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Readiness to embrace artificial intelligence in information literacy instruction at a Zimbabwean University

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ABSTRACT

The rapid developments in technology and the rise of artificial intelligence (AI) have prompted a need for librarians to revamp their information literacy services. This article evaluates the potential for integrating AI into information literacy (IL) instruction at Bindura University of Science Education Library (BUSEL) by employing the Artificial Intelligence Readiness Index (AIRI) and Chapnick's Framework. A case study approach was employed, gathering data from library, finance, and ICT staff through questionnaires and interviews. The results indicate that while instructors possess a basic understanding of essential AI concepts, such as human intelligence and task performance, their familiarity with AI tools varies significantly. The study revealed that BUSEL is currently unprepared for AI integration, primarily due to insufficient technological infrastructure and a lack of institutional support. There is absence of leadership influence, which has resulted in a limited understanding of AI among staff members. Although the IL curriculum aligns with relevant frameworks and standards, the library's IL content is outdated and lacks AI-related materials. Furthermore, there are no established policies to guide the integration of AI. AIRI score suggests that BUSEL is AI-aware but not fully prepared to implement it effectively. It is recommended that the library invest in enhancing its infrastructure and initiate comprehensive staff training.

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Information & Communication Technology (ICT); Teaching & Learning; Academic Librarianship


SUBJECT

CLASSIFICATION CODES

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Introduction

Bindura University of Science Education (BUSE) has recently established a dedicated Artificial Intelligence (AI) department aimed at equipping the university community, particularly students, with essential AI knowledge and skills. This initiative aligns with directives from the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD) and the Zimbabwe Council for Higher Education (ZIMCHE), which through various communiques to universities and workshops have encouraged Higher Educational Institutions (HEIs) to explore and incorporate AI technologies. AI encompasses diverse technologies that enable machines to simulate human cognitive capabilities (Del Castillo & Kelly, 2024). The emergence of ChatGPT, which belongs to a class of new technologies known as generative AI has brought on a frenzy of educational research and media attention, much of which is focused on the impact tools such as ChatGPT may have on academic assessment, academic integrity, and teaching and learning more generally (Tiernan et al., 2023). Although Huang (2024) gleaned from

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various authors that AI in education presents ethical and privacy concerns, ZIMCHE recognises the considerable potential of AI to improve data-driven decision-making, adaptive assessments, personalised learning, and intelligent tutoring systems. In this context, the Bindura University of Science Education Library (BUSEL) is actively working to integrate Generative artificial intelligence and large language models (LLMs) into its services, especially in the realm of information literacy (IL) education.

AI is being applied in libraries in a variety of ways, including chatbots, online reference aid, and the development of intelligent library systems. These applications provide advantages such as increased user interactions with AI-generated information, inclusivity, privacy protection, and knowledge diffusion (Andrews et al., 2021; Bourg, 2017; Vijayakumar & Sheshadri, 2019). Libraries have long championed IL through their instructional programmes, recognising it as a crucial 21st-century skill that enables individuals to effectively acquire, evaluate, and utilise the vast amounts of information available in today's digital landscape (Tachie-Donkor & Ezema, 2023). However, achieving high-level IL competencies on a large scale requires more than traditional classroom instruction. Initial advocates of AI integration believed it could offer opportunities to improve students' information literacy, thereby enriching information literacy instruction ((Del Castillo & Kelly, 2024). Some of the most extensive considerations of generative AI within academic libraries have emerged from explorations of how to place these tools into the broader ecosystem of information literacy skills and knowledge (Carroll & Borycz, 2024). AI presents an opportunity to enhance IL by offering personalised and adaptive tutoring, simulated hands-on experiences, instant feedback, and engaging content tailored to diverse learning styles (Huang, 2024). By thoughtfully implementing AI, libraries can meet the evolving needs of modern learners through customised, hands-on, and lifelong learning approaches (Ogunyemi & Johnston, 2012).

The concept of *AI Readiness* is a way to describe the transition that those working in education and their students need to make from not understanding what AI is and what AI can do, to being able to understand, in non-technical terms, what AI is capable of achieving (Luckin et al., 2022). Yin et al. (2024) cautioned that organisations aiming to incorporate AI into their services must carefully evaluate their readiness prior to launching such projects Academic libraries must effectively prepare for AI integration in their instructional practices to ensure its success (Uren & Edwards, 2023). Conducting a thorough change readiness assessment can yield valuable insights to enhance the performance and outcomes of change initiatives (Walkme, 2024). Neglecting to prepare for readiness can heighten the risk of project failures (Ogunyemi & Johnston, 2012). Such assessments must address the unique technical complexities and knowledge gaps associated with AI integration. Currently, there is limited research on the preparedness, challenges, and opportunities at BUSEL, creating a knowledge gap that hinders the development of effective strategies and best practices for successful AI integration. This knowledge gap hampers the development of strategies and best practices required for successful AI adoption, potentially hindering student learning outcomes and impeding the overall effectiveness of academic libraries in an AI-driven educational landscape. Therefore, it was critical to investigate and evaluate BUSEL readiness to integrate AI-enhanced technologies to facilitate the identification of barriers and opportunities, and propose recommendations to facilitate the seamless integration of AI into information literacy programs. While several studies have examined AI readiness, there remains a dearth of research specifically focused on African economies (Shonhe & Kolobe, 2023) and few studies have specifically targeted IL services (Huang, 2024).

This study is significant because it informs policymakers and library administrators about AI-enhanced technologies in information literacy programs, highlighting benefits and obstacles. Understanding academic librarians' views enables policymakers to develop informed policies and strategies for AI integration in libraries, addressing resource allocation, training, and infrastructure. By exploring librarians' perspectives and experiences, the study provides practical suggestions for increasing colleagues' receptivity to AI and successful inclusion in information literacy programs. Additionally, the findings and recommendations help administrators and tech-savvy personnel build innovative and open environments. The research contributes to theoretical understanding of new technology integration in library training, enhancing existing literature on technology integration and exploring AI's intersection with library service.

To assess BUSEL's readiness to integrate AI-enhanced technologies such as Generative AI and large language models (LLMs) into IL programmes, researchers utilised the AI Readiness Index (AIRI) model (AI

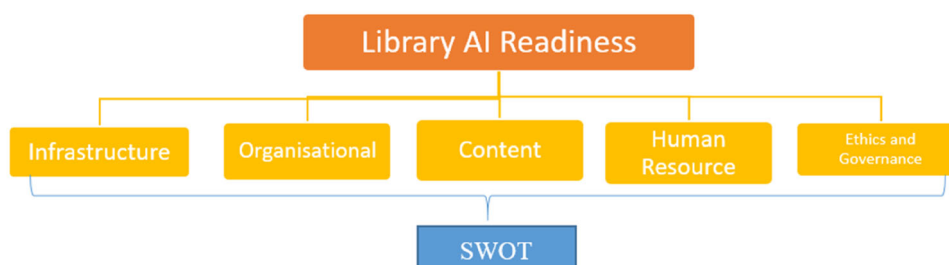


Figure 1. Library AI readiness framework (researchers).

Table 1. Subcomponents of the conceptual framework (Researchers).

Concept	Components to be covered
Infrastructure	<ul style="list-style-type: none"> • Internet • Hardware and software • Data infrastructure
Organisational	<ul style="list-style-type: none"> • Leadership support • Communication • Business value readiness • Financial Readiness
Human Resource	<ul style="list-style-type: none"> • AI talent • Experimentation Culture • Technology and content knowledge (TCK)
Content	<ul style="list-style-type: none"> • Data quality • Reference Data
Ethics and Governance	<ul style="list-style-type: none"> • AI Policies • AI Risk control • AI Governance

Singapore, 2024) and incorporated the content readiness concept from The Chapnick Readiness Model (2000) for a tailored approach. A SWOT analysis was conducted to evaluate various aspects of readiness for AI integration in IL instruction. This combination of conceptual frameworks and SWOT analysis enhances the understanding of BUSEL's capacity to effectively implement AI in its instructional practices. The organisational readiness framework and its components are illustrated in Figure 1 and Table 1.

Research objective

1. Assess the current technological infrastructure of BUSEL to determine its capacity to support AI integration;
2. Determine the organisational support for the adoption of AI technologies;
3. Examine quality of digital content that can be leveraged for AI applications in IL;
4. Assess the skill levels and competencies of library staff regarding AI technologies and their applications in IL instruction;
5. Explore the ethical and governance considerations associated with the adoption of AI at BUSEL.

Literature review

Interplay between AI and IL

Carroll and Borycz (2024) argue that AI tools offer a timely opportunity to re-examine and refresh the fundamental information literacy skill of information evaluation for the modern era. They suggest that instructional interventions, when carefully designed and implemented, can empower students to develop sophisticated understandings of the key issues and limitations associated with Large Language Models (LLMs), such as bias, accuracy, and reliability. Heck et al. (2021) suggest that AI can clarify the complexities of the "black box of learning," offering insights into learners' experiences and the learning process. Generative AI tools can provide educators with effective teaching strategies to help learners develop essential skills like problem-solving and critical thinking. Intelligent agents, such as robots or virtual assistants, can support learners throughout their educational journeys (Heck et al., 2021). By aiding

in information-seeking processes, AI can alert learners to potential challenges. To achieve this, reliable indicators of skill development and effective teaching methods must be established, making it crucial for librarians to reach a consensus on evaluating IL for automated assessments (Lo, 2024).

According to Firat (2023), AI applications can be integrated into learning management systems (LMS) for various purposes. The most common applications include personalized learning where AI tailors content to individual students' needs, using platforms like IBM Watson, Google Cloud AI, and GPT-3. AI can support personalized learning experiences by analysing user data and tailoring content to meet individual needs, which can be particularly beneficial in information literacy instruction (Cox et al., 2019; Heck et al., 2021). This personalization is further enhanced by the ability of libraries to utilize AI to monitor user engagement and performance, allowing for adjustments in instructional strategies and content delivery based on real-time feedback (Heck et al., 2021; Cox et al., 2019). Learning analytics also offer opportunities to study learners' behaviours and skills (Heck et al., 2021). Analysing these behaviours can help refine IL concepts, as seen in context-based approaches. AI scores open-ended texts and multiple-choice tests using ChatGPT, Gradescope, and e-rater (Firat, 2023). ChatGPT can help with research, source analysis, and reference citations during IL instruction (Del Castillo & Kelly, 2024). AI-powered games develop essential skills like problem-solving and decision-making, using platforms like Google Cloud AI, IBM Watson, Classcraft, and Kahoot. Examples of AI solutions enhancing LMSs like Canvas and Moodle include Smart Sparrow and Learnosity (Firat, 2023).

Moreover, the implementation of AI-driven intelligent tutors can provide users with immediate assistance and guidance in navigating information resources, thereby enhancing their information literacy skills (Cox et al., 2019). In addition to these advancements, it is crucial for libraries to focus on teaching users how to evaluate AI tools and their outputs, as well as understanding data creation processes, including protecting privacy and navigating the new information environment shaped by AI (Cox et al., 2019). IL must therefore include technological literacy, emphasising understanding AI's data processes (Heck et al., 2021). However, the interdisciplinary nature of the field poses challenges, as educators and researchers come from diverse backgrounds with varying objectives, making a single AI solution unlikely to fit all IL contexts (Heck et al., 2021). While AI can accelerate information discovery, users must remain critical and not overly reliant on AI-provided information. Ultimately, IL frameworks should foster competencies that enhance learners' understanding of AI tools and their responsible use.

AI adoption in instruction

Integrating AI into IL instruction requires significant investments in infrastructure, resources, and staff training. These technologies can aid library users in locating relevant resources, evaluating information credibility, and enhancing their research skills (Dina et al., 2020). However, the integration of AI technologies in academic libraries necessitates careful consideration of various factors (Ajani et al., 2022). Assessing the readiness of academic libraries to adopt and effectively integrate these technologies into their IL instruction is essential. Such readiness assessments provide insights into the current state of libraries' infrastructure, resources, staff expertise, and institutional support for AI integration (Yin et al., 2024).

Infrastructure readiness

Infrastructure readiness is essential for an organisation's successful adoption of new technologies (Uren & Edwards, 2023). This involves assessing the availability and configuration of resources, hardware, software, and networks to support the targeted technology. Additionally, it includes the organisation's ability to ensure reliable access and provide adequate training for users (Twigg, 2000). The effectiveness of new technology applications largely depends on technological preparedness (Surry et al., 2005). For effective e-Learning implementation, incorporating technological innovations is critical (Rogers, 2003). A fast internet connection is vital for AI adoption in libraries; while 5G technology offers new opportunities, 4G is generally sufficient for modern information centers (Collins et al., 2021). Internet requirements vary by AI application, necessitating a reliable connection, sufficient bandwidth, and security measures to protect sensitive data (Muraszkiewicz, 2019).

Organisations must also ensure hardware readiness, verifying that necessary resources are available and configured correctly (Matsepe & Van Der Lingen, 2020). Factors like maintenance, performance, and compatibility are crucial for maximising system efficiency. High-performance computers are necessary for data processing and AI model training, while cloud-based platforms provide scalable resources for integration. Unique software requirements exist for developing AI in educational settings. Early e-Learning phases require reliable internet and sufficient computing resources (Broadbent, 2001). Data infrastructure readiness is vital for AI integration, encompassing hardware, software, networks, and data management processes (Hiniduma et al., 2024). Strong data security measures are essential to protect sensitive information (Lo, 2023).

Organisational readiness

Organisational readiness is defined by members' commitment and confidence to implement change (Weiner, 2009). It includes positive attitudes toward change and the ability to respond effectively (Rafferty et al., 2013; Roodt & Kinnear, 2007), which is crucial for integrating new processes (Newman, 2012). Effective leadership is essential for successfully incorporating AI into practices (Lingam & Vanishree, 2024). Leaders foster collaboration among stakeholders, aligning initiatives with institutional goals and addressing concerns (Roodt & Kinnear, 2007). This support involves ongoing evaluation and improvement of AI initiatives (Aziz et al., 2020), creating an environment conducive to experimenting with AI technologies to enhance instruction and student achievement. Assessing business readiness is vital for aligning organisational priorities with learning initiatives, particularly in evaluating a library's capacity to utilise AI effectively (Nugroho et al., 2023). Implementing AI in libraries also requires careful financial consideration and sophisticated IT infrastructure (Canda, 2024).

Human resource readiness

Human resource readiness involves having a skilled and adaptable workforce to support AI integration (Contino, 2005). Studies indicate that human resources are critical for successful e-Learning implementation (Aydin & Tasci, 2005). Cultural readiness reflects the alignment of organisational norms with AI adoption (Guzmán et al., 2020). Creating a supportive environment encourages experimentation with AI technologies and fosters collaboration among educators. Addressing fears about job displacement and promoting transparent communication about AI's benefits can help build a responsive culture (Oketch & Otchieng, 2013). AI literacy is vital for assessing readiness to integrate AI into instruction. It encompasses educators' understanding of AI technologies and their ethical implications (Jöhnk et al., 2021). High AI literacy enables educators to effectively incorporate AI into their teaching practices and guide students in critically evaluating AI-generated content (Heck et al., 2021).

Content readiness

Content readiness evaluates the suitability and quality of educational materials for AI integration (Chapnick, 2000). This includes assessing content accuracy, accessibility, and scalability (Khalid et al., 2014). Ensuring alignment between existing content and AI integration goals enhances the learning experience. Assessing data readiness involves evaluating an organisation's data management practices (CastorDoc, 2023). Organisations should have established policies for maintaining data quality, including validation and regular audits (ICARIA Technology, 2023). Reference data is crucial for assessing data readiness (McLogan, 2024). Reference data serves as the backbone for maintaining the consistency and accuracy of information within an organisation (McLogan, 2024). It focuses on whether there is a single source of truth, consistency of data format, and reliable metadata (AI Singapore, 2024). Its primary role is facilitating interoperability and data integrity across diverse business applications and databases.

Ethics and governance

The presence of AI policies is essential for ethical AI integration in educational settings. These policies should outline guidelines for responsible AI use, addressing user consent, data privacy, and algorithmic transparency (Bradley, 2022). A successful AI policy clarifies the objectives of AI integration in IL instruction. Establishing data governance practices and promoting algorithmic transparency are vital for minimising. AI governance provides a framework for the ethical and accountable use of AI technologies (Lo,

2023). This includes establishing roles for overseeing AI integration, developing ethical guidelines, and ensuring compliance with legal obligations (Cath, 2018). Effective AI governance promotes transparency and user trust while safeguarding individual privacy rights (Eitel-Porter, 2021).

Previous studies

Several studies have explored AI integration readiness at the organisational level, including research by Jöhnk et al. (2021), Holmström (2022), Chatterjee et al. (2020), and Dai et al. (2020). Jöhnk et al. (2021) identified various factors influencing AI readiness, such as strategic alignment, resources, knowledge, culture, and data. Weijia found that factors like data scale, leadership focus, innovation climate, management mechanisms, competitive pressure, and awareness, acceptance, and value assessment of AI also influence readiness. Notably, the factors identified in these studies overlap and complement each other, creating a comprehensive framework for assessing an organisation's preparedness for AI integration.

Recent studies have also investigated the readiness of educators to integrate Artificial Intelligence (AI) into their teaching practices in various countries, including Jordan, Nigeria, and Egypt. Alshorman (2024) conducted a study in Jordan, specifically in the cities of Irbid and Amman, to examine teachers' attitudes towards AI integration. The findings revealed that the majority of teachers displayed a positive disposition towards AI, indicating a foundational readiness to incorporate AI technologies into their pedagogical strategies. However, the level of readiness varied significantly among teachers, with some feeling less confident in their ability to troubleshoot and evaluate AI tools. The study identified key barriers to AI adoption, including limited access to AI tools, reliable internet connectivity, and concerns over data privacy and security. These challenges correlated with lower readiness and satisfaction with resource access and professional development.

In Nigeria, Tunmibi and Okuonghae (2023) investigated the influence of technological readiness on the adoption of AI technology among librarians. Contrary to expectations, their study found that technological readiness did not significantly influence AI adoption. This suggests that other factors, such as organizational support, training, and cultural context, may play a more critical role in determining AI adoption among librarians. A study by Ali (2023) in Egypt used a mixed-method approach to examine the AI readiness of faculty members from 10 different universities. The results showed that 87% of participants demonstrated high levels of AI readiness, which was not correlated with the type of university they belonged to. Notably, technological literacy emerged as a significant predictor of AI readiness, while demographics had no influence. These findings underscore the importance of developing educators' technological skills to enhance AI readiness.

Methodology

The case study methodology utilised in this research allowed for a comprehensive analysis of BUSEL's preparedness to integrate AI into its IL education offerings. The decision to employ this strategy stemmed from the need to understand the complexities surrounding AI integration, which involves various contextual factors such as infrastructure, organisational structure, content, human resources, ethics, and governance and provide a thick description of the case. By combining qualitative and quantitative approaches, the research was able to capture a comprehensive picture of the factors influencing AI integration, while also highlighting the unique contextual elements present within the institution. In this context, researchers used judgment to select participants based on their familiarity with the phenomenon, as noted by Parahoo (1997). The study included participants from the BUSEL management, faculty librarians, digital and scholarly communications librarians, and librarian assistants, as well as senior members from finance and ICT departments.

The study employed multiple data collection techniques, utilising document analysis, interviews, and questionnaires. The researcher conducted interviews with participants from finance, ICT, and the library departments to gather qualitative insights regarding AI readiness. A questionnaire which had quantitative variables was developed to assess the degree of AI readiness among library professionals. This instrument was informed by previous studies (Alsabbagh, 2019; Hero, 2020; Shonhe & Kolobe, 2023; Uren & Edwards, 2023) and focused on several dimensions of readiness that include infrastructure

readiness, organisational readiness, human resource readiness, content readiness, ethics and governance readiness. As a supplementary data source, the researcher analysed various documents, including reports, policies, strategic plans, circular materials, and communications, to provide additional context and support for the findings.

A multi-methods technique allowed qualitative and quantitative data to be analysed independently and then combined. Descriptive analysis was applied to close-ended questions, while open-ended questions were qualitatively coded. Microsoft Excel analysed quantitative data, and to generate visual representations such as tables. The interview recordings were transcribed verbatim to create a written record of the conversation. In vivo coding was employed within open coding to capture participants' exact words and expressions to preserve authenticity. The main themes and subthemes that captured the essence of the participants' views on the AI readiness were developed after the coding exercise.

The data presentation utilises a weaving approach, which "entails integrating both qualitative and quantitative findings around specific themes or concepts" (Pasipamire, 2020, p. 469). Qualitative data were presented through narratives, providing a rich description of participants' insights and experiences. For quantitative data, the study utilised descriptive statistics in form of tables and charts to clearly convey key information. The AIRI Index scale by AI Singapore (2024) was used to assess BUSEL's readiness to integrate AI into IL instruction and provide appropriate recommendations. The AIRI Index utilises a mean score to measure an organisation's readiness to integrate AI. The scale is as shown in Table 2 above.

The SWOT analysis serves as a valuable tool for assessing strengths, weaknesses, opportunities, and threats, providing insights into the library's preparedness for AI integration. A SWOT analysis was performed by the researchers after the analysis of the results to establish BUSE's strengths, weaknesses, opportunities and threats.

Approval was obtained from BUSE prior to data collection. The ethical considerations reviewed by the research ethics committee included obtaining informed consent from each participant. The researchers clarified that the risks associated with participating in this study were minimal.

Results

Knowledge of concepts related to AI

Library IL instructors were asked to demonstrate their knowledge of AI by defining AI. Figure 2 is the word cloud generated from the input text highlighting key topics and concepts. "Perform tasks," "computer," and "human intelligence" are the three largest and most visible terms in the word cloud.

Table 2. AIRI Index.

Average Score	Less than 2.5	2.5 to 3.4	3.5 to 4.5	Greater than 4.5
Level of readiness	AI Unaware	AI Aware	AI Ready	AI Competent

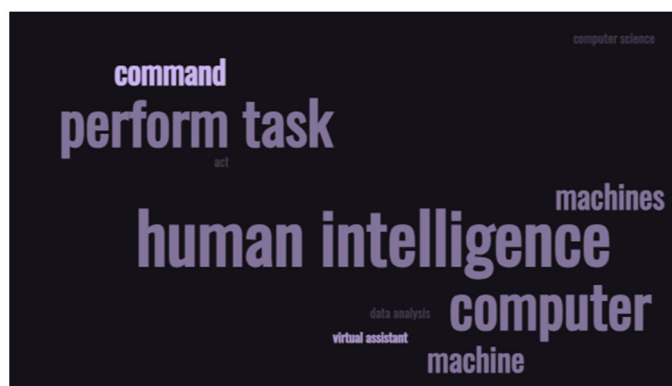


Figure 2. Word cloud for key concepts in AI.

This means that these are the AI concepts that library IL instructors are most familiar with. The word clouds also include key terms such as command, act, data analysis, machine, computer science and virtual assistant.

Experience with AI for teaching and learning

Library IL educators were asked to share their experiences using AI in teaching and learning. The reactions to the employment of AI in IL instruction at BUSEL reflect a variety of perspectives and experiences. Some respondents identified AI's potential benefits, such as its ability to quickly seek and retrieve relevant information from vast digital resources, as well as its ability to boost student engagement and motivation. Others, however, raised concern about over-reliance on AI and the risk of reduced learning and understanding, particularly among people with limited expertise with AI tools. However, one study participant stated that the library was already employing various AI products built for IL, such as Mendeley, Zotero, RemoteXs, Tawk.to, and Connected Papers for providing instruction.

Infrastructure readiness

Respondents were questioned about the types of computers they believe will be required for AI integration into IL, as well as the storage devices used to store IL-related data. The research revealed that 100% of library IL teachers stated that the laptop is necessary for AI integration into IL education, as this is where they save their IL data. Respondents were asked to rate the extent to which they agreed with statements on the sub-factors considered in each category on a five-point Likert scale. According to the data presented, the library infrastructure weighted mean scores range from 1.89 to 3.22. The broad range signals that there is no universal consensus among the respondents regarding the overall state of the library's infrastructure. The library backup systems received the highest rating ($\bar{x}=3.22$). Table 3 shows the results. The library's internet infrastructure also received a positive rating ($\bar{x}=3.11$). However, an area of concern arises regarding the number of available computers, which received a relatively low average score ($\bar{x}=1.89$) and the lack of internet-related security measures ($\bar{x}=2.33$).

When asked about the software requirements for integrating AI into IL, the majority of instructors said that they "do not know" what was required.

Organisational readiness

Respondents were asked to rate the extent to which they agreed with stated assertions regarding the incorporation of AI-enhanced technology in IL instruction at BUSE Library on a five-point Likert scale. Table 4 shows the statistical results for the responses given. The library's leadership demonstrates a strong understanding of AI technologies ($\bar{x}=3.67$) and their capabilities ($\bar{x}=3.44$). effective communication abilities to articulate the benefits of AI integration ($\bar{x}=3.44$). the library's leaders demonstrate skill in change management ($\bar{x}=3.56$). promote continual learning and development by organising AI-related training sessions and workshops ($\bar{x}=3.67$).

Table 3. Statistical results for infrastructure readiness (n = 9).

Statement	Weighted mean score
The library provides internet with high broadband	3.11
The library has implemented robust cyber security measures, e.g. CISCO, SSL	2.33
The library has enabled virtualisation services	2.56
The library has sufficient backup systems	3.22
Internet services are easily accessible to both staff and students anytime	3.11
There are adequate number of computers	1.89
The computers have sufficient Random Access Memory (RAM) for operations	2.44
The computers have the required software for AI integration	2.44
The library has sufficient storage space for data mining	2.78
The library has adequate external devices e.g. cameras, microphones to support e-learning	2.33
The library has adequate networking equipment e.g. switches, routers	2.67
The library has adequate Interactive Display Technologies e.g. projectors	2.22
The library has necessary accessibility features e.g. screen readers	2.00
Weighted average score	2.22

Table 4. Statistical results for organisational readiness (n = 9).

Comment	Weighted mean score
Leaders set a clear vision for AI integration into instruction	3.11
Leaders have solid understanding of AI technologies	3.67
Leaders have a solid understanding of AI capabilities	3.44
Leaders possess change management skills	3.56
Leaders communicate about the benefits of AI integration into instruction	3.44
Leaders organise AI integration-related training sessions and workshops	3.67
Leaders provide access to relevant AI resources	3.22
Leaders allocate appropriate resources e.g. funding, technology infrastructure, and personnel to support AI integration	2.89
Leaders promote the ethical use of AI in AL instruction	3.22
Leaders promote a culture of continuous improvement regarding AI technologies in instruction	3.44
AI integration can improve student outcomes	4
AI integration can improve learning experiences	3.67
AI integration increases student engagement	3.78
AI integration helps reduce focus on administrative tasks	3.89
AI integration improves instructors' productivity	4.11
AI integration can provide valuable insights into data-informed decisions	4.00
AI integration can lead to cost savings	4.33
AI integration can enhance the library's visibility	4
Weighted average score	3.63

BUSE management have however expressed a willingness to assist library instructors in a variety of ways. One participant said, *"I am committed to providing technical expertise, guidance, and training opportunities in collaboration with the library staff to address challenges and allocate necessary resources."* Another participant stated that *"In future as long as opportunities are offered, I will ensure the availability of funding sources, such as grants or strategic budget allocations, to finance the process. When the time comes, I can also offer expertise in drafting financial policies and contract negotiations with vendors."*

Influence of leadership

The research respondents were asked to rate leadership's influence on the integration of AI-enhanced technologies at BUSE Library, and the results yielded a weighted mean score of 3.56. This high-weighted mean score indicates that leadership influence is viewed as having a substantial impact on the incorporation of AI technology at the library. The leadership's belief in the benefits of AI integration is reflected in their willingness to support the library and staff. These findings were echoed in an interview, with a member of management stating that *"AI will enhance how librarians impart skills and also reduce the workload of staff"*. Another member of management said that *"AI integration can benefit instructional practices by increasing staff retention, generating potential revenue from increased student enrolment, creating efficient content, and saving time."*

Human resource readiness

Respondents were asked to assess the extent to which they agreed with stated assertions regarding the human resource readiness of BUSEL when integrating AI into IL on a five-point Likert scale. Table 5 shows the statistical results for the responses given. The data shown above shows that instructional librarians at BUSEL demonstrate a notable proficiency in utilising computers, software, and Learning Management Systems (LMS), ($\bar{x} = 3.89$). Librarians exhibit readiness to integrate AI technologies into their instruction ($\bar{x} = 3.78$). The librarians express a sense of trust in the benefits that AI integration can yield ($\bar{x} = 3.67$) which signifies their belief in the transformative potential of AI technologies in enhancing instructional outcomes. When it comes to training, the librarians have attended limited sessions organised by the university ($\bar{x} = 2.44$). However, they have shown a proactive inclination towards voluntary training outside the university ($\bar{x} = 2.89$).

When asked if library staff is ready to integrate AI into IL instruction, one of the participants indicated that *"staff members are willing to do so, but they may require further training"*. Another participant was of the view that *"to ensure that librarians are ready to integrate AI, they seek stakeholder participation in order to fulfill the essential requirements"*.

Table 5. Statistical results for human resource readiness (n = 9).

Statement	Weighted mean score
I am proficient in the use of computers, software applications, operating systems and LMS	3.89
I am ready to integrate AI technologies into IL instruction	3.78
I trust in the benefits of AI integration into IL instruction	3.67
I possess a basic understanding of concepts, terminology and ethics related to AI in instruction	3.56
I have a basic foundation in AI technologies related to instruction	3.44
I have only attended trainings organised by the university on the integration of AI into instruction	2.44
I have voluntarily attended trainings organised outside the university on the integration of AI into instruction	2.89
I possess basic data literacy and analysis skills	3.22
I collaborate with colleagues and IT experts in the integration of AI in IL instruction	3.00
Weighted average score	3.32

Content readiness

Library IL instructors were asked which IL framework they adopted at BUSEL. The chart below (Figure 3) shows the responses received.

The chart above indicates that BUSEL uses the ACRL and SCONUL IL frameworks. Only one participant claimed that BUSEL follows the UNESCO framework, while another stated that they are unsure which framework is used at BUSEL. However, during one of the interviews, a participant indicated that they had partially embraced the ACRL and SCONUL approaches because these approaches complement one another and when implementing content into the IL curriculum, respondents mentioned that they evaluated the level of students (undergraduate, postgraduate) as well as their ability to present information based on their needs.

Respondents were asked how frequently they reviewed content for the IL curriculum. As indicated in Figure 4, 33.3% of respondents said IL material is evaluated once a year, while 22.2% said it is checked every 3-6 months or as needed. The remaining 22.2% claim that BUSEL evaluates its content monthly or every five years. However, in an interview, it was indicated that BUSEL examines its IL content as when needed, and of late, they last reviewed it five years ago and have thus not identified areas where AI technologies can improve educational materials.

Respondents were asked the extent to which they agree with statements relating to their IL content based on the Likert scale rating. Table 6 shows the results. The results show that the overall average weighted mean score across all aspects of AI integration within the IL is 3.38. This score indicates a solid foundation and a commendable level of proficiency in integrating AI technologies into the instructional IL curriculum and content. The IL curriculum demonstrates provision for the integration of AI technologies ($\bar{x} = 3.00$). The available content within the IL is deemed adaptable to different AI-enhanced learning scenarios ($\bar{x} = 3.33$).

Ethics and governance readiness

AI policy awareness

When respondents were asked whether they were aware of the AI policy framework at BUSEL, 100% of the respondents stated that they were not aware of the institutions' AI policy guiding teaching and learning practices. Respondents were also asked to rate the readiness of BUSEL regarding the ethics and governance in the integration of AI-enhanced technology in IL instruction. The following results were obtained. The results show that the overall average weighted mean score across all aspects of ethics and governance readiness is **1.61**. The integration of AI technologies into instructional library (IL) practices currently lacks a robust ethical framework, policies, or guidelines delineating the guiding principles ($\bar{x} = 1.56$). This dearth of ethical guidelines underscores the need for a more comprehensive framework to ensure responsible and ethical AI integration within IL instruction. Furthermore, relevant stakeholders are not adequately involved in the development of policies or frameworks concerning AI in instruction, achieving a mean score of ($\bar{x} = 1.56$). Table 7 illustrates these results.

A participant corroborated these results by stating that there is no policy on AI in place. Another participant also confirmed this by saying,

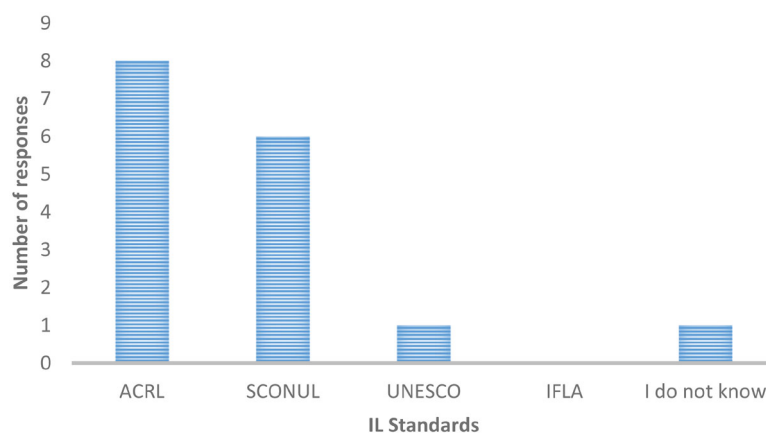


Figure 3. IL Standards adopted at BUSE.

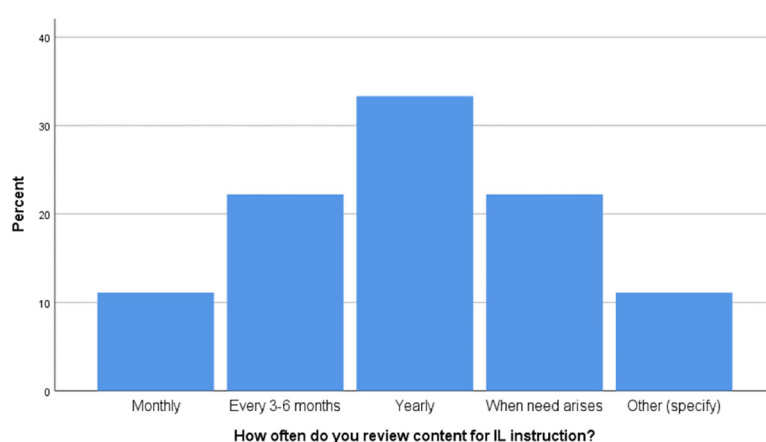


Figure 4. How often IL content is reviewed.

Table 6. Statistical results for content readiness (n = 9).

Statement	Weighted mean score
The IL curriculum supports the integration of AI technologies	3.00
AI algorithms can leverage available IL data	3.00
Available content is adaptable to different AI-enhanced learning scenarios	3.33
The IL curriculum follows relevant curriculum frameworks and standards	3.67
Available content is available in different formats to enhance AI-enhanced learning scenarios e.g. visuals for gamification	3.56
IL content is occasionally checked for errors, completeness, consistency currency and relevance	3.89
There is comprehensive documentation available to ensure data quality	3.33
Reference data encompasses a wide range of learning resources e.g. print and digital sources	3.78
Reference data encompasses experience documentation	3.11
Reference data is inclusive to support diverse student populations e.g. linguistic databases, Braille	3.22
Reference data includes research studies, academic publications and best practice guidelines related to AI integration	3.33
Weighted average score	3.38

"The University is still in the process of introducing the AI concept, no policy has been set in place, as they are still gathering stakeholder views on the issue."

"The lack of an AI policy poses many challenges" as stated by a participant, who indicated that the library may face challenges in getting investment in "hardware, software, staff training, ongoing maintenance and licensing costs for AI tools and platforms. "Policies such as procurement policies to accommodate the acquisition of AI hardware; budgeting and funding allocation processes to prioritise AI-related investments, and accounting policies to capture the benefit of AI would need to be updated to cater for the integration of AI into IL."

Table 8 shows the documents obtained that were relevant to the study.

Table 7. Statistical results for ethics and governance readiness.

Statement	Weighted mean Score
There is an ethical framework/policies/guidelines outlining guiding principles for AI integration into IL instruction	1.56
Relevant stakeholders are consulted in the framing of policies/frameworks regarding AI in instruction	1.56
There are data privacy guidelines in place when integrating AI-enhanced technologies into instruction	1.78
There are mechanisms to detect and mitigate biases in AI algorithms in IL instruction	1.79
The role of AI technologies in IL instruction is clear to IL instructors	1.56
There are relevant key performance indicators to assess the performance, fairness and ethical application of AI technologies	1.44
Weighted average score	1.61

Table 8. Document analysis results.

Document Type	Assessment
Reports	<ul style="list-style-type: none"> • There were reports from the Assistant Librarians on the AI tools they thought would be of use to the library. • There are also reports on the free webinars attended on AI tools that can be used in the library.
Policies and strategic plans	<ul style="list-style-type: none"> • There were no documents found on policies and strategic plans with regards to AI integration into IL
Circular material	<ul style="list-style-type: none"> • There was no material found related to curriculum objectives showing AI integration into IL instruction
Communications	<ul style="list-style-type: none"> • There was a communication email regarding a training workshop that was set to take place in the library. This was meant to help librarians understand AI concepts and tools, • A follow up email was also found from the host of the workshop, seeking a second training to assist librarians with the integration of AI. No communication was sent back.

Discussion

Infrastructure readiness

The findings of this study reveal significant obstacles regarding BUSEL's infrastructure suitability for integrating AI with IL education. The overall infrastructure readiness score of **2.2 out of 5** highlights significant deficiencies that require improvement. This underscores the library's lack of readiness. The internet service was however of good quality, with respondents noting that both students and staff can access the internet without any challenges. Rosenberg (2001) points out access simply means everyone (or at least most people) can get online and if people do not have basic access, nothing else matters. This shows that the internet is an important component of AI integration. While library management admits having "reasonable amount of resources," sentiments at the of staff show the difficulties in obtaining funds for infrastructure upgrades due to the university's limited resources. Furthermore, the data suggests a general lack of awareness among IL educators regarding the exact software criteria for AI integration, as evidenced by replies on software requirements, with the majority of instructors admitting they "do not know" what is required. This is as Blummer and Kenton (2015) discovered, in a qualitative study, and concluded that instructors who were not integrating specific technology consistently as both teaching and learning tools lacked adequate software and the technical skills associated with the technology use.

Organisational readiness

Organisational readiness assesses BUSEL's leadership, business value, and financial preparedness. The research data show that organisational readiness has an overall mean score of **3.63**, suggesting a high level of preparation. However, examining documentation and conducting interviews revealed that BUSEL currently lacks particular institutional policies or plans for incorporating AI into IL training. Some participants agreed that there are no university guidelines or strategies in place for AI integration. This demonstrates a substantial gap in organisational preparation, as the lack of clear institutional guidance and planning can impede the effective deployment of AI technologies. Furthermore, responses to organisational support for AI integration were mostly negative. Subaveerapandiyan (2023) stated that leadership vision issues can seriously affect technology integration.

Weijia (2022) emphasises that leadership influence is the most crucial factor in AI readiness, directing organisational priorities. A participant noted that inadequate support stems from challenges in securing necessary funding. Subaveerapandiyan (2023) identified finance as a significant barrier to AI application in libraries. This funding shortfall reflects a lack of organisational commitment to AI integration, limiting the library's ability to invest in infrastructure, training, and resources. The findings indicate insufficient buy-in from university leadership, hindering efforts to incorporate AI into IL instruction. While some existing partnerships related to AI integration are noted, their effectiveness remains unclear. The study mentions AI tools like Mendeley, Zotero, and Connected Papers introduced through collaborations, but lacks details on these partnerships or their impact on AI integration. Additionally, there is no evidence of broader collaborative initiatives within the university or with external partners for strategic AI implementation in IL.

Human resource readiness

Human resource readiness at BUSEL received an overall weighted average score of 3.32, reflecting the skills and competencies of those involved in integrating AI-enhanced technologies into IL instruction. About 55.6% of IL instructors have over 10 years of teaching experience, which, according to Vuong et al. (2019), may influence their openness to adopting new technologies, with more seasoned educators often being less receptive. While instructors were familiar with key AI concepts such as human intelligence and task performance, their experiences with AI tools varied. Some found AI beneficial for improving efficiency and student engagement, while others had minimal experience, indicating a readiness to learn. However, comments revealed a limited understanding of software needs and familiarity with AI technologies. Mahmud (2024) noted that a lack of competence can hinder AI integration, highlighting a significant knowledge gap that requires extensive training.

Despite this, BUSEL instructors showed a willingness to acquire necessary skills, evidenced by their participation in free webinars and AI workshops. The varying levels of comfort and confidence among library instructors underscore the need for tailored training to boost their expertise in AI technologies. Research into academic librarians' levels of engagement with and understanding of AI has shown considerable variation among practitioners which has led to a growing recognition that academic libraries may need to invest in reskilling their staff to use AI technologies (Carroll & Borycz, 2024). Weijia (2022) argues that organisations providing consistent AI education foster an innovative atmosphere, encouraging employees to explore AI integration in their tasks. Long and Magerko (2020) emphasise the necessity for more customised training and support to enhance buy-in for effectively incorporating AI into library services. While questionnaire responses did not clearly indicate IL instructors' desire to use AI in teaching, some expressed positive views on AI's potential to assist with complex questions and learning.

Content readiness

Johnson et al. (2018) highlight that evaluating an organisation's IL data reveals its readiness to leverage AI, including the establishment of necessary infrastructure, processes, and governance for data integrity. Initially, BUSEL seemed well-positioned for AI integration, with questionnaire responses indicating that its content is prepared for such advancements. The curriculum and resources exhibit high adaptability and format diversity. James-Springer (2016) notes that traditional text-based formats often hinder learner engagement, prompting the inclusion of multimedia in e-learning materials to enhance interaction and facilitate integration with AI applications. Additionally, the IL curriculum aligns with relevant frameworks and standards, ensuring compatibility with industry best practices for smooth AI integration. Lui and Karniol emphasise that reliable, up-to-date reference data is essential for AI initiatives, serving as a foundation for training models and providing informed recommendations. BUSEL's commitment to maintaining high-quality, well-documented content enhances its readiness for deploying AI tools.

The library's extensive range of learning resources, including both print and digital formats, supports diverse student populations, contributing to its preparedness for AI integration. However, research revealed that BUSEL relies on outdated IL content, last updated five years ago. Oketch and Otchieng (2013) argue that content must integrate with new systems to meet organisational needs continuously.

The lack of regular review could significantly hinder BUSEL's readiness for AI integration, as evolving content and technology necessitate updated information to address changing information needs.

Ethics and governance readiness

The study indicates that BUSEL lacks specific ethical criteria for integrating AI into IL instruction. Responses from library staff reveal varying levels of understanding regarding the implications of AI technology, highlighting the need for broader ethical training. Concerns about data management and privacy emerged, particularly as instructors store IL-related data on personal laptops, raising security issues. Cath (2018) emphasises the importance of clear data governance regulations and safe storage systems for ethical data management. Involving various leaders and formalising stakeholder engagement could enhance the governance framework and address ethical concerns. However, the study notes that management did not mention ongoing monitoring or evaluation of AI technologies in IL instruction. Cath argues for a strong framework to analyse the ethical impacts of AI tools for effective governance. Mahmud (2024) points out the lack of clear policies for AI integration suggest a weak ethical framework. Most libraries have yet to establish such frameworks, potentially hindering development across the sector due to a lack of research foundations (Lo, 2023).

AIRI assessment

The AIRI Index by AI Singapore (2024) was used to determine the level of readiness of BUSEL to integrate AI into IL instruction. Table 9 shows the mean score of the average weighted scores for each section.

According to the AIRI, this score indicates that BUSEL is **AI-aware**. This indicates it is aware of AI applications and may recognise prospective use cases. Additionally, BUSEL can detect prospective use cases for AI applications and consume ready-made AI solutions. BUSEL aggressively explores AI solutions to meet its organisational demands. The AIRI therefore recommends that BUSEL consumes ready-made, end-to-end, Commercial Off-The-Shelf (COTS) AI solutions. "COTS AI" refers to AI solutions that can be purchased from third-party vendors rather than being custom-built or developed in-house. These COTS AI solutions are often pre-packaged, easy to integrate, and may be quickly deployed to address a wide range of business concerns or tasks. They provide a cost-effective and efficient solution for organisations using AI technology without requiring significant development or expertise.

SWOT analysis of BUSEL

Given the results of the study, the researcher performed a SWOT Analysis on BUSEL in integrating AI-enhanced technologies in IL instruction and Figure 5 shows the strengths, weaknesses, opportunities and threats that are in the internal and external environments.

Conclusion and recommendations

BUSEL is not ready to integrate AI into IL instruction. This conclusion aligns with Alshorman's (2024) findings, which revealed that Jordanian teachers' readiness to integrate AI was hindered by challenges such as limited access to AI tools, unreliable internet connectivity, data privacy concerns, and security issues. However, this outcome diverges from Ali's (2023) study, which reported high AI readiness among

Table 9. Average weighted scores.

Section	Average weighted score
Infrastructure Readiness	2.22
Organisational Readiness	3.63
Human Resource Readiness	3.32
Content Readiness	3.38
Ethics and governance readiness	1.61
Average weighted score	2.83

Strengths	Weaknesses	Opportunities	Threats
IL offers content in various formats, including visuals for gamification.	Lack of infrastructure needing upgrades.	Developing clear policies for ethical AI use.	Lack of stakeholders' knowledge and support.
IL curriculum adheres to relevant frameworks and standards.	No formal ethical guidelines for AI in IL instruction.	Establishing data governance and secure storage solutions.	Potential funding constraints hindering investments.
Continual data quality checks safeguard accuracy and reliability.	Varying levels of understanding among staff about AI impacts.	Collaborative processes for evaluating AI tools.	Lack of comprehensive governance framework for AI use.
Cross-functional involvement of key stakeholders suggests collaboration.	Data stored on personal laptops raises security concerns.	Free webinars to enhance knowledge of AI concepts.	
Comprehensive documentation maintains integrity and traceability.	Lack of cohesive understanding for AI integration.		
Reference data includes a wide array of learning resources.	No financial plan for infrastructure upgrades or licenses.		
Research studies and best practices relevant to AI integration.			
BUSEL has a culture that allows technology integration.			

Figure 5. SWOT analysis of BUSEL.

Egyptian educators. BUSEL lacks the infrastructure to handle IL data. Additionally, BUSEL lacks the organisational commitment to support AI integration. IL educators are unaware of the requirements for AI and continue to use outdated information for IL instruction. Finally, no strategy or framework exists to ensure AI integration runs smoothly and ethically. Extensive training is required before BUSEL can incorporate AI into instruction. BUSEL should conduct a thorough review of the computing infrastructure, software, and data management capabilities to identify gaps and develop a roadmap for upgrading the necessary technology to support AI integration. USEL must provide structured training and professional development programs to build the knowledge and skills of instructors in utilising AI-powered tools and applications effectively in their teaching practices. This will also help in fostering a culture of continuous learning and innovation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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