

# ARTIFICIAL INTELLIGENCE (AI) FOR DIGITAL LITERACY AND EDUCATIONAL PROGRAMS IN PUBLIC LIBRARIES: A CASE STUDY OF COLOMBO DISTRICT

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## ABSTRACT

The study aims to examine the potential of artificial intelligence (AI) in educational and digital literacy programs in public libraries in the Colombo District, Sri Lanka. The public library is considered a vital institution in the development of the community as a digital gateway and information portal. It provides the underserved population with basic technology skills. Digital literacy programs have limitations, such as a one-size-fits-all approach, low learner engagement, and lack of scalability. AI technologies have the potential to address the limitations of digital literacy programs. AI-based technologies have the potential to create a personalized learning experience, which would be beneficial in improving the effectiveness of the program. This study aims to examine the potential of AI as a major contributor to digital literacy programs in public libraries in the Colombo District, Sri Lanka. Digital literacy programs, the advantages of using AI technologies, the limitations of using AI technologies, and a strategic plan for the implementation of AI technologies in digital literacy programs in public libraries in Sri Lanka.

**Keywords:** Artificial Intelligence, Public Libraries, Digital Literacy, Digital Divide, Colombo district, Sri Lanka

## 1. INTRODUCTION

Public libraries have been acknowledged to be playing an important role in the fight against inequality by promoting digital learning and access. Over the years, public libraries have transformed into learning centers, promoting digital inclusion by providing free access to the internet and computers (IFLA, 2017). Public libraries in the Colombo District of Sri Lanka serve a diverse range of users, including schoolchildren, the unemployed, individuals interested in starting their own businesses, and the elderly. Most of these users rely on public libraries as a source of learning to acquire basic digital literacy skills (Perera & Fernando, 2022).

However, public libraries have been faced with challenges in providing digital literacy education to their users. The challenges have been attributed to the availability of technology and the learning needs of library users. The traditional method of learning may not have the ability to adapt to different learning needs and speeds within the

classroom. In this case, there is a need to investigate the use of artificial intelligence to promote digital literacy education.

Moreover, AI-based adaptive learning systems have the potential to tailor learning content according to the individual student's learning needs, provide instant feedback, and facilitate learning in multiple languages. These benefits make learning programs more accessible and effective. AI technologies have the potential to increase engagement, accessibility, and the effectiveness of teaching in the library. However, the effective implementation of AI technologies relies on the existence of technological infrastructure, finance, trained personnel, and community support (Holmes et al., 2021).

## **2 RESEARCH OBJECTIVES**

The main objective of the research is to assess the state of digital literacy and education programs in the Colombo District. There are two objectives of the research, and they are as follows;

01. To evaluate the impact of AI tools on user engagement, learning outcomes, and instructional efficiency within public library digital literacy programs.
02. To identify and analyze the organizational, technical, and ethical barriers to AI adoption in public libraries.

## **3 RESEARCH OUTCOMES**

This research will provide:

- A comprehensive understanding of the current level of digital literacy in Colombo District's public libraries.
- Insights into the potential benefits of AI-powered educational tools, including personalized learning, scalable solutions, and real-time feedback.
- Identification of barriers to the adoption of AI, including infrastructure, staff training, and user acceptance.

## **4 LITERATURE REVIEW**

### **Digital Literacy and Its Importance in Public Libraries**

Digital literacy is the ability to effectively and critically use, evaluate, and create information across a variety of digital media. In terms of public libraries, digital literacy programs are vital in ensuring that individuals are empowered to participate in a modern society through a variety of activities such as accessing information, communicating, or even conducting digital commerce (Lippincott, 2015). In many developing countries, such as Sri Lanka, public libraries are very vital in ensuring that digital literacy education

is carried out, especially since they are a primary source of computer and internet access.

### **The Role of Artificial Intelligence in Education**

In the field of education, Artificial Intelligence (AI) has achieved notable milestones, with its applications varying from personalized learning tools to tutoring systems. AI-based learning tools have the potential to meet the learning demands of individual learners by offering experiences aligned with their learning progression, abilities, and learning styles (Holmes, 2019). For example, AI-based learning tools have the potential to identify the strengths and weaknesses of the learners, thereby offering effective learning experiences.

### **AI in Public Libraries**

The use of AI in public libraries is less discussed, especially with regards to the education of digital literacy. However, some studies have shown the potential of using AI learning tools to help the libraries overcome the challenges they face with the availability of learning resources through the provision of learning experiences (Cullen & Gaubatz, 2020). The potential of the learning tools to provide learning experiences depending on the learning needs of different demographic groups such as non-native speakers, the elderly, and the disabled can be beneficial (Greene, 2020).

## **5 METHODOLOGY**

The research design adopted was a quantitative survey design, which was employed to assess the level of digital literacy, awareness, and perception of AI among public librarians in the Colombo District, Sri Lanka. The sampling design was a purposive and convenience sampling approach, which was employed to obtain a representative sample from the population, considering gender, age, experience, educational qualifications, and library location, as per the Krejcie and Morgan table. Primary research was conducted through a questionnaire survey, which was conducted through an online Google form.

The study comprised 29 public librarians from 56 public libraries, which represented a 52% response rate. The analysis was conducted through the Statistical Package for the Social Sciences (SPSS) software. Descriptive analysis was employed to analyze the demographic variables and Likert-scale questions, which were conducted through frequency distribution, means, and standard deviations. The study was conducted only for public libraries in the Colombo District, which might limit the scope for other districts in Sri Lanka.

## 6 RESULT AND DISCUSSION

Based on the demographic information obtained, the respondents were relatively evenly distributed. Of the 29 public librarians who participated in the survey, the majority were female 72%, while male respondents accounted for 28% of the total. In terms of age distribution, most participants were between 30 and 50 years old, with 41% falling within the 31–40 age group and 44% within the 41–50 age group. A smaller proportion (2%) were below 30 years of age, and 13% were above 50 years.

Regarding educational qualifications, most librarians had attained a bachelor’s degree (75%), while librarians who had attained a master’s degree and those who had attained only a diploma comprised 17% and 8%, respectively. In relation to professional experience, librarians who had worked for 5-10 years in public libraries comprised 38%, while those who had more than 15 years and less than 5 years of experience comprised 31%, and 7%, respectively, while those who had between 11 and 15 years of experience comprised only 7%. Furthermore, all the librarians in this study (100%) were employed in their profession as librarians. These findings suggest that this sample comprises a professionally diverse and experienced workforce in the Colombo District who are able to engage with emerging technology such as artificial intelligence.

The following table demonstrates librarians' self-reported level of understanding about artificial intelligence.

**Table 1: Librarians' understanding of artificial intelligence**

Level of Understanding	Frequency	Percentage
Very Good	15	51.7%
Good	5	17.2%
Fair	9	31.0%
Poor	0	0.0%
Very Poor	0	0.0%

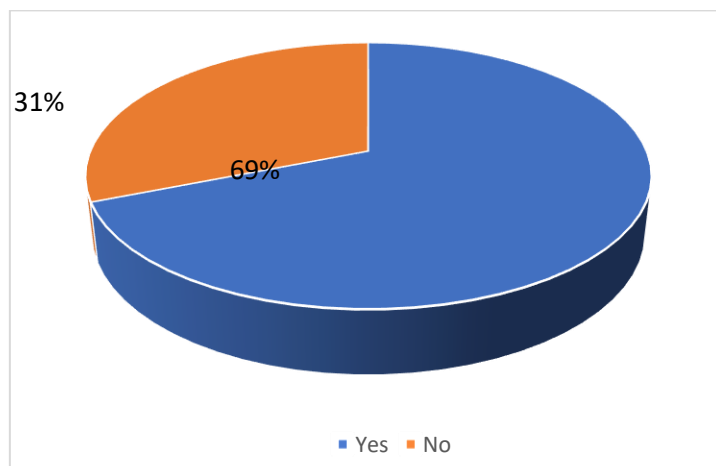
Note: N = 29

According to the analysis of the data provided, it was evident that most of the respondents (51.7%) claimed to have a “very good” level of understanding of AI. When combined with those who claimed to have a “good” level of understanding (17.2%), this equated to 68.9% of librarians who had clearly demonstrated their strong level of comprehension of AI. At the same time, it was evident that a large proportion of the respondents (31.0%) had claimed to have only a “fair” level of understanding of AI.

The participants were asked to identify the tools or applications of AI that they were aware of. All the participants (100%) were aware of the chatbots, ChatGPT, and basic AI tools. This reflects the popularity of the AI application tools for conversations among public

librarians in the Colombo District. However, the level of awareness of the other application tools of AI was found to be relatively low. None of the participants (0%) were aware of the tools for automated cataloging and classification. Only three participants (10.3%) were aware of the tools for the application of AI for plagiarism. Eight participants (27.6%) were aware of the tools for translation. None of the participants were aware of other application tools of AI.

When the respondents were queried about the use of AI-based systems or applications in their libraries, 20 out of 29 respondents (69%) indicated that their libraries are using these technologies, whereas 9 respondents (31%) indicated that their libraries are not using these technologies. The results indicate that although most of the public libraries in the Colombo District have started using AI tools in their libraries, a significant number of libraries have not yet started using these tools.



**Figure 1: Usage of AI-Based Systems or Applications in Libraries**

To further explore perceptions of the significance of AI, respondents were asked to rate the importance of AI in improving library operations. The findings showed that 14 respondents (48%) rated AI as very important, whereas 10 respondents (34%) rated AI as important. In addition, a small number of respondents, 4 (14%), rated AI as neutral, whereas only 1 respondent (3%) rated AI as less important. On the other hand, no respondents rated AI as not important. Overall, these findings reveal that public librarians in the Colombo District generally have positive perceptions regarding the role of AI in improving library operations.

The survey aimed at finding librarians' perspectives on the library functions most likely to benefit from the application of artificial intelligence. As shown in Table 2, the majority of the librarians, 22 (75.9%), believed that the function of cataloging and classification had the greatest potential of benefiting from the application of AI. Other functions, such as reference and information services, as well as digital literacy, were also believed to benefit from the application of AI, as indicated by 23 (65.5%) and 23 (58.6%) librarians, respectively. A fair number of librarians also believed that the application of AI had the potential of benefiting the functions of resource recommendation systems, as well as

data analysis and personalization, as indicated by 18 (51.7%) and 17 (41.4%) librarians, respectively. However, the function of administrative tasks had the potential of benefiting from the application of AI, as indicated by 20 (31.0%) librarians.

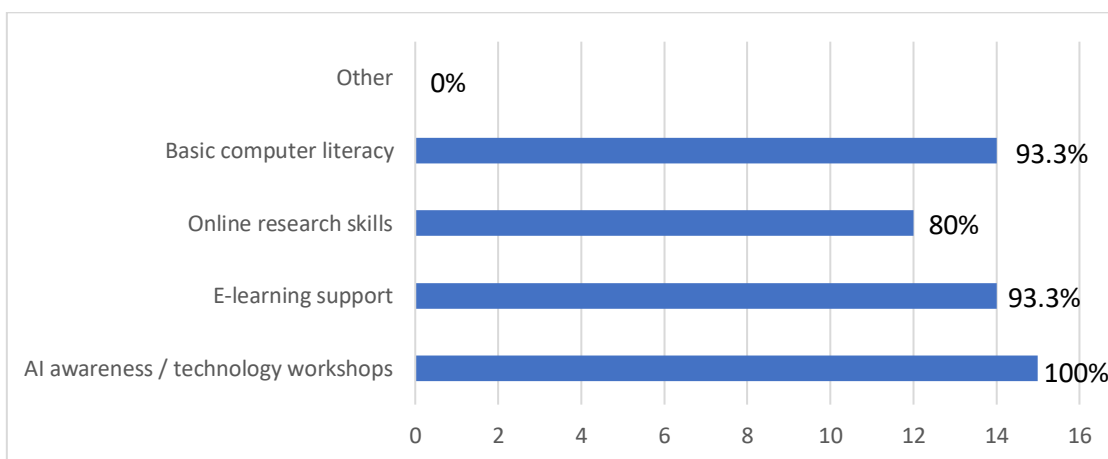
**Table 2: Library Functions Where AI Could Be Most Beneficial**

Library Function	Frequency (n)	Percentage (%)
Cataloging and classification	22	75.9
Reference and information services	23	65.5
Digital literacy training	23	58.6
Resource recommendation systems	18	51.7
User data analysis and personalization	17	41.4
Administrative tasks	20	31.0

These findings imply that public librarians in the Colombo District perceive AI as particularly beneficial for improving information management, user services, and digital literacy programs. Overall, the findings demonstrate a growing awareness of the potential of AI to improve efficiency, accessibility, and user engagement in public library services.

The survey questions were designed to determine whether or not the respondents' libraries provide digital literacy or educational programs. Of the 29 participants, 15 respondents (51.7%) said that their libraries provide such programs, implying that slightly more than half of public libraries in the Colombo District are actively engaged in initiatives to improve digital literacy.

Out of these libraries, various types of programs are provided. AI awareness/technology workshops were the most provided program, and this was reported by all 15 respondents (100%). This indicates that AI technology is highly emphasized. E-learning support was provided by 14 respondents (93.3%), and online research skills training was provided by 12 respondents (80%). Basic computer literacy was provided by 14 respondents (93.3%).



**Figure 2: Types of Digital Literacy or Educational Programs Conducted**

Further, the respondents were asked to identify the barriers that had been faced in the integration of AI into the programs of education. The main barriers that were identified included limited digital infrastructure (18 respondents, 41.4%), budget constraints (11 respondents, 37.9%), and lack of institutional support (15 respondents, 31.0%). It is important to note that none of the respondents mentioned the lack of awareness and expertise as a barrier.

The research findings have also highlighted the important role that is played by artificial intelligence (AI) in the improvement of public library services. In the research, it was highlighted that AI programs, like AI awareness, e-learning support, research skills training, and computer literacy programs, play an important role in the improvement of public library services. The provision of a large number of AI programs shows that librarians understand the important role played by AI in the provision of library services. In the survey, the types of support that librarians feel are necessary for the effective adoption of AI in their libraries were also explored. In the survey, the respondents were given a list of options from which they could choose the types of support they feel would be necessary.

**Table 3: Support or Training Required for Effective AI Adoption**

Type of Support / Training	Frequency (n)	Percentage (%)
Technical training	29	100
Policy and ethical guidelines	21	72.4
Funding support	11	37.9
Partnerships with educational or tech organizations	29	100
Other	0	0

The findings suggest that for AI technology to be successfully implemented in public libraries, technical, strategic, financial, and cooperative support are required. Of particular interest is that all the 29 respondents (100%) agreed on the need for technical support and cooperation with institutions related to education and technology. This is because it is necessary for people to gain experience in using AI technology. Policy and ethical guidelines were also seen as necessary by 21 (72.4%) of the respondents, which also indicates that AI technology should be used in a responsible manner in relation to privacy, security, and intellectual property issues. On the other hand, financial support was seen as necessary by 11 (37.9%) of the respondents, implying that AI technology could be acquired and made available in public libraries through financial support. No other support was seen as necessary.

## 7 CONCLUSION

The purpose of this study was to examine how artificial intelligence (AI) could contribute to digital literacy and library educational programs in public libraries in the Colombo District in Sri Lanka. The results indicated that most librarians possess a positive attitude towards AI and are also familiar with AI tools such as ChatGPT, Cloud AI, etc. The actual application of AI in library services is limited to digital literacy programs. Some challenges identified in this study are digital infrastructure, lack of financial support, and lack of institutional support. However, librarians also identified the need for further technical support, policy and ethical issues, and financial support. They also identified the importance of working in collaboration with educational and technology-related institutions. On the other hand, librarians also believe that AI could help in better user interaction, more personalization in learning, and more efficient service delivery.

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