Digital Readiness Assessment in Higher Education: A Systematic Review of Key Components

تقييم الجاهزية الرقمية في التعليم العالي: مراجعة منهجية للمكونات الرئيسية

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Abstract:

Digital readiness is one of the most critical aspects for the successful implementation of modern higher education programs. The main purpose of this study is to discuss the theoretical studies and research prior to researching the factors that enable measuring or evaluating the digital readiness of institutions of higher education and scientific research. As a research method in this study, a systematic review was used by reviewing articles related to the subject of the study. This study found that digital education and the electronic library are among the most important determinants of "digital readiness in institutions of higher education and scientific research", while the infrastructure, digital skills, and support of senior management are among the most important factors. The results of this review contribute to enriching the current literature, directing future study, and consolidating and developing digital citizenship competencies in the educational environment as a catalyst for digital literacy.

Keywords: Digital readiness; Institutions of higher education and scientific research; Systematic review.

JEL Classification Codes: I21, I230.

ملخص:

فرض عصر العولمة والتحولات الرقمية منطقًا على المنظمات بجميع أشكالها، وحتى على مؤسسات التعليم العالي التي تواجه الآن حتمية التكيف مع متغيرات ومتطلبات الواقع الجديد بالمرونة والديناميكية المناسبة. يعد الاستعداد الرقمي أحد الجوانب الأكثر أهمية للتنفيذ الناجح لبرامج التعليم العالي الحديثة. الغرض الأساسي من هذه الدراسة هو مناقشة نظرية للدراسات والبحوث السابقة للبحث في العوامل التي تمكن من قياس أو تقييم الجاهزية الرقمية لمؤسسات التعليم العالي والبحث العلمي. كمنهج بحثي في هذه الدراسة، تم استخدام المراجعة المنهجية من خلال مراجعة المقالات المتعلقة بموضوع الدراسة. وجدت الدراسة أن التعليم الرقمي والمكتبة الإلكترونية من أهم محددات "الجاهزية الرقمية في مؤسسات التعليم العالي والبحث العلمي"، بينما تعد البنية التحتية والمهارات الرقمية ودعم الإدارة العليا من أهم العوامل. تساهم نتائج هذه المراجعة في إثراء الأدبيات الحالية وتوجيه الدراسة المستقبلية وترسيخ كفاءات المواطنة الرقمية وتطويرها في البيئة التعليمية كمحفز لمحو الأمية الرقمية.

كلمات مفتاحية: الاستعداد الرقمي.، مؤسسات التعليم العالي والبحث العلمي.، مراجعة منهجية.

تصنيفات JEL: I21، I230.

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INTRODUCTION:

Developed and developing countries alike seek to develop education, especially higher education, as it is a knowledge producer and an essential source of competencies and skills that will face scientific, technological, political, economic, and social challenges and variables. On the one hand, on the other hand, universities are at the top of the educational hierarchy. It makes it the most affected and needed by the requirements of technological and digital development imposed by the Fourth Industrial Revolution, such as artificial intelligence and the Internet of Things, cloud computing, and big data, which have changed the course of higher education in general towards the smart digital model, and the methods and methods of education and the structure of universities in particular; This is done through the use of digital technology and its administrative, educational and research applications, to secure a place for it among smart educational institutions and systems, and to keep pace with the challenges of information technology and invest it optimally to build a society commensurate with the knowledge society in the digital age as well as meeting its requirements and components, from physical and technical infrastructure, and intelligent human cadres, And smart learning and research environments, with clear plans and strategies. Algerian institutions face problems related to adapting to the rapid technological developments, which now pose challenges to developing the technological infrastructure, developing the technological skills of individuals, enhancing their abilities to use daily technology, and enhancing the levels of technological innovation to confront the digital divide, which has become the most important cause of technological illiteracy, in addition to the scarcity of financial capabilities. and the economy is required to provide technology requirements and provide a flexible technological environment. The reality indicates that the education system at all levels has been suffering for long periods from the deterioration of its technological readiness and is facing great challenges related to digital transformation, not only in terms of adopting digital tools and technology in the teaching and learning process but also in order to integrate technologies to change and modify existing systems and processes, modes and channels of communication and all activities. Academic and administrative development of a number of digital tools and technologies to meet the changing educational needs of students. Virtual educational platforms have been created around the world with a variety of new simulated learning methods (Alenezi, 2021). However, higher education institutions still have a lot to do to achieve the digital transformation that this era requires.

In order to meet international standards, it is necessary to adhere to these policies and standards, which demonstrate the reputation of higher education institutes that support students with advanced learning mechanisms and knowledge delivery tailored to the curriculum. The digital transformation of universities means the replacement of advanced digital technology in all organizational levels of the university and in all administrative, educational, and research fields, relying in its basic principles on technological applications based on human interaction and thinking, establishing and designing dialogue and integration in interaction between university members and digital devices and technologies within the work environment (Ali, Osama, 2013) Digital readiness is the ability to use information and communication technology to develop the economy and increase well-being, and it includes a

variety of digital competencies and different characteristics, such as using computers to retrieve information, evaluate it, produce it, present it, exchange it, communicate, and participate in networks via the Internet. It also includes the digital skills necessary to find, process, produce, and communicate information, and be fluent in technologies, applications, and communication standards (Kim, and others, 2019). It can also be defined procedurally as the ability of the state to provide everything necessary to employ information technology in the educational process, applying international quality standards for information and communication technology, including the provision of appropriate infrastructure and networks, and the enhancement of digital capabilities and competencies, and the necessary digital skills, in the field of education. It is also called "technological readiness", and it means: "activities related to new media and communication, which are knowledge, skills, positions, and competencies related to technology and the use of digital technologies to achieve educational goals and expectations (Baradaran, and others, 2018). One of the most important reasons for evaluating the digital readiness of university institutions is the reality imposed by the rapid technological changes. Both e-learning and digital libraries have become, at the present time, the necessary elements of the information society and the knowledge economy because of their various advantages and the electronic programs and services they offer, not to mention their basic role. Crucial in education and research, university institutions are required to have an appropriate level of digital readiness to be in tune with educational, research and cultural plans and purposes and to deliver maximum efficiency to their users.

Through the aforementioned, the following research questions can be formulated as follow:

- What is meant by digital readiness in institutions of higher education and scientific research?
- What are the most important determinants commonly used to assess digital readiness in universities?
- What are the dimensions that affect digital readiness in institutions of higher education and scientific research?

In order to provide a summary and neutral interpretation of the results and answer the research questions, the rest of the paper can be organized according to the following steps:

- Explaining the methodology used and how to select studies and articles for this literature review.
- Presenting the results and answering the research questions.
- Presenting conclusions and recommendations to improve and develop digital readiness in higher education

1- Materials and methods:

The methodology employed in our systematic review on digital readiness in higher education constitutes a meticulously structured approach to gather, assess, and synthesize a wide array of relevant research studies and scholarly literature. This methodological framework is designed to systematically explore and analyze key components, trends, and factors influencing digital readiness within the higher education sphere.

Our systematic review begins with a comprehensive and exhaustive search of various academic databases, peer-reviewed journals, conference proceedings, and other reputable

sources. This extensive search strategy ensures that a comprehensive selection of pertinent studies is considered.

Following this initial data retrieval, a rigorous screening process is implemented to identify studies that meet our predefined inclusion and exclusion criteria. This step is crucial in ensuring the relevance and quality of the selected literature.

Once the relevant studies are identified, data extraction procedures are meticulously conducted. Key information and data points from each selected study are systematically recorded. This enables us to categorize and organize the findings in a structured manner, facilitating the subsequent analysis.

The heart of our methodology lies in the systematic synthesis and analysis of the extracted data. We employ various analytical techniques, such as thematic analysis, content analysis, and comparative analysis, to identify recurring themes, patterns, and relationships among the selected studies. This rigorous approach allows us to draw meaningful insights and conclusions about the digital readiness landscape in higher education.

Furthermore, our methodology adheres to established guidelines and best practices for systematic reviews, ensuring transparency, replicability, and rigor in the research process. We also incorporate a critical appraisal of the methodological quality and bias risk assessment of the included studies to enhance the credibility of our findings.

1-1 Data sources:

The current study relied on databases familiar to researchers: Google Scholar, ProQuest, Scopus, IEEExplore, Springer, Science Direct, and Emerald These databases were chosen because they contain a relatively high density of information systems, articles, and research papers related to the research topic, which There are likely to be studies related to digital readiness. This study found many scientific resources, so it was necessary to expand on defining terms related to digital readiness as keywords such as digital literacy, digital competence, technological maturity, and information and communication technology (ICT) skills to describe the ability to use digital technology. This study used Advanced Search to filter results based on predefined inclusion criteria. After careful examination of the abstracts of articles published in the journals that were reviewed during the period from 2015 to 2022 to ensure their compatibility with the research topic, which amounted to 132 articles, and based on objective analysis to analyze the content, coding and organizing the categories based on the pre-specified inclusion criteria. This study included major axes: digital readiness, digital infrastructure, digital competencies, and skills, the digital divide, senior management support and educational policies. A preliminary search for studies was conducted based on the PRISMA protocol for a systematic review and meta-analysis approach that was initially developed for physicians and then widely adopted by various fields of research with the purpose of reducing selection and conclusion bias (Liberati and others, 2009).

systematic review has different characteristics compared to a meta-analysis or literature review of studies wherein, the systematic review is guided by pre-formulated questions to identify, select and evaluate relevant research critically and systematically to collect and

analyze data without a statistical approach (Moher, and others, 2009). As a first step, the abstract of each paper that dealt with experimental studies related to the subject of the research and met the criteria that help explore the determinants of measuring digital readiness in institutions of higher education and scientific research and identify the factors influencing them was examined.

1-2 Inclusion and exclusion criteria:

Based on the inclusion criteria, this study went through several stages:

1. Selection of research papers that meet the criteria after examining all articles.
2. Examining the abstracts of the articles to ensure their suitability for the research objectives.
3. An in-depth reading of the elements of each article.
4. Conduct a content analysis.
5. Conclusion of the main results in line with the answer to the research questions.

Table (1): Distribution frequencies of articles

Characteristic	Numbers of articles
Database	
Google Scholar	34
Scopus	12
Proquest	02
Science Direct	01
IEEExplore	05
Springer	12
Emerald	08
Type	
Journal article	51
Conference paper	23
Methods	
Survey	10
Interview	03
Questionnaire	61
Year of publication	
2015	05
2016	06
2017	03
2018	06
2019	11
2020	14
2021	17
2022	12
2023	00
Language	
English	74

Source: Prepared by the researchers

In this study, as in other similar studies, some high-quality criteria were identified, as a result of which relevant studies and appropriate research are selected to answer the following research question:

What are the articles and studies through which the main dimensions and determinants of digital readiness and the factors influencing them can be identified?

This study used restrictions after verifying the inclusion and exclusion criteria with the help of a group of experts and professionals in information and communication technology, statistics, and linguistics. They evaluated each item for more clarity and relevance, and suggested modifications, which are as follows:

- Research work is related to digital readiness in higher education institutions.
- Research that is commensurate with the research objectives, research design, research tool, and research sample.
- Research papers published in English, because the concept of digital readiness is one of the modern topics at the Arab level.
- Research published between 2015 and 2022. The selection of the date range was based on the results of empirical research on digital readiness that began to be conducted on a large scale to the researchers' knowledge after 2015.
- Research focused on the use of technology in institutions of higher education and scientific research.
- The latest science on digital readiness.

Articles that fit well with the established criteria were grouped in Table 1

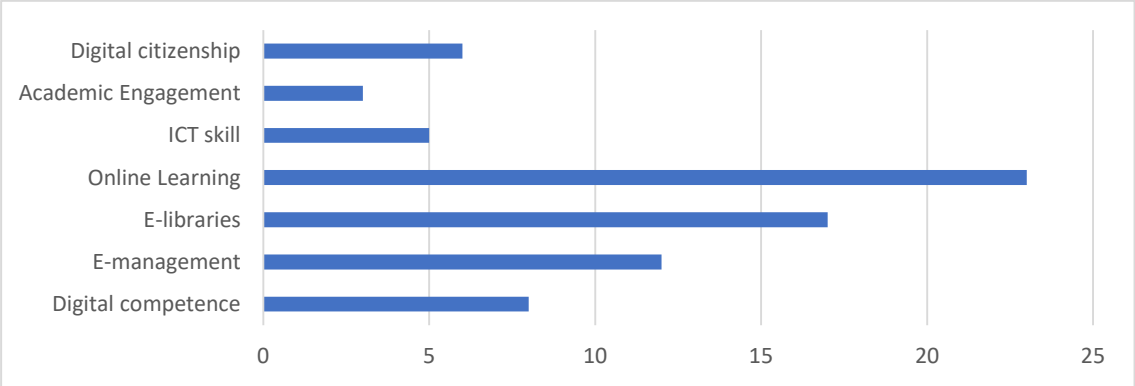
1-3 Quality criteria:

To decide whether papers meet a set of characteristics or quality criteria and that meet all of the inclusion criteria and do not match any of the exclusion criteria will be fully reviewed. Quality criteria focused on describing the concept of digital readiness, research objectives, research design, research tool, research sample, answers to research questions, research conclusions, research limitations, and recommendations for future development of digital readiness in the context of higher education and future research directions. It has been validated by a panel of experts and university professionals who have evaluated each item for clarity and suitability and suggested modifications.

2- Results and discussion:

2-1 Distribution of primary articles according to readiness determinants

Fig (1): Distribution of primary articles according to readiness determinants.



Source: Prepared by researchers based on Excel outputs

Figure n°1 presents the frequency distribution of primary articles according to readiness determinants, with references. The data highlights the number of articles falling under seven different readiness determinants or concepts, namely Digital competence, E-management, E-libraries, E-learning, ICT skill, Academic Engagement, and Digital Citizenship.

- E-learning has the highest number of articles, with 23 falling under this category. This finding is consistent with the growing trend in online learning and the increased use of digital technologies in education and training programs.
- E-management and E-libraries follow next, with 12 and 17 articles respectively. E-management is an important concept in the business and organizational context, and studies have explored its impact on organizational performance. E-libraries have also been the subject of many studies, particularly in the field of library science, and research has explored their impact on information access and use.
-Digital competence, with 8 articles, comes fourth in the list. This finding is not surprising given the growing importance of digital technologies in all aspects of life. Many studies have explored the concept of digital competence and its impact on various outcomes, including employability and digital citizenship.
- ICT skill has only 5 articles, suggesting a relative lack of attention to this concept in the literature. However, ICT skill is an important concept in today's digital world, particularly in terms of the digital divide and access to digital technologies.
- Academic Engagement and Digital citizenship have the lowest number of articles, with only 3 and 6 respectively. These findings suggest a need for more research in these areas, particularly given the growing importance of digital technologies in education and the need for responsible and ethical use of digital technologies.

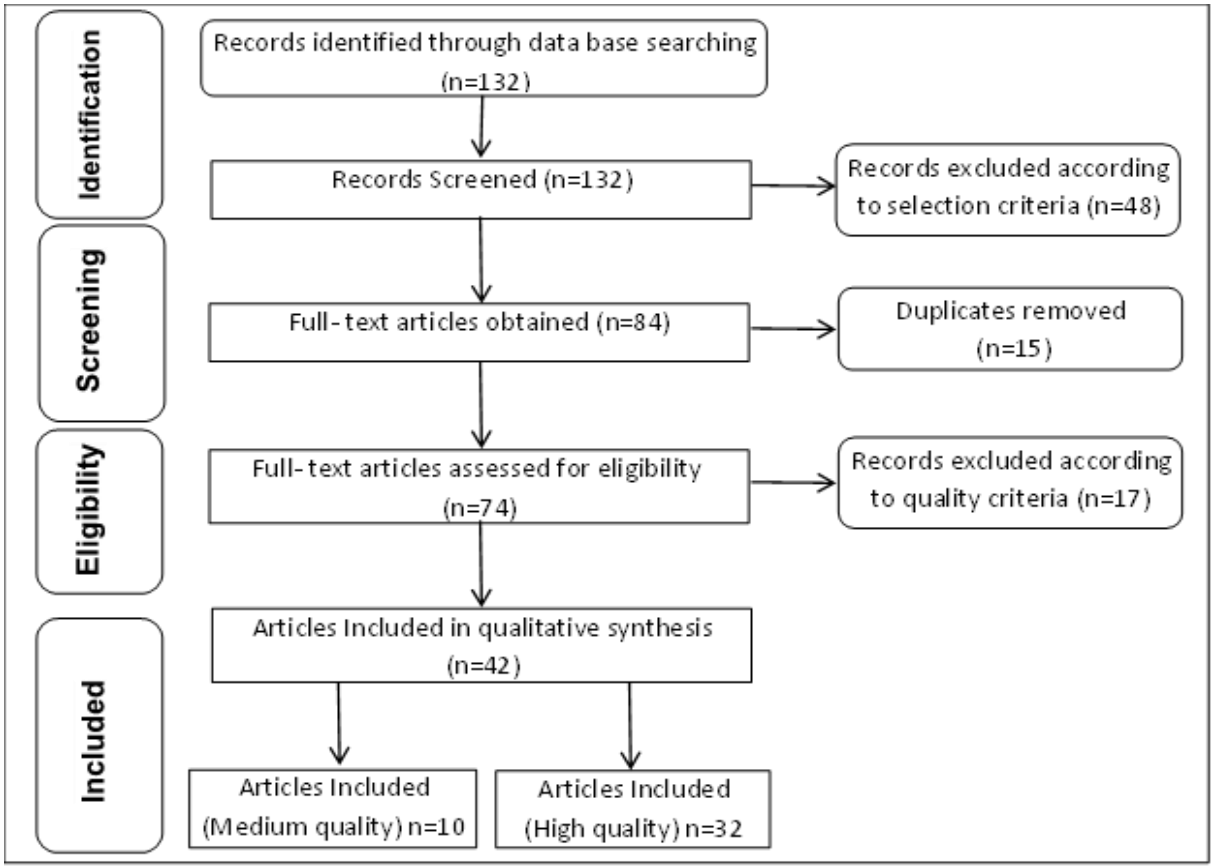
In conclusion, the data highlights the importance of e-learning, e-management, and e-libraries, and the growing importance of digital competence and ICT skill. The data also suggests a need for more research in the areas of academic engagement and digital citizenship.

2-2 PRISMA Flowchart:

Through an in-depth review of journals and conference papers in the field of information and communication technology, and after reviewing the title and abstract of 132 articles

published in different databases, it was found that 48 articles don't fit the inclusion criteria, 10 articles are duplicates and 17 do not meet the set quality standards, as a preliminary result A total of 57 articles were selected for the purpose of a full content examination. As a final result, and after dispensing with 15 articles that dealt with the same topic with the same dimensions and determinants, 42 articles suitable for the subject of the study and inclusion criteria were retained. Using content analysis, all articles were evaluated by researchers and classified into two groups, (10) medium-quality and (32) high-quality articles were relied on, and figure (02) illustrates that.

Fig (2): Prisma flow: Data extraction procedure



Source: Prepared by researchers

3- Related works:

3-1 Digital readiness determinants

3-1-1 E-learning

The current generation of learners has been referred to as "digital natives" as a reflection of their demonstrated skills and knowledge of digital technology. Their readiness for university e-learning environments. The results indicate that students are not well prepared unless they are reasonably prepared to deal with e-learning technology, for reading and writing activities, synthesizing ideas, planning strategies, and working with others. (Kvon and others, 2019) applied Theoretical and experimental methods such as observation, and

statistical methods for data analysis to detect problems facing the development of the readiness of the information and digital environment of the university and analyze them by surveying the opinions of university professors about enhancing the efficiency of education and applying new educational concepts and methods through the use of innovative information technologies. The research revealed that the factors that hinder the development of the information environment and the digital readiness of the university is the awareness of the university administration and faculty members of the importance of raising the quality of educational services in line with the modern requirements of society and enhancing the competencies of both students and professors participating in the educational process. In the same context, (Dereso and others, 2022) wanted to investigate the impact of COVID-19 on the policies and strategies of senior management of higher education and its impact on teacher readiness for digital learning and the academic performance of students in public universities in Ethiopia. A simple random sample of 384 faculty members across Ethiopia was included. The results revealed that the hypothesized model is well suited and that the most influential path is the impact of higher education management policy and strategies on digital learning, followed by the impact of COVID-19 on higher education policy, academic performance, and teacher readiness, respectively. The study also noted the partial effect of teacher readiness on students' academic performance. A number of students and teachers totaling 318 respondents from different states in India expressed their readiness for online learning as a better option for learning during the COVID-19 pandemic (Sahoo, 2020) which forced lecturers in South African universities to reimagine their educational activities. They have to embark on remote teaching to save the 2020 academic year. This has created an opportunity to leverage creative and digital skills to enhance the digital learning experience through the innovative use of digital tools and resources. The outcome of the process not only improved their understanding of the teaching method, but also enhanced their digital competencies and enabled them to create resources that they can use in their professional lives (Marais, 2021), which is confirmed by the research findings presented in a paper (Mitrofanova and others, 2021) regarding the importance of Indicators of the level of digital skills of university professors and their mastery of information and communication technologies, as well as the degree of availability of digital infrastructure and equipment for the use of educational software products and online education services, the degree of development of training technologies necessary to develop the digital educational environment and raise the competence of Russian higher education institutions in the context of the digital economy and the development of the necessary methodological tools To improve the readiness of the higher education system in general and the skills of teachers in particular to deal with digital technologies (Reister ,Rook, 2021). Through a survey to measure teachers' readiness to shift to online education and their perceptions as well as their experience with online teaching during the COVID-19 pandemic, he emphasized the importance of management and faculty formulating virtual teaching strategies, providing the necessary tools and equipment as well as providing them with the opportunity to take effective courses. Focused on teaching in virtual contexts to enable them to successfully transition to online education which has become an imperative way forward to improve self-learning and lifelong learning. Determine the readiness status of online teaching and learning policy in Kenyan universities; Exploring the readiness of the universities' infrastructure and knowing the level of competence of lecturers and students and their

willingness to adopt online teaching and learning facilities are three specific objectives of the study (Agava and others, 2021), whose data was collected using an online questionnaire that included 112 lecturers and 372 students, representing 34 universities. The results indicated that almost all the institutions represented have a policy for teaching and learning via the Internet and at a good level in terms of infrastructure readiness, while the level of competence in using online learning and teaching platforms is much lower than the average. In Bangladesh, some universities have turned to distance teaching and learning via the Internet due to the transitional phase the higher education system is going through and a sudden shift to deal with the COVID-19 crisis. Teachers and students from public and private universities participated in the study to learn their views regarding readiness to fully participate in technology-enhanced teaching and learning and that it is necessary to change the education system and adapt emerging technologies to meet the challenges of education in future emergencies and address the digital divide and issues of social justice in policy and practice (Shohel and others, 2021). (Alhassan, 2020) conducted a study several months before the onset of COVID-19 to investigate the readiness, acceptability, and feasibility of e-learning among 233 female nursing and midwifery students at a Ghanaian public university. The results showed that nearly 100% of the respondents had smartphones that are mostly used for learning purposes and sharing academic information. However, healthy trainees were restricted due to low bandwidth and lack of smooth internet connectivity in their learning environments, which negatively affected e-learning opportunities. And in Ukraine (Stukalo, 2021) discussed the digital readiness of universities, their staff and students through teaching and learning in pandemic conditions. The data obtained through interviews and questionnaires showed that Ukrainian universities responded to the challenges and quickly organized the distance teaching process in emergency situations, due to the development and application of electronic management and e-learning technologies. In the same way, (Alqudah and others, 2021) wanted to ascertain the attitudes of 579 university students from five Jordanian public universities towards online learning, measure their willingness to adopt it, and investigate their perceptions about the challenges they faced during the learning process. The preliminary results of the study indicated that the majority of students (82.2%) prefer face-to-face education over online learning environments, and that unreliable or non-existent Internet connection, lack of motivation, and an unsatisfactory home environment for learning are among the most influential barriers to online learning. And in an attempt to discover the challenges facing the prospects for implementing online higher education in Bengali universities. A study (Chowdhury, Behak, 2022) found that the perception of teachers, parents, and students about online education is negative. This is due to influencing factors such as digitization, digital literacy, widespread use of mobile phones and the Internet, and that the digital divide in the country is among the problems that impede the implementation of online education and the provision of mixed courses and programs in higher education in Bangladesh. In a study conducted by (Pete, Soko, 2020) he sought to assess the readiness of the teacher and the learner to learn via the Internet and to explore the devices that lecturers and learners use in teaching and learning, their level of digital proficiency and the level of satisfaction with the cost and speed of Internet connection using the questionnaire that

included three sub-Saharan countries The largest: Kenya, Ghana and South Africa. Participated in the research 855 lecturers and learners from Ghana, 842 from Kenya and 644 from South Africa, the results showed that the readiness of the studied universities is not at the required level and that the respondents in general in the three countries use mostly laptops and smart phones compared to desktop computers, in addition to that they enjoy Lecturers and learners with intermediate digital proficiency which means they are able to use a range of applications effectively.

3-1-2 Digital Library

In the current highly competitive situation and the networked information environment, university institutions can be classified as electronically ready if their libraries have the necessary electronic requirements and infrastructures (Noorafrooz, Keshavarz, 2021). Reviewing and analyzing the importance of the digital library system and exploring its role in academic institutions was The main objective of the study (Chanda, 2021), which sought to explore the most important challenges of using digital libraries that managers may face and the most important advantages that can be obtained and proved that the digital library at present is an integral part of the digital readiness of the academic institution and without the existence of a system for it, it is not possible To operate smoothly as it provides authentic information to users. And through a study conducted by (Ahmad, Rafiq, 2022) assessed the digital readiness of 63 public universities and institutions through the readiness of their libraries for digital preservation programs in terms of the availability of financial, technological, and human resources, policies, and procedures. It was generally noted that the availability of funds for the acquisition of technological infrastructure is the only area in which libraries enjoy a good level of preparedness, while the level of preparedness is weak in terms of training opportunities, human skills, policies, and procedures related to digital preservation, and thus a negative level of readiness for digital preservation in these areas. Libraries and their theoretical effects on researchers and practical effects on the administrative bodies of higher education, and directors of universities and libraries. In Nigeria, a paper (Asogwa and others, 2021) assessed the readiness of federal universities to manage their electronic records through the extent to which university libraries provide information and communication technology infrastructure, develop institutional plans, and enact policies and strategies. that guide electronic records management, using a control checklist, oral interviews and questionnaire as a data collection tool from a community of 84 librarians from 18 federal university libraries in Nigeria. The study found that ICT facilities were available in all libraries, but the readiness status for their use in managing electronic records was low. Inadequate funding, intermittent electricity supply, and absence of an electronic records management policy were some of the major factors that impeded the readiness for electronic records management and thus impacted the digital readiness of Nigerian universities. The same is the case for (Oketch, Wamae, 2022), whose study, in which 68 library staff participated, sought to assess emergency preparedness and planning for digital libraries at the University of Egerton. The study proved that the level of disaster preparedness and planning for the digital library was low, as not all library staff received adequate training, in addition to

the lack of support and the university administration's lack of sufficient funds to purchase appropriate equipment for that.

3-2 Variables Affecting Digital Readiness

Table (02) represents the distribution of articles according to variables affecting readiness. The main concept behind this table is to identify the factors that affect the readiness of individuals or organizations to adopt digital technologies. The table lists seven variables that have been identified as important factors affecting readiness, along with the number of articles that have been published on each variable.

The first variable listed in the table is the "Digital gap," which refers to the differences in access to digital technologies and resources among individuals or groups. This variable has five articles associated with it, indicating that there is a significant amount of research being conducted on how the digital divide affects readiness.

The second variable listed is "Digital literacy," which refers to the knowledge and skills required to effectively use digital technologies. This variable has six articles associated with it, suggesting that there is a lot of interest in understanding how digital literacy affects readiness.

The third variable listed is "Digital competence," which refers to the ability to use digital technologies to achieve specific goals. This variable has 12 articles associated with it, indicating that there is a substantial body of research on the role of digital competence in readiness.

The fourth variable listed is "Infrastructure," which refers to the physical and technical resources required to support the use of digital technologies. This variable has nine articles associated with it, suggesting that there is significant interest in the role of infrastructure in readiness.

The fifth variable listed is "Management support," which refers to the support and resources provided by management to facilitate the adoption of digital technologies. This variable has six articles associated with it, indicating that there is interest in understanding the role of management support in readiness.

The sixth variable listed is "Socio-emotional," which refers to the psychological and emotional factors that affect the readiness to adopt digital technologies. This variable has two articles associated with it, suggesting that there is relatively little research on this topic compared to the other variables.

The seventh and final variable listed is "Attitude," which refers to the beliefs, values, and perceptions that individuals hold about digital technologies. This variable has two articles associated with it, suggesting that there is also relatively little research on this topic compared to the other variables.

Overall, this table provides a useful overview of the variables that are believed to affect readiness, and the number of articles associated with each variable provides a sense of the amount of research being conducted on each topic.

Table (2): Distribution of articles according to variables affecting readiness

Main concept	Numbers of articles
Digital gap	5
Digital literacy	6
Digital competence	12
Infrastructure	9
Management support	6
Socio_emotional	2
Attitude	2

Source: Prepared by researchers

ICT skills are becoming increasingly important in every context, so preparing digitally competent executives who are able to deal with problems and seek solutions to them has become one of the main goals of universities. Various policies, initiatives, and strategies dealing with innovations have been proposed to improve the readiness of higher education technology in Germany and the University of Oldenburg is an example. The results of examining the perceptions of 200 students and 381 teachers about the skills of using digital tools revealed that both teachers and students use digital technology in order to support the broader use of educational technology for teaching and learning purposes and to implement the strategies of higher education institutions (Oketch, Wamae, 2022). Based on the theory of technology diffusion to explain the relationship between variables, the purpose of the study (Nyaga, 2018) that targeted 596 respondents was to investigate the readiness to implement a digital literacy program in the northern sub-county of Ementi in Kenya. Its results concluded that the readiness to implement the digital literacy program was affected by Significantly increased teacher competency followed by infrastructure readiness and then teacher awareness while the impact of digital literacy content was less on digital literacy program implementation. The adoption and development of e-learning systems in Thailand require continuous support from the executive levels of the university. Many researchers have highlighted the essential role of infrastructure, such as reliable internet connectivity and appropriate ICT, often listing them as the most influential constraints to the adoption of digital technologies (Schuwer, Janssen, 2018). Connectivity to the broadband network is important, especially in terms of cost and this is proven by the study (Saekow, Samson, 2021), strong financial support from the government, the establishment of a project plan as a clear and well-defined strategy is a key success factor, and organizations must provide Educational technology support to help faculty members so they can focus on teaching rather than technology. The low level of satisfaction with the Internet connection, cost, and reliability are factors that negatively affected the promotion of online learning, and it is necessary to have an appropriate digital infrastructure and shift the focus from central investment in information and communication technology on campus to outside it by supporting Internet packages and reducing tax fees to provide reliable and affordable Internet connection The cost for off-campus learners and teachers (Pete, Soko, 2020). While the majority of USP junior students (88%) own at least one ICT device and have access to the Internet, most students have sufficient ICT skills and a positive attitude towards e-learning that contributed to her relatively successful transition from learning face-to-face to online learning as a result of the COVID-19 pandemic (Johnson, Reddy, Chand, Naiker, 2021). A study (Kiahun, 2019) in which a total of 168 respondents participated from heads of academic programs and lecturers

at the University of Liberia revealed that guidance, administrative support, internal affirmative action policy, promotion criteria, academic qualifications, experience, hard work, and diligence were major factors affecting the delivery of lectures electronically. The COVID-19 crisis has revealed the need for teachers to have digital skills in order to teach effectively online and to apply digital technologies in all educational activities. More than 800 teachers participated in a survey on the use of digital technologies in teaching, and their responses revealed that in order to find, evaluate and develop educational resources for teaching in addition to assessing students, long-term planning for the development of the digital school and digital education, in general, must also be considered (Perifanou, Economides, 2021). A number of students and teachers from different states in India express readiness for digital devices (99%) and financial support (80%), even though they lack a good internet connection, adequate electricity supply, and lack of personal space at home although only 35% of Students have digital skills. To make online learning easier and more effective, it is necessary to support the administration, government, parents, institutions, and teachers (Sahoo, 2020). Leadership and strategy are among the most important challenges associated with the application of technologies in relation to digital teaching in higher education institutions by establishing a common vision for the adoption of educational technologies, and in a broader sense, the acceptance of digital change (Porter, Graham, 2016). Moreover, the organization needs to address the lack of skills and resources (Johnson, Devitt, & Kiersey, 2019) to counter the current deficiencies in terms of digital skills and competencies and the need for institutional strategies and policies that impede the provision of support through the provision of skills, competencies, and trainers in addition to flexible structures To meet their needs, let alone guide, support and appreciate their efforts (Bälter, 2017) to meet their needs and enhance their digital literacy, customize platforms and deliver open online courses (Vigentini and others, 2020). (Viberg and others, 2019) emphasized developing trainers rather than training them as designers of technology-enhanced learning rather than participants. In this regard, the availability of infrastructure, institutional support, technical resources, financing, and training, in addition to digital literacy, contributes significantly to the flourishing of the use of digital technologies and improves digital readiness in higher education institutions (Deacon and others, 2022). Further analysis showed that indicator skills, software, information services, and investment have greater weight and impact, and path analysis showed that human resources, electronic infrastructure, and network software and services have a direct impact on digital readiness, respectively, in one of the largest universities in Iran (Noorafrooz, Keshavarz, 2021).

Conclusion:

This systematic review of the literature has highlighted the challenges of improving digital readiness in universities. Based on the results, this study determined that digital readiness consists of several determinants, including digital management, e-learning, and digital library. Moreover, these determinants are affected by a group of factors and variables that affect them in higher education institutions, such as infrastructure, digital skills, and management support.

In this review, a total of 42 publications were analyzed. The overall finding is that the reviewed publications defined digital readiness in a general way through relevant research while it could be found from various other perspectives. We explored dimensions and determinants commonly used to assess the digital readiness of teachers and students in universities. We examined the purposes of the studies first, then realized that the authors in the selected publications preferred to investigate students and teachers because they make up the majority of the higher education community. Since the outbreak of the Covid-19 epidemic and the emergence of new models of educational learning processes, it has led to the necessity and inevitability of acquiring and developing digital competencies and skills and more administrative and financial support to improve the infrastructure of universities and provide the necessary digital environment for teaching, learning and scientific research. It is also clear that the exploration and investigation of digital readiness is still in its initial stage, with only 12% of publications exploring the factors that can influence digital readiness and 88% defining the dimensions of their assessment. According to the results obtained, more attention should be given to appropriate pedagogical curricula implied by digital competencies and skills which are key for universities to adapt to the current educational model and social environment. In terms of research methods, the quantitative research methodology was applied using questionnaires as a research tool in all selected publications. These studies provided us with a more accurate observation of digital readiness at higher levels such as education and scientific research, libraries, and even from the administrative side. With these validated tools, the digital readiness of universities and the digital competence of university teachers and students can be measured from different dimensions in time. The results of this review are useful in enriching the current literature and discovering gaps in the previous literature to guide future studies and gain a comprehensive understanding of the definition and application of digital competence in higher education and the embedding and development of digital citizenship competencies in the educational environment as a catalyst for digital literacy.

Limitations:

Data collection methods and sample size are the most common limitations and therefore it is preferable that future studies avoid using a single research method and consider the sample size of participants. This study focused on the literature published in the past seven years, while it was found through this study that the subject of digital readiness had developed before that period and its grown continuously, and therefore some studies that could be influential were excluded. The standards established cannot cover all areas and may limit this systematic review.

Identifying Research Gaps and Future Research:

Through this systematic review, research gaps were identified and many research opportunities were provided in the field of digital readiness in the context of higher education. Most of the selected articles examined the importance of the level of proficiency, digital skills, and infrastructure in applying the e-learning and digital library systems, thus improving the digital readiness of universities. Moreover, other sub-areas of digital readiness such as

citizenship and digital governance cannot be ignored and warrant further investigation. On the other hand, according to the results of this systematic literature review, the majority of the articles used a single research method while integrating the quantitative data approach, along with the qualitative data approach, may provide more comprehensive results on digital readiness in higher education.

Although undergraduates make up the largest proportion of the higher education sample, it would be wise to conduct more studies related to the digital readiness of graduate students, and administrative staff because sample size can affect the quality of results.

Laboratory:

Laboratory of Evaluating and Prospective Economic Policies and Institutional Strategies **(LEPPESE)**

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