The Extent to Which the Digital Skills Needed to Learn Artificial Intelligence are Included in the Science Curriculum (Cambridge) in the First Cycle Classes in Basic Education Schools in the Sultanate of Oman

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Abstract

The current study aimed to identify the extent to which the current science curricula used in the Sultanate of Oman include the digital skills necessary to learn artificial intelligence in light of the current developments that have occurred in all fields, and the importance of the topic lies in working to provide students with the necessary digital skills through the curricula and the importance of developing curricula continuously to develop student's skills and abilities to deal with artificial intelligence techniques and the Fourth Industrial Revolution, and the study was to answer two main questions about the extent to which the curriculum includes digital skills By surveying supervisors and teachers, and by analyzing the curriculum document. The study followed the descriptive analytical approach, through a survey of the sample of (223), and the analysis of the curriculum document for the fourth grade, and found that there was a low inclusion of these skills in the curriculum according to the opinion of the sample, where all skills fell within the low level, and the results of the analysis indicated that the curriculum also includes digital skills in a low way, and recommended the importance of developing the curriculum to include digital skills that qualify students to learn the artificial intelligence techniques necessary in the era of the Fourth Industrial Revolution.

 Keywords: Digital skills, Artificial Intelligence, Cambridge Curriculum.

Introduction

Due to the tremendous development in the field of artificial intelligence in recent years, which has gradually made its way to various sectors, including education, and educational curricula are one of the most important components in the educational process, as they determine what is taught to students and how it is taught. With the development of artificial intelligence technologies, there is a close relationship between curricula and artificial intelligence, as artificial intelligence can be used to improve educational curricula in ways Numerous. AI is a powerful technology that can provide many benefits to learning, including personalized learning that can be achieved by using AI to adapt education to each student's needs. This can lead to better learning outcomes, as students can focus on the areas they need most. In addition to active learning, through which artificial intelligence can be used to create interactive and stimulating learning environments. This can help students learn more effectively and enable them to participate directly in the learning process. As well as open learning where artificial intelligence can be used to make education easier and accessible to all. This can help break down geographic and economic barriers that may prevent some students from accessing education (AI for Education, 2022). The main purpose of the study was to identify the readiness of the current curricula to prepare students to use artificial intelligence by identifying the extent to which they include the digital skills required by artificial intelligence techniques.

Learning digital skills is the cornerstone and basic base on which the field of artificial intelligence is built, and the inclusion of digital skills in curricula is very important to provide students with the skills necessary to learn artificial intelligence techniques, and digital skills are focused on skills that include employing technology in life, skills to obtain information accurately and quickly, research skills in digital sources, digital problem-solving skills by employing the applications of the Fourth Industrial Revolution in general, and artificial intelligence in a way Special.

In the study of Ehlers & Kellerman, 2019), which included more than (50) international experts in education, it presented a model of future skills, which represent the skills required by artificial intelligence techniques in light of three dimensions, which we summarize as follows:

1. **Self-dimension**: It includes skills related to the abilities of individuals to take responsibility and face challenges in the future and includes skills (agility, self-reliance, self-initiative, motivation towards achievement, self-flexibility, personal skills, self-management, and ability to think and reflect).

2. **Objective dimension**: It includes skills related to a specific topic such as (digital culture skills, creativity skills, and mental flexibility skills).

3. **The global dimension**: It includes skills related to public order such as (future mind skills, cooperation skills, communication and communication skills, skills of the ability to build meaning).

While the Global Forum on the Fourth Industrial Revolution (Economic Forum Report, 2016) identified the skills of the Fourth Industrial Revolution and artificial intelligence in three axes:

1. **Personal skills** such as (perseverance, leadership, curiosity, initiative, adaptability, social and cultural awareness).

2. **Basic skills** such as (scientific skills, technology skills, cultural skills, arithmetic skills).

3. **Competency** skills such as (critical thinking skills, creativity, problem solving, communication).

We note from the above that digital skills are part of the skills required by artificial intelligence, as for the importance of including them in the curriculum, several studies have confirmed this, including: (González & Ramirez, 2022) The importance of developing future skills based on identifying the components of education in light of artificial intelligence techniques and the skills used in the twenty-first century, by analyzing a number of studies in the same context in a number of countries, and the elements of the analysis were organized in six Categories were: technology, organization, digital competence, soft skills, difficult skills, teaching methods, and the study concluded after analysis in light of these elements that education in the era of artificial intelligence depends on digital strategies, infrastructure and digital security, And the existence of technological educational practices that support learning, and pointed out in its results that Singapore, in its readiness for the requirements of artificial intelligence, is the most appropriate model compared to the rest of the world, where the educational system is famous for preparing students for how to learn instead of what they learn, and the study recommended the importance of the design and evaluation of education and curricula based on standards of technologies and models that improve the quality of education without borders, supported by new teaching and learning methods based on technology. She recommended the importance of defining the framework of students' competencies, standardizing the skills they must learn, and integrating technologies that achieve meaningful education, to meet the requirements of the artificial age society.

Hashem's (2021) study, which emphasized the importance of acquiring students and providing them with the knowledge and skills that qualify them for future jobs in the digital age by including them in the curriculum, and stressed the importance of aligning education outcomes with the needs of the labor market. And Sisi's study (2020), which confirmed that digital skills are the most required skills of the industrial age, according to experts, and that are acquired to students by including them in the curriculum. As for Moses's study (2021), which aimed to identify the challenges facing teachers in providing students with future skills through curricula and other elements of the education system, the study used the survey method, and the questionnaire tool that was applied to a sample of (500) teachers who were selected by a simple random sample method, and the results of the study resulted in that teachers face great challenges in providing students with future skills and recommended the need to conduct a curriculum development process periodically in order to develop its content and overcome any aspects Deficiencies may include it.

Yusuf's study (2020), which aimed to restructure educational institutions in the light of artificial intelligence skills, which followed a systematic review of educational institutions and their elements and followed the descriptive analytical approach, and concluded that educational institutions have contributed significantly to reshaping future skills and technologies in terms of allowing the testing of innovations, but he stressed the great need to consider the curricula that he described as traditional, and recommended the strategic use of common skills and techniques to prepare and provide students and provide teachers with knowledge as well He stressed several points to restructure educational institutions in light of artificial intelligence skills to meet the challenges that students may face in the future, the most important of which are: technological methods such as working on the education system with artificial intelligence, providing students with the necessary skills by directing them towards learning, self-evaluation, working through group communication, and taking education outside the boundaries of the classroom.

As for Al-Shahrani (2020), he studied the extent to which artificial age skills are included in the science curricula at the intermediate stage, and followed the descriptive approach, where the study evaluated six units of the curriculum for the two semesters, after preparing an analysis list according to skills called the twenty-first century skills. The study found a number of results, the most important of which were: the availability of learning and creativity skills to a weak degree, while the skills of digital culture are not available, and life and profession skills are poorly available. These three skills and what falls under them are among the most important skills of the Fourth Industrial Revolution. The study recommended the need to develop science curricula according to these skills. According to Muller, 2019, the goal of education and curricula should evolve to prepare outcomes not only according to future needs, but to carry out functional tasks according to what they will be in the future, and curricula must provide support for learners to develop those skills to do anything in the future rather than do something specific that ignores itself.

Embedding AI skills in the curriculum

Many curriculum specialists, educators and innovation specialists pointed to the importance of including artificial intelligence skills in the curricula, especially the curricula of the basic stages of education, in order to enhance students' innovative and creative thinking skills and to develop their technical skills, and stressed the need to provide students with the opportunity to learn, practice and highlight them. Al-Husseini (2023) pointed out that the need has become urgent and great to introduce students to the skills necessary for artificial intelligence and other enablers of the Fourth Industrial Revolution, so that work is done to develop innovation skills in their various behavioral, functional and technical axes, starting from the basic school stages, and this is not done until there are goals in the curriculum that call for this, in addition to providing a supportive environment that facilitates communication between students and experts in artificial intelligence skills and creating an environment that supports innovation in the curriculum and encourages students to present their ideas. And highlight their abilities and skills.

Al-Kharusi (2019) stressed that curricula in light of the Fourth Industrial Revolution and its applications represented in artificial intelligence and other applications must contain an assessment that supports mastery of learning, scientific research skills, and higher thinking skills. Some topics and lesson systems, such as Carnegie Learning, can help teachers break free from a one-size-fits-all curriculum, as the issue of having a book can be linked to an educational platform to provide teachers and learners with quick information and knowledge about different educational situations, including student levels, development priorities, and strengths. Ibrahim (2022) also stressed that there is a significant deficiency in including physics curricula in including artificial intelligence in any of its forms, as Ibrahim analyzed the physics curriculum in the light of artificial intelligence, and recommended the need to provide a vision for including artificial harm in the curriculum. The Fahimirad & Kotamijani (2018) study, which aimed to predict the role of artificial intelligence in the future of education, confirmed the trend towards including artificial intelligence in education, is large.

Study problem

The curriculum is one of the most important basic elements of education, and it must keep pace with the rapid developments of life, and because the Fourth Industrial Revolution, including artificial intelligence, is one of these developments that have brought about rapid changes in many fields, of which education is one if not the most important. The Fourth Industrial Revolution made education a different world, imposing on it a variety of methods and strategies that had not been known before. The Sultanate's orientation towards developments and changes in educational curricula is a matter followed in the development of education first-hand, and the low level of outputs in the results of the international study (TIMSS) was one of the main reasons that called for the Sultanate to develop and change curricula, as the national report (2015) presented the result of the international study (TIMSS), which showed low levels of students in mental processes, for example: Critical thinking, analysis, and conclusion, where the results were below the desired level in the Sultanate, And within the low level according to the criteria of this study. The average female students in science in the fourth grade was (average = 453) compared to (average = 405) for male students, and the average rate in the eighth grade in science for females was (average = 458) compared to (average = 380) for males, and these rates are very low and fall within the low level according to the criteria of this study (National Report, 2015). The results of the international study (TIMSS) in the next session in (2019) indicated that the level of students is still below the average, as the Sultanate obtained (average = 435) points in science in the fourth grade and an average of (average = 475) points in the same subject in the eighth grade (TIMSS 2019 U.S. Results, 2019), and this was the last results issued to evaluate the international study (TIMSS).

Many studies have revealed the importance of integrating the requirements of the Fourth Industrial Revolution and artificial intelligence in education and curricula, including the Al-Sayaria study (2022), which aimed to identify the extent to which the Sultanate keeps pace with the Fourth Industrial Revolution in various educational sectors, of which education is one of them, on the need to provide students with the necessary skills in the era of the Fourth Industrial Revolution, and the need to strive towards improving the educational environment, and employing the techniques of the Fourth Industrial Revolution and artificial intelligence. Efforts to raise the level of readiness for the requirements of the Fourth Industrial Revolution technologies in line with the pillars of the Sultanate's vision. Elayyan's study (2021), the results of his study, which aimed to reveal the impact of the Fourth Industrial Revolution on education in the Sultanate, indicated the extent of differences in the perceptions of science teachers about the effects of the Fourth Industrial Revolution (IR 4.0) on education.

Where the results of the study revealed that there is a significant impact of the Industrial Revolution and its requirements on education, and stressed that if the Fourth Industrial Revolution and its technologies such as artificial intelligence and its requirements for skills are integrated into education, its impact in the future will be significant and widely in improving learning opportunities and maintaining students' activity throughout the learning period, and the study suggested seeking to implement transformations in technologies, educational programs, school curricula, learning environment and educational skills activities, to deal with the requirements of the Fourth Industrial Revolution And its technologies that are accelerating day by day.

This study comes to look at the developed curricula to the extent to which they include one of the skills of the Fourth Industrial Revolution and artificial intelligence techniques, which are digital skills, and to identify whether there is a need to develop the current curricula according to the techniques of the Fourth Industrial Revolution and artificial intelligence techniques and skills to use it, or they include digital skills sufficiently.

Objectives of the study

From the above, it is clear to us that the main objective of the study is: to identify the extent to which the curricula of the first cycle in science include the digital skills required by artificial intelligence, and from the previous main goal, the objectives of the sub-study are split, namely:

- The extent to which science curricula include in the first cycle of basic education the digital skills required by artificial intelligence from the point of view of supervisors and early teachers in the Sultanate.
- The extent to which the science curriculum document for the fourth grade of basic education includes the digital skills required by artificial intelligence

Study Questions

The main study question is: To what extent does the first cycle curriculum in science include the digital skills required by artificial intelligence? From the previous main question, the two sub-questions of the study split:

- What extent do science curricula include in the first cycle of basic education the digital skills required by artificial intelligence from the point of view of supervisors and early teachers in the Sultanate?
- What extent does the science curriculum document for the fourth grade of basic education include the digital skills required by artificial intelligence?

The importance of the study

The importance of the current study lies in its investigation of the reality of the current curricula used in the Sultanate, in light of the digital skills required by the Fourth Industrial Revolution and artificial intelligence techniques. The importance of the current study can be presented in the following:

- Proposing future studies and research related to curricula and artificial intelligence.
- The study will draw the attention of educators and curriculum developers to the gap between what is offered in the curricula and the skills that must be available to keep pace with the world towards the Fourth Industrial Revolution and its technologies.

Delimitations of the Study

- Objective limits: Science curriculum documents for the fourth grade in the Sultanate.
- Time limits: Application of the study in the academic year 2022/2023.
- Human limits: Specialists in curricula and teaching methods from supervisors and early teachers. Spatial boundaries: Sultanate of Oman.

Study terminology

Digital skills: were defined by Zeidan (2021) as knowledge and expertise based on the use of digital devices and technologies that enable individuals to carry out various tasks of collecting, analyzing and sharing data, creating various processes and other skills, accurately and effectively based on production in the activities of scientific life.

Artificial Intelligence: Salah (2023) defined it as the science that is based on training machines on skills that mimic the skills performed by humans, such as making decisions, implementing procedures, processing data, and providing solutions to various problems.

The Cambridge curriculum is one of the world's most effective and high-quality educational programs, which comes in successive sequences from primary to secondary, and includes integrated assessment tools (Cambridge, 2017). The Sultanate, in cooperation with the Cambridge International Foundation, has translated them and adapted them to suit the Omani environment.

Methodology

The current study followed the descriptive analytical approach, to monitor the extent to which science curricula and the science curriculum document include the digital skills required by the Fourth Industrial Revolution and artificial intelligence techniques, by analyzing the content of the science curriculum document, by collecting data from it, classifying it, comparing it, analyzing it, and extracting results, and also by collecting data and information from specialists in science curricula for the fourth

grade in the Sultanate from supervisors and early teachers on the extent to which science curricula and the science curriculum document include digital skills through Their experience in applying the curriculum.

Study population

The study population includes two different communities, the community of individuals and the community of documents, and includes the following: Community of individuals of educational supervisors and first teachers: All supervisors who supervise the Omani science curricula (Cambridge) are represented in the first cycle classes (primary school grades), which include grades (1-4), and their number is (100) supervisors in the Ministry of Education during the academic year (2021-2022) (Ministry of Education, 2021). According to the statistics of the Ministry of Education, the number of first teachers is (227) teachers, affiliated with the Ministry of Education during the academic year (2022-2021) (Ministry of Education, 2021).

Documents Community

It includes science documents in the first cycle, which represents grades (1-4) for the first and second semesters, and according to the first edition (2017) approved by the Ministry of Education in the Sultanate of Oman, and the number of four documents represented in the range and sequence matrix for each stage of the school stages from the first grade to the ranches, so that the document or matrix includes the first and second semesters.

Study Sample

The Thompson equation was used to calculate the study sample, where this equation is used in the event that the population was limited in number (Dhahyan, 2000) the following table shows the study sample of individuals:

Table (1): Distribution of the study sample of individuals

Number of supervisors	Number of First Teachers	Total
80	143	223

Table (2) includes the details of the study sample of units, lessons and pages for each semester in the curriculum document.

Table (2): Distribution of study units, lessons and pages in the sample documents

Document	First Semester			Second Semester		
Science Curriculum for Fourth Grade	Unit Title	Number of lessons	Number of pages	Unit Title	Number of lessons	Number of pages
	Man and animal	6	6	Sound	9	9
	Organisms and environments	8	16	Electricity and Magnetism	10	20
	Solids, liquids and gaseous substances	6	12			

Study Tool

The study tool was to identify digital skills derived from the skills of the Fourth Industrial Revolution and artificial intelligence, which were built after reviewing the relevant studies and literature, and were adopted after arbitration and reformulation based on the opinions of arbitrators to be used to

achieve the purposes of the study by surveying the opinions of the sample of supervisors and first teachers to identify the extent to which science curricula include digital skills from their point of view, and used to analyze the curriculum document to monitor the extent to which the document includes these skills and the digital skills after judging the questionnaire consisted of (11) skills.

Adopted scale

To judge the responses of the sample, the actual limits of the categories were used as a criterion, which is represented in the following table

Table (3): Significance of the arithmetic averages of the responses of the study sample members

Arithmetic mean categories	Level
From 1 to 1.66	low
from 1.67 to 2.32	medium
From 2.33 to 3	High

Table (4) represents the criterion for judging the inclusion of digital skills in the curriculum.

Table (4): The criterion for judging the degree of availability of digital skills

Percentage of	Availability to
0%	20% Very Low Available
Greater than 20%	40% Low Available
Greater than 40%	60% available medium
Greater than 60%	80% Highly Availability
Greater than 80%	100% Very High Availability

Authenticity of the tool

The apparent validity of the tool was verified by presenting it to a group of educational arbitrators and curriculum specialists, in order to review it, and express their opinion on the accuracy of the wording and the importance of the phrases to the subject of study. The number of arbitrators has reached (7) arbitrators. Their opinions and comments on the wording, and the degree of belonging of the skills to the digital skills belonging to the skills of the industrial revolution and artificial intelligence, were used, and additional constructive observations or comments of the arbitrator were taken, which contributed to the reconstruction of the tool in its final form, and the list included in its initial form of (10) skills and came out with (11) skills in its final form.

Tool stability

The consistency of the list is that the list gives the same results if it is reapplied in the same conditions again. Here, the exploratory sample was used to ensure the stability of the list, and the Cronbach alpha coefficient was used, which amounted to (0.870), and the stability over time was used to ensure the stability of the analysis and calculate the stability coefficient between the two analyzes using Cooper's equation for the stability of the analysis and it was equal to (1.0%).

Statistical processing

In order to answer the questions of the study, the quantitative data was processed through the statistical package (SPSS) to analyze the data, where it was used in this study to calculate frequencies, percentages, arithmetic averages, and standard deviations, to determine the sample responses, where the general average of all numerical skills was calculated, and the averages and standard deviations were calculated for each of the skills included in the tool.

Study results and discussion

The results of the first question: To what extent do science curricula in the first cycle of basic education include the digital skills required by artificial intelligence from the point of view of supervisors and first teachers in the Sultanate?

To answer this question, the arithmetic averages and standard deviations for each of the numerical skills were extracted as shown in Table (5).

Table (5): Arithmetic Averages, Standard Deviations, and Item Ranking for Digital Skills

	Sub-skills emanating from the digital skills field	Average	Deviation Normative	Level	arrangement Skills
1	The curriculum includes tasks done using digital environments such as browsing over the Internet	1.583	.512	low	3
2	The curriculum guides students to obtain information from trusted digital sources.	1.457	.508	low	10
3	The curriculum directs students towards critique of the digital information available in it.	1.390	.541	low	11
4	The curriculum contains the skills to transform ideas into digitally applicable projects.	1.64 1	.648	low	2
5	Students can use the digital information available in the curriculum to address the problems they face.	1.55 6	.515	low	4
6	The curriculum includes the skill of self-assessment of digital knowledge.	1.484	.696	low	9
7	The curriculum includes the skills of communicating information through different digital media.	1.645	.674	low	1
8	The curriculum employs some of the applications of the Fourth Industrial Revolution in its activities, such as robotics.	1.493	.584	low	8
9	The curriculum includes digital problem-solving skills.	1.506	.649	low	7
10	The curriculum includes group work activities via digital technologies.	1.515	.663	low	6
11	The curriculum involves digital engagement with a variety of cognitive domains.	1.533	.605	low	5
	Average	1.527	.415	low	

It is clear from the table that all digital skills fell within the low level and had a general average (mean = 1.527), which is a low level of inclusion, and the two skills averages were limited between (average = 1.645-1.390).), all of which are at the low level, underscoring the need for the curriculum to include digital skills in a big **way.** 7) was the highest included skill, and skill (3) was the least included skill, and the difference between their averages was (difference = 0.255).

For detail, we find that despite the availability of all skills at a low level, there is a disparity in the percentage of curriculum inclusion for each of them, as skill No. (3) was the least included skill (average = 1.390), which said (the curriculum directs students towards criticizing the digital information available in it), which indicates that the skill of criticism in the curriculum needs to be more inclusive and directed to students in the curriculum. It is followed by skill number (2), which says (the curriculum directs students to obtain information from reliable digital sources), as it has an arithmetic mean (arithmetic mean = 1.457), and its standard deviation is (standard deviation = 0.508), which indicates that the curriculum needs to include guidance for digital sources through which students can obtain the information they need to better understand the lesson. As Al-Tobi and May (2023) stressed in their study on the use of knowledge tours via the web in teaching the curriculum in the Sultanate of Oman, those in charge of the curricula must develop them in line with the requirements of the current era of technical use, including e-learning and learning using networks to support the educational process and qualify students for the future. Al-Mutairi (2023) stressed that the use of digital stories is an effective tool in student learning.

Results of the second question: To what extent does the science curriculum document for the fourth grade of basic education include the digital skills required by artificial intelligence?

To answer this question, the researcher calculated the frequencies and percentages of the availability of a digital skill in the science curriculum document for the fourth grade in the first and second semesters, and the frequencies were calculated through as follows in Table (6)

Table (6): Frequencies and Percentages of Digital Skills Availability in the Science Curriculum for the Fourth Grade

	Sub-skills emanating from the digital skills field	Chapter One		Chapter Two		sum		Order	Include
		Iteration	Ratio	Duplicate	Ratio	Duplicate	Ratio		
1	The curriculum includes tasks done using digital environments such as browsing over the Internet	0	0%	4	%28.57	4	16%	3	Very low
2	The curriculum guides students to obtain information from trusted digital sources.	0	0%	1	7.14%	1	4%	4	Very low

3	The curriculum directs students towards critique of the digital information available in it.	0	0%	0	0%	0	0%	-	Very low
4	The curriculum contains the skills to transform ideas into digitally applicable projects.	11	100%	0	0%	11	45.83%	1	Medium
5	Students can use the digital information available in the curriculum to address the problems they face.	0	0%	1	7.14%	1	4%	4	Very low
6	The curriculum includes the skill of self-assessment of digital knowledge.	0	0%	7	50%	7	28%	2	Very low
7	The curriculum includes the skills of communicating information through different digital media.	0	0%	1	7.14%	1	4%	4	Very low
8	The curriculum employs some of the applications of the Fourth Industrial Revolution in its activities, such as robotics.	0	0%	0	0%	0	0%	-	Very low
9	The curriculum includes digital	0	0%	0	0%	0	0%	-	Very low

	problem-solving skills.								
10	The curriculum includes group work activities via digital technologies.	0	0%	0	0%	0	0%	-	Very low
11	The curriculum involves digital engagement with a variety of cognitive domains.	0	0%	0		0	0%	-	Very low
	Total	11	44%	14	56%	25			

It is clear from the previous table that the skills included in the field of digital skills were repeated an average of (25) times in the two semesters, of which (14) times in the second semester and (11) once in the first semester. It is clear from the table that the number of skills that were repeated is only (6) skills, which are skills No. (1,2,4,5,6,7), compared to (5) skills that did not have repetition or availability in the curriculum, which are skills No. (3,8,9,10,11), and this indicates the absence of a number of digital skills in the content of the science curriculum document.

It is clear to us that the first semester included (11) repetitions in total (repetition rate = 44%), which means that the percentage of including digital skills in the first semester is lower than in the second semester. However, this repetition includes only one skill while the rest of the digital skills are absent from the curriculum document, which confirms that the curriculum is largely omitted from this area, although studies indicate the importance of including it. As it can be seen from the table that the skill included in the first chapter, which is the skill that states (the curriculum contains the skills of transforming ideas into digitally applicable projects), and the number of its repetition (11), and the general percentage of repetition of this skill (repetition rate = 45.83%), which is the level of inclusion or availability of an average according to the table of the criterion for judging the degree of inclusion of digital skills, and we find that this skill was included more than among the rest of the available skills, but there was no inclusion Her in the second chapter indicates the lack of balance between the two chapters.

Discussion of the results of the study

The results of the study indicated that the level of inclusion of digital skills that students need in the era of artificial intelligence is low, which indicates the need for the curriculum to include these skills, and to reconsider the curricula to keep pace with the Fourth Industrial Revolution and the skills required to learn artificial intelligence and its various technologies. The low inclusion of digital skills in the curriculum is due to the digital requirement that the skills agree to use, as the curriculum is almost devoid of any guidance for students towards using the information network to search for facts or information, and there is no guidance for students towards training in the use of digital data, or working to confront digital problems, and find solutions to them.

Or even the use of applications and techniques that contribute to enhancing these skills, especially since there are currently many technical programs and applications that can be used to enhance students' digital skills and abilities, which are suitable for young age groups in the fourth grade stage, which if included would have enabled students to acquire and develop many digital skills.

Many studies have pointed to the importance of including these skills in curricula to create generations capable of keeping pace with and contemporaneous with the requirements of the Fourth Industrial Revolution, artificial intelligence and future requirements, including a study (Al-Tobi, 2023; Al-Mutairi, 2023; González & Ramirez, 2022; Sisi, 2021, Zaidan, 1202; Al-Tunisi, 2021; Dahshan and Samhan, 2020; Al-Qamshu'iyya, 2020; Yusuf, 2020; Boateng, 2020). Yusuf (2020) stressed that the growth of global challenges in light of the requirements of the Fourth Industrial Revolution, and the large gap between the world inside and outside schools, is one of the most important justifications that push us to integrate and include digital skills that contribute to providing students with the skills necessary to learn artificial intelligence techniques and face the future.

Study recommendations and suggestions

Based on the results of the study, it is clear to us that the current curricula need to reconsider the inclusion of digital skills, so that students can acquire them and face the requirements of the industrial revolution and artificial intelligence required by the current era through them, and accordingly, the current study recommends the following:

1) In light of the low level of inclusion of digital skills in the science curriculum in the fourth grade, the study recommends reconsidering the inclusion of these skills in the content of the curriculum.
2) Allocating introductory and training programs for teachers and educators related to the curriculum document on digital skills and how to enable students through the curriculum.
3) Paying attention to technology and digital and working to benefit from its potential in the educational process.
4) Conducting more studies to identify the extent to which science curricula and documents based on the digital skills required by the Fourth Industrial Revolution and artificial intelligence are included, and analyzing the practical activities available in the curriculum to determine the extent to which they can develop students in digital skills.
5) Pay more attention to the content provided to students that increase students' awareness and awareness of digital skills, the skills of the Fourth Industrial Revolution and artificial intelligence techniques.

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