ensuring the delivery of quality tertiary education in Sri Lanka.

Figure 3 outlines the impact of location on the probability of online learning among University of Jaffna undergraduates belonging to distinct academic streams. Mainly, students in the science stream exhibit a notably higher probability of online learning participation than their non-science counterparts. Suburban areas demonstrate considerable variability in online participation probabilities across the major stream categories. Conversely, in urban settings, the disparity in participation probabilities between both streams diminishes compared to suburban locations.

Figure 3

Undergraduates' online learning participation probability with respect to stream and location (1: Rural, 2: Sub-urban, 3: Urban)



The negative relationship between location and online participation is substantiated by Table 1, indicating 5% statistical significance (Prob > chi2 = 0.027). This suggests a diminished enthusiasm for online learning among urban students. Typically, science stream students, who are mandated to incorporate hands-on practical components in their curriculum, exhibit a reluctance towards the online modality.

Furthermore, probit regression discloses a significant hindrance to online learning participation with an increased number of students in the family (Prob > chi2 = 0.057). This is rationalized by the economic constraints most Sri Lankan families face, making it impractical to furnish the requisite gadgets and data individually as the family size expands. In consonance with

Hayashi et al. (2020) and Priyadarshana et al. (2022), who emphasized the disproportionate impact on students from low-income households, it can be inferred that access gaps to tertiary education widen under such circumstances.

Consequently, contemplating a transformation in Sri Lankan higher education in the backdrop of resource scarcity to meet escalating demands necessitates the incorporation of blended learning as prescribed by Aragon et al., 2002; Wallace, 2003; Pawan et al., 2003; Eom et al., 2006; Hayashi et al., 2020 & Subashini et al., 2022. On top of it, our study recommends that having the online learning component blended at a desirable right proportion into the curriculum is mandatory. More specifically, a customized approach regarding the proportion of the online learning component in the blended learning domain based on the students' academic years and streams is essential, rather than employing a uniform approach. The authors consider this to be more crucial and a prerequisite for ensuring the success and sustainability of higher education in the evolving academic landscape of Sri Lanka.

In a nutshell, this study emphasises integrating online learning components into the curriculum and finding the optimal proportion for this integration.

Conclusions

This study focused on the University of Jaffna and shed light on online education's challenges and dynamics, particularly in a post-pandemic context. The findings underscore the critical factors that constrain undergraduate learning online. The intersection of gender, location, academic stream, and economic status unveils the intricate patterns influencing the likelihood of online learning participation among undergraduates. Notably, the digital

divide, evident based on the device preferences of students, poses challenges that require pragmatic, sustainable solutions to ensure the inclusivity of students from all economic strata.

In contemplating transforming the Sri Lankan higher education landscape, incorporating online learning components into the regular undergraduate curriculum appropriately emerges as a plausible solution to address resource constraints and meet the escalating demand for higher education in Sri Lanka. Further, this study emphasizes that integration must be advocated with precision, considering the characteristics of students, such as academic year, stream, location, gender, and economic status of the family. Integrating online learning components based on these variables is crucial for higher education's sustained viability and success in Sri Lanka. The analysis across academic years and streams of undergraduates reveals a need for a flexible approach in determining the percentage of the online learning component under the blended learning domain.

In conclusion, this study contributes valuable insights for policymakers, educators, and researchers endeavouring to shape the future of higher education in Sri Lanka by acknowledging students' diverse requirements and preferences and aligning that with higher educational strategies, especially concerning the evolving digital landscape.

Limitations and Further Research

Building upon the foundations laid by this study, future research endeavours could extend their purview to encompass all seventeen universities in Sri Lanka. The current study centred on the University of Jaffna and its six

faculties. However, a comprehensive understanding of higher education policy frameworks necessitates a more inclusive examination.

The precision of future research can be significantly enhanced by shifting from a broader binary classification of undergraduates as science and non-science streams to a more specific approach based on individual disciplines. This tailored approach promises to provide more insightful information, allowing for a more refined comprehension of each academic discipline's diverse needs and preferences.

Further, more attention should be directed towards determining the optimal proportion of online education within the curriculum, aligning with each academic discipline's unique demands and capacities. In essence, future research endeavours should aspire to transcend the limitations of this study by embracing a discipline-specific nationwide approach.

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