Migration Letters

Volume: 21, No: 1, pp. 863-877

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Information, Media and Communication Technology Culture in Mathematics Textbooks

Tahani S. Alangari[1], Alanoud S. Alotaibi[2], Shaima A. Aldhafeeri[3]

Abstract

The current study aims to build a list of the information, media, and technology skills that should be included in elementary school mathematics textbooks, verify the degree of inclusion of these skills, and build a proposed conception to include these skills in elementary school mathematics textbooks. A descriptive approach has been applied using content analysis method. The study instrument was limited to revealing the degree of availability of information, media, and technology culture skills. The study found that the level of inclusion of information, media, and technology skills in elementary school mathematics textbooks in Saudi Arabia is medium. Recommendations were provided for developing mathematics textbooks that incorporate these skills, and raise awareness of these skills among students, teachers, and parents. Further studies are needed to investigate the effectiveness of these skills in mathematics education and to identify the training needs of mathematics teachers considering information, media, and technology skills.

Keywords: *Communication Technology; information Technology; Media Culture; Mathematics Curriculum.*

Introduction

The current era is characterized by rapid changes in all fields, which has led to the emergence of successive changes and challenges, and the accumulation of knowledge and information in a way that makes it difficult for any educational system to transfer it in traditional ways or make the learner familiar with it through memorization and indoctrination, which requires learners to acquire 21st century skills, in order to prepare a generation capable of keeping pace with the developments of the current century and facing its challenges.

As Abdel Aal (2018) sees, the 21st century has witnessed and is witnessing many cognitive, economic, and technological transformations, which have had a profound impact on the human being in terms of his abilities, skills, and competencies. Even it has become noticeable that countries with the cognitive, economic, and technological

[1] Curriculum and Instruction Department, College of Education, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

[2] Curriculum and Instruction Department, College of Education, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

[3] Curriculum and Instruction Department, College of Education, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

components can achieve excellence in various fields of life, and those who do not possess these components remain in need of others, always following them.

Therefore, many educational institutions at the beginning of the 21st century, as Al-Shahrani and Al-Makhzouf (2020) mentioned, began to reconsider their orientations and plans to reform the educational system and all its elements in order to comply with the changes and requirements of this era, and to achieve a positive harmony with it. Through focusing on skills that elevate learners to participate in building a developed society capable of facing the challenges of this rapidly accelerating age of science, knowledge, and innovation.

As Hassan (2015,229) addressed, interest in 21st century skills is one of the trends that has attracted attention in order to support students in different educational stages, and in practical life, in terms of mastering all of the educators, both content and skills. Interest in these skills began in all disciplines, through the Partnership for 21st Century Skills, which has become one of the most important leaders in the development and teaching of 21st century skills in the world.

The Kingdom of Saudi Arabia's Vision 2030 has responded to the requirements of the 21st century, as it has focused on providing educational opportunities for all in an appropriate educational environment in light of the educational policy of the Kingdom of Saudi Arabia, raising the quality of its outputs, increasing scientific research, encouraging creativity and innovation, developing community partnership, and improving the skills and capabilities of education staff, through raising the level of education under the slogan "Education that contributes to driving the economy." One of its most important goals was the need to harmonize between educational outputs and the needs of the labor market, and to provide students with the knowledge and skills necessary for future jobs. It has also laid a foundation to predict the 21st century skills that must be acquired for the next generation to achieve the vision and goals of its homeland, and this is done by including these skills in education standards, textbooks, and teacher training. (Sulbah, 2018; Ministry of Education, 2019)

According to the Partnership for 21st Century Skills, these skills are:

- Learning and innovation skills: Information literacy, media literacy, and ICT literacy
- Life and career skills: Critical thinking and problem solving, communication and collaboration, creativity and innovation

In order for a learner in 21st century to live easily and easily, they should possess basic skills such as: lifelong learning, problem solving, and communication. The global economy of the 21st century requires high levels of imagination, innovation, and creativity in order to invent new and better services and products for the global market on an ongoing basis. 21st century skills also include digital culture skills that will enable students of the network generation to have unprecedented power to amplify their abilities to think, learn, communicate, collaborate, and innovate. The need for learning the appropriate skills to process the vast amount of information and technical means arises, and these skills include: information literacy, media literacy, and ICT literacy. 21st century skills also include career and life skills that work to develop the individual's skills to become a self-directed learner, independent learner, able to adapt to change, manage projects, and take responsibility. These skills include: flexibility and adaptability, initiative and self-direction, social interaction, cross-cultural interaction, productivity and accountability, leadership and responsibility.

Our society faces many challenges during the 21st century, at the international, regional, and local levels, which make the development of education and the evaluation of its curricula an strategic choice that cannot be dispensed with within the framework of opening up to world cultures. This is to achieve the hopes and aspirations of the desired

future and the ability to keep pace with the changes that are taking place in the world in various fields. The developed educational process has become one of the most important necessities of human development, which is necessary to achieve comprehensive growth. This requires comprehensive and continuous change in the thought and culture of any society that aspires to progress. This will not come except through the development of education and its systems. Curricula are one of the tools of education that must be subjected to evaluation and continuous monitoring in any country due to the changes that society is exposed to due to the vast flow of information. It is important for us to keep pace with these changes by continuous development in our curricula, as it is the only way to advance all areas of life. (Abu Hassan, 2015). The current study aims to build a list of the information, media, and technology skills that should be included in elementary school mathematics textbooks, verify the degree of inclusion of these skills, and build a proposed conception to include these skills in elementary school mathematics textbooks. Therefore, the study sought to answer the following questions:

- What are the information, media, and technology skills that should be included in the elementary school mathematics textbooks?
- What is the degree of inclusion of information, media, and technology skills in elementary school mathematics textbooks?
- What is the proposed conception for the inclusion of information, media, and technology skills in elementary school mathematics textbooks?

Literature review

The concept of 21st century skills is one of the modern educational trends that has attracted the attention of many educators. The goal of this is to achieve students' success in the cognitive aspects during their academic journey, and to acquire the skills necessary for work and life. It has been defined by Shahatah and Al-Najjar (2003,107) as "all the processes of updating, improving, and renewing (introducing new innovations) to the curriculum and all its elements, in order to improve and develop the educational and educational process." Abdul Salam (2013) defined it as all the 21st century skills that enable the individual to succeed in his work, such as: creativity skills, teamwork skills, and skills for using modern technology and dealing with the information revolution and modern means of communication. It has also been defined as a set of skills that are needed to make learners prepared for learning, innovation, life, and work, and to use the available information and technological means in the best possible way in the 21st century (Shibly, 2014). It has also been defined as a set of skills that students need for success in education and life and work. (Hassan, 2015)

The main areas of 21st century skills:

Experts and educators have differed in their precise definition of 21st century skills, as there is no single unified list. Hundreds of lists have been proposed, and these lists include several skills, including:

- Life skills, which include flexibility, adaptability, and resilience;
- Workforce skills, which include collaboration, initiative, leadership, and responsibility;
- Applied skills, which include accessing and analyzing information, effective communication, and identifying alternative solutions to problems;
- Personal skills, which include creativity, innovation, critical thinking, and problem solving;
- Interpersonal skills, which include collaboration and teamwork.

This difference is due to the differences in societies, their level of technological, economic development, and the differences in cultures between the people of the world. However, the community agrees on the importance of providing individuals with these skills, and preparing them for them at an early age. The educational literature has addressed a number of frameworks that have addressed them, and the opinions of most experts agree on the framework developed by the Partnership for 21st Century Skills, which is the most applicable of these frameworks.

IT and media skills:

Personal life is characterized by technology in the 21st century, where media plays an increasingly important role, and takes on different characteristics from the past, including the abundance of information, the rapid changes in technological tools, and unprecedented cooperation on a scale to provide individual contributions.

To be effective in the 21st century, a person must possess a practical and important set of thinking skills related to information, media, and technology. IT and media skills include the following sub-skills:

- Information culture: This culture is related to accessing information efficiently and effectively, using it, integrating it, managing it, and evaluating it.
- Media culture: This culture is related to the creative media message, understanding, building, and its goals, and the ethical and legal issues to which it is committed.
- Information technology and communication culture: This is the effective application of technology using technology as a research and information access tool, such as using search engines and browsing tools, and taking advantage of digital technology such as computers, digital viewing and listening devices, and smartphones.

The development of 21st century skills and teaching and learning mathematics:

The Partnership for 21st Century Skills has developed a set of recommendations for integrating teaching and learning mathematics with the development of 21st century skills, which include the following:

- The need to design mathematics curricula in light of the 21st century skills, so that these curricula include models of appropriate mathematical activities that encourage critical thinking, problem solving, scientific research, and conceptual development.
- Integrating the basic concepts of 21st century skills within the concepts, generalizations, and mathematical skills.
- Involving mathematics teachers in the design process to ensure their support and understanding of the ideas that emphasize 21st century skills.
- Providing lessons and units that include the basic concepts and skills that students need to know and perform, and avoiding teaching facts that hinder the development of critical thinking, problem solving, and other 21st century skills.
- Training students to apply and demonstrate their ability to use 21st century skills.
- Providing student-centered teaching that develops 21st century skills, linking curricula with student experiences, and helping them to expand their capabilities.
- The need for mathematics curricula to be in line with the recommendations of the National Council of Teachers of Mathematics (NCTM) for mathematics teachers, which advocates the development of 21st century skills.
- Interest in professional development programs for mathematics teachers before and during service in the importance of developing 21st century skills.

The integration of these skills in a deliberate and methodological way in general education curricula, and in mathematics curricula in particular, will enable educators to achieve many of the goals that they have not been able to achieve for many long years. They justify this by arguing that it enables students to learn and achieve in academic subjects at high levels, as it provides a structured framework that ensures the engagement of learners in the learning process, and helps them in the process of building confidence in themselves, and it also represents a framework for professional development for teachers, and that these skills prepare students for innovation and leadership in the 21st century and active participation in scientific and practical life.

The importance of 21st century skills in mathematics curricula, especially IT and media skills, is essential to achieve many of the achievements. It is an important goal that experts hope to achieve for students because it enables them to contribute to the world of work and civil life, and actively participate in society and find solutions to problems.

Method

The current study used a descriptive approach, the method of content analysis, because it is the most appropriate method to achieve the goal of the current research, which was defined by (Al-Assaf, 2006) as "the repetitive and organized monitoring of the selected unit of analysis, whether it is a word, topic, individual, character, unit of measurement, or time when judging the content of any educational material, and the analysis may be in light of one or more criteria combined, and here it was used to analyze the content of the mathematics book for elementary school through (objectives, content, activities, and evaluation), to identify the degree of inclusion of 21st century skills (information and communication technology skills) in the mathematics book for elementary school mathematics textbooks.

The study population and sample:

The study population is the sample, which is the mathematics books for the upper levels of elementary school, in the Kingdom of Saudi Arabia for the year 2023, edition 1444 AH. Table (1) shows the study sample.

Table 1: Book units, number of lessons, and pages

Book unit	Number of lessons	Number of pages
Place value	21	78
Addition and subtraction	18	75
Data organization, presentation, and interpretation	18	54
Patterns and algebra	21	81

Research instrument:

The study tool was limited to revealing the degree of availability of 21st century skills, specifically the skill of information, media, and technology culture in one unit of the mathematics books for elementary school, through a content analysis card by identifying the analysis categories and their elements, including three main skills:

- Information culture
- Media culture
- Information technology and communication culture

As shown in Table (3), (explicit and implicit) were used to judge their indicators.

The research is based on two tools to achieve the objectives of the study:

A: A list of information, media, and technology skills that must be available in the content of the mathematics books for elementary school.

Goal of the list: This list aims to identify the information, media, and technology that must be available in the content of the mathematics books for elementary school.

Sources of the list:

- Research and studies related to 21st century skills.
- Literature related to 21st century skills.
- Objectives of the mathematics curriculum for elementary school.
- Developmental characteristics of an elementary school student.

B: Building a card to analyze the mathematics book for elementary school.

This card aims to verify information, media, and technology skills in the mathematics books for elementary school. To achieve this goal, the list of information, media, and technology skills is converted to criteria for analyzing the mathematics book. The design of the analysis tool is one of the important procedures in the content analysis process, as it works to fulfill all the elements of the analysis, and enables the researcher to follow a unified approach in the analysis process, reduce the time and effort expended, and enable him to quantify the data. (Atia: 2009, 153)

The analysis was carried out according to a number of the constraints:

- The analysis sample is the scientific content of all the topics included in the mathematics book, first semester (for the year 1444 AH), through (objectives, content, activities, and evaluation), with the exclusion of the cover, the introduction to the book, and the indexes. Table (1)

Unit of analysis: The explicit idea was chosen as the unit of analysis to suit the nature of the research. The idea was divided into two types: Explicit idea: It is the clear analytical unit that can be identified directly. Implicit idea: It is the hidden analytical unit that can be inferred from the content.

- Analysis categories: They were represented in the digital culture skills in its three axes (information culture, media culture, information and communication skills. As in Table (3)

The degree of availability of digital culture skills was determined using the following criteria, as shown in Table (2):

Table 2: Criteria for Judging the Level of Inclusion of Digital Culture Skills

Percentage	Level of Inclusion
0% to 33%	Low
34% to 67%	Medium
68% to 100%	High

Validity and Reliability

To ensure the validity of the tool for this study, the researcher took the following steps:

- Submit the tool to a group of experts in the field for review.
- Revise the tool in light of the results of the first arbitration process, then return it to them again.

- Review the tool after the second arbitration process.
- Output the tool in its final form.

To ensure the reliability of the analysis process, the researcher used the inter-rater agreement method to re-analyze a unit of the book that was randomly selected and compare their results, and then calculate the percentage of agreement between them. By applying Holsti's equation (1969), for both types of stability, which showed high agreement, Coefficient of reliability= 0.8.

Results and Discussion

To answer the first question, what are the information, media and communication technology skills that should be included in elementary school mathematics textbooks? a list of information, media and communication technology skills that should be included in elementary school mathematics textbooks was developed, using educational literature and previous studies. Indicators were also identified for each information, media and communication technology skills in its three axes: information culture, media culture, and information and communication technology culture (ICT). The list was then converted into a content analysis card consisting of 12 items, distributed over 3 main axes, with 5 indicators for the first axis, 3 indicators for the second axis, and 4 indicators for the third axis.

Table 3: Information, media and communication technology skills should be included in Math Textbooks

Core Skill	Performance Indicators	Number	Percentage
Informational Culture	The content encourages students to use technology in its multiple forms correctly.	5	41.66%
	The content encourages students to critically evaluate information.		
	The content enhances students' use of information creatively and in problem solving.		
	The content emphasizes ethical behavior when using technology.		
	The content helps students understand how to manage the flow of information from a wide variety of sources.		
Media Culture	The content develops students' critical thinking in receiving media messages.	3	25%
	The content encourages students to produce meaningful media content.		
	The content helps students understand the ethical and legal standards for accessing media messages.		
Communication Technology Culture	Self-control in the use of technology	4	33.34%
	The content includes situations that require using technology for research or organization		
	The content develops positive attitudes towards technology and multiple media, such as highlighting the positive role of technology in public life.		
	The content refers to safe sources for learners that can be used		

	for further learning and expansion of the material.		
Total		12	100%

To answer the second question: What is the level of inclusion of Information, media and communication technology skills in elementary school mathematics textbooks? The upper levels of elementary school mathematics textbooks were analyzed for information, media, and communication technology skills in the three axes, and the repetitions and percentages were calculated for the availability of each indicator of the skill.

Table 4: Results of the content analysis of the mathematics textbook for information, media, and communication technology skills.

Core skill	Performance indicators	Total repetitions	Inclusion level	Ranking
Information culture	The content encourages the use of technology in its multiple forms in a correct way.	18 explicit + 210 implicit = 228	Medium	1
	The content encourages the student to critically evaluate information.	0 explicit + 0 implicit = 0	Low	4
	The content enhances the student's use of information creatively and in problem-solving.	0 explicit + 15 implicit = 15	Low	2
	The content emphasizes the ethical rules of behavior when using technology.	0 explicit + 0 implicit = 0	Low	4
	The content contributes to the student's understanding of how to manage the flow of information from a wide and diverse range of sources.	0 explicit + 6 implicit = 6	Low	3
Media culture	The content develops critical thinking in receiving media messages.	0 explicit + 0 implicit = 0	Low	4
	The content encourages the student to produce meaningful informational material.	0 explicit + 0 implicit = 0	Low	4
	The content contributes to the student's awareness of the ethical and legal standards for accessing media messages.	0 explicit + 0 implicit = 0	Low	4
technology communication culture	The content develops self-regulation in the use of technology.	0 explicit + 0 implicit = 0	Low	4
	The content includes situations that require the use of technology for research or organization.	0 explicit + 9 implicit = 9	Low	3
	The content develops positive attitudes towards technology and multiple media, such as highlighting the positive role of technology in public life.	6 explicit + 24 implicit = 30	Low	2

The study found that the level of inclusion of information, media, and technology skills in elementary school mathematics textbooks in Saudi Arabia is medium. This is evident from the following findings:

- In the first axis (information culture), the level of inclusion was medium, with a percentage of 66.4%. The highest-ranked indicator was "The content encourages the use of technology in its multiple forms in a correct way." with a percentage of 60.8%. The lowest-ranked indicators were "The content encourages the student to critically evaluate information." and "The content emphasizes the ethical rules of behavior when using technology." with a percentage of 0%.

- In the second axis (media culture), the level of inclusion was low, with a percentage of 0%. All three indicators were ranked last, with a percentage of 0%.

- In the third axis (information and communication technology culture), the level of inclusion was medium, with a percentage of 33.6%. The highest-ranked indicator was "The content refers to safe sources for learners that can be returned to for additional information and expansion of the material." with a percentage of 23.2%. The lowest-ranked indicators were "The content develops self-regulation in the use of technology." and "The content includes situations that require the use of technology for research or organization." with a percentage of 0%.The researcher attributed the low level of inclusion of information, media, and technology skills in elementary school mathematics textbooks to the following factors: The nature of mathematics textbooks, which focus primarily on developing critical thinking, problem-solving, and creative thinking skills; the lack of opportunities for students to use technology to research and investigate; the consideration by mathematics curriculum designers of the lack of adequate access to technology in schools and homes; the researcher recommends that the following be done to improve the inclusion of information, media, and technology skills in elementary school mathematics textbooks; redesign the textbook to focus more on the development of information, media, and technology skills; provide more opportunities for students to use technology to research and investigate; consider the availability of technology in schools and homes when designing mathematics curriculum. The findings of the current study are consistent with the findings of previous studies on the inclusion of information, media, and technology skills in mathematics textbooks in Saudi Arabia and other countries. For example, a study by Al-Ghamdi (2015) found that the level of inclusion of these skills in mathematics textbooks in Saudi Arabia was low. A study by Al-Harbi (2020) found that the level of inclusion of these skills in mathematics textbooks in the United States was medium.

To answer the third question: What is the proposed conception for including information, media, and communication technology skills in elementary school mathematics textbooks?

A proposed conception was built to develop elementary school mathematics curriculum in light of digital literacy skills, where each skill is addressed in terms of objectives, content, activities, and assessment.

Components of the proposed conception

- Philosophy of the proposed conception:

It focuses on integrating technology into education, developing digital literacy skills, promoting interaction and collaboration, and promoting self-directed learning and discovery.

- Starting points of the proposed conception:

1. Previous Arab and foreign studies related to the development of mathematics curricula and 21st century skills.

2. Global projects in the field of developing mathematics curricula and 21st century skills.

3. The results of the study of analyzing the content of elementary school mathematics curriculum, which is the low inclusion of digital literacy skills.

- Objectives of the proposed conception:

The general goal is to develop the elementary school mathematics curriculum in light of digital literacy skills.

- Importance of the proposed conception:

1. It expands his understanding of the latest developments in the scientific and educational arena, the changing conditions of society and its requirements and expectations.

2. It makes him an expert in a world full of information and innovations, in which learners need guidance.

3. It gives him the tendency to experiment and renew, and to trust himself in organizing educational situations, which includes activities and training strategies, in addition to the ability to research and investigate to solve educational problems with awareness and consciousness.

4. It gives him assessment strategies that are consistent with the technological development to assess the mental, social, and sensory development of the learner to ensure his continuity.

- Justifications for the proposed conception:

1. The requirements of the digital age: Society today lives in the age of information and communication technology, and digital skills are essential for interaction and success in this age. Therefore, mathematics education in schools must include the appropriate information and communication technology skills for students.

2. Enhancing critical thinking and real-world problems: through the use of technology in teaching mathematics, students can think critically and solve real-world problems that are based on mathematical concepts. Digital applications and programs can be used to enhance students' interaction with the materials and apply mathematical concepts in real-world contexts.

3. Enhancing interactive and collaborative learning: Technology can enhance interactive and collaborative learning in mathematics. Students can use interactive applications and tools to collaborate with their peers in solving problems and discussing mathematical ideas. This gives them opportunities to share knowledge and interact in a positive way.

- Dimensions of the proposed conception:

1. Integration of technology: The conception aims to integrate technology into mathematics education, where computers, digital programs, and interactive applications are used to enhance the learning process and improve understanding of mathematical concepts. This allows students to effectively deal with mathematical materials and apply them in real-world contexts.

2. Promoting interaction and participation: The proposed conception encourages promoting active interaction and participation of students in the learning process. The use of technology provides opportunities for active interaction with mathematical content and solving problems interactively. Students can collaborate and interact with their peers and share ideas and solutions.

3. Diversifying and improving assessment tools: The proposed conception promotes the use of digital and interactive assessment tools to assess student achievement in mathematics. Digital tools and applications can be used to track student progress, analyze

their performance, and provide immediate feedback and guidance to improve performance.

- Mechanisms of the proposed conception for developing elementary school mathematics curriculum in terms of information, media, and technology skills:

A: Information culture

Including objectives for developing information culture:

- The student is able to issue judgments about the credibility of sources, use information sources effectively, choose informative sources according to mathematical tasks, and follow up on information related to mathematics.
- The activities take into account the development of information culture, for example: The activities require issuing judgments about the trust and credibility of specific information sources, and relying on activities that use different information sources, such as books, references, and the internet.
- Teaching and learning strategies that develop information culture, including: current events approach, inquiry, electronic discussion, electronic brainstorming, electronic mind maps, electronic cooperative learning, web-based knowledge trips, simulations.
- Using technological tools and means that contribute to the development of information culture, including: conversation and dialogue, video conferencing, email, file transfer, bulletin boards, mailing lists, newsgroups.
- Designing items to measure the level of information culture among students and following the test prepared in the current study for this purpose.

B: Media culture

Including objectives for developing media culture:

- The student is able to deduce the arguments consistent with the evidence given about mathematical generalizations in the media, deduce the arguments inconsistent with the evidence given about mathematical generalizations, and distinguish between facts and opinions presented in the media.
- The content takes into account the development of media culture, for example: Presenting paragraphs taken from one of the media related to a particular scientific phenomenon and asking students to identify the arguments that are consistent and inconsistent with the evidence about the phenomenon, as well as urging students to distinguish between facts, opinions, and viewpoints.
- Activities take into account the development of media culture, for example: Activities require reviewing different media (radio or television program, website of a scientific magazine...) that discuss mathematical issues and topics related to the material, and asking students to express their opinion about what these media present of facts, opinions, viewpoints, evidence, and proofs about the issue.
- Teaching and learning strategies that develop media culture, including: current events approach, case study, inquiry, electronic discussion, electronic brainstorming, electronic mind maps, electronic cooperative learning, web-based knowledge trips, simulations.
- Using technological tools and means that contribute to the development of media culture among students, including: conversation and dialogue, video conferencing, email, file transfer, bulletin boards, mailing lists, newsgroups, and web 2.0 tools provided by the second generation of e-learning, including: blogs, wikis, RSS feeds, and tools for publishing media for audio recordings or video clips, YouTube social

networks, including Facebook. All of these tools are available to both teachers and learners.

- Designing items to measure the level of media culture among students and following the test prepared in the current study for this purpose.

C: Technology culture

Including objectives for developing the culture of information and communication technology:

- The student uses technologies in studying mathematical topics, uses technical tools to collect and process data and display results, uses technologies to transmit mathematical ideas, and uses technologies to solve problems and make decisions.

- The content takes into account the development of technological culture, for example: Helping students use technologies to collect, store, process data, and display results, and exchange and transmit mathematical ideas.

- Activities take into account the development of technological culture, for example: Activities rely on the use of technologies to collect, store, process data, and display results, and exchange and transmit mathematical ideas between the student and the teacher.

- Teaching and learning strategies that develop technological culture, including: current events approach, case study, inquiry, electronic discussion, electronic brainstorming, electronic mind maps, electronic cooperative learning, web-based knowledge trips, simulations.

- Using technological tools and means that contribute to the development of technological culture among students, including: conversation and dialogue, video conferencing, email, file transfer, bulletin boards, mailing lists, newsgroups, and web 2.0 tools provided by the second generation of e-learning, including: blogs, wikis, RSS feeds, and tools for publishing media for audio recordings or video clips, YouTube social networks, including Facebook. All of these tools are free and available to both teachers and learners.

- Designing items to measure the level of technological culture among students and following the test prepared in the current study for this purpose.

- Requirements for implementing the proposed conception:

Implementing the proposed conception for developing elementary school mathematics curriculum in light of information, media, and technology skills requires the following requirements and procedures:

1. Teacher training: Appropriate training should be provided for teachers to develop their skills in using technology in teaching mathematics. Teachers should have a good understanding of the digital tools and applications relevant to mathematics and how to use them effectively in the classroom.

2. Provision of necessary infrastructure: The necessary infrastructure should be provided in schools, including the availability of computers and reliable internet access. There should be the necessary devices, software, and digital applications for teaching mathematics.

3. Selection of appropriate educational materials: Educational materials that support the proposed conception and integrate digital literacy skills into mathematics learning should be selected. There should be a variety of digital resources that are appropriate for the age level and mathematical abilities of students.

4. Encouraging active interaction and participation: Active interaction and participation of students using technology in mathematics education should be encouraged. Opportunities should be provided for students to collaborate and interact with digital tools and applications to solve problems and explore mathematical concepts effectively.

- Challenges to implementing the proposed conception:

Implementing the proposed conception for developing elementary school mathematics curriculum in light of information, media, and technology skills may face some challenges, including:

1. Lack of technology and infrastructure: There may be a lack of availability of computers and internet access in some schools, which limits the ability to apply technology in teaching mathematics.

2. Lack of training and preparation for teachers: Teachers may need appropriate training and preparation to use technology in teaching mathematics. Teachers may find it difficult to use digital tools and integrate them into the educational process, and therefore there is a need for continuous training and support for them.

3. Time and scheduling challenges: Teachers may face challenges in organizing time and adapting traditional mathematics curricula to the integration of technology. It may be difficult to provide enough time to train students on how to use digital tools and apply them to solve mathematical problems.

- Ways to overcome challenges to implementing the proposed conception:

1. Improvement of technological infrastructure: Efforts should be made to improve the technological infrastructure in schools by providing computers and high-speed internet access. Cooperation can be sought with relevant authorities and institutions to provide the necessary funding and resources to update and develop the technological infrastructure in schools.

2. Provision of continuous training and support: Continuous training should be provided for teachers on how to use technology in teaching mathematics and how to apply it in the classroom. Workshops and training courses can be organized and technical mentors can be provided to help and support the use of digital tools and applications.

3. Communication and awareness: Effective communication should be established with teachers and parents to explain the benefits of using technology in teaching mathematics and to clarify how to implement the proposed conception. Meetings and workshops can be held with teachers and awareness sessions for parents to share information and inquiries and update them on technological developments and their importance in education.

4. Development of appropriate educational materials: Appropriate and suitable digital educational materials should be developed and selected for elementary school mathematics textbooks. These materials should be interactive, stimulating, and promote understanding of mathematical concepts.

the proposed conception for developing elementary school mathematics curriculum in light of information, media, and communication technology skills is a promising approach that has the potential to improve student learning and outcomes. However, the successful implementation of this conception will require addressing the challenges mentioned above, such as the lack of technology and infrastructure, the lack of training and preparation for teachers, and the time and scheduling challenges.

Conclusion

The results of the study could be utilized to develop mathematics textbooks that incorporate these skills. This can be done by including activities and exercises that require students to use these skills to learn mathematics. The findings also could be used to raise awareness of these skills among students, teachers, and parents. This can be done through workshops, presentations, and other outreach activities. providing teachers with the training they need to incorporate information, media, and technology skills into their teaching is essential. This training can be provided through online courses, workshops, and other professional development opportunities. It is also proposed conducting further studies to investigate the effectiveness of these skills in mathematics education and to identify the training needs of mathematics teachers in light of information, media, and technology skills.

References

Al-Dbyān, A. B. H. M. (2021). The level of inclusion of digital literacy skills in the first grade mathematics textbook in the Kingdom of Saudi Arabia. Journal of Educational and Psychological Sciences, 5(47), 94-76.

Al-Khaltham, H. M. (2013). Analysis of the content of the first year of high school jurisprudence book in the Kingdom of Saudi Arabia in light of the 21st century skills. Journal of Education, Al-Azhar University, Faculty of Education, 154, 224- 243.

Al-Otaibi, W. (2011). The reality of using educational technologies in teaching science courses in the secondary stage from the perspective of female teachers in the city of Hail. Master's thesis. Faculty of Education. Umm Al-Qura University. Saudi Arabia.

Abu Hassan, Y. M. (2015). Evaluation of the content and activities of social studies curriculum in the elementary stage in light of the 21st century skills. Unpublished master's thesis, Faculty of Education, Port Said University, Port Said.

Al-Balawi, A. F., & Al-Balawi, A. M. (2019). A proposed training program to develop some 21st century skills among elementary school mathematics teachers in Tabuk city. Arab Studies in Education and Psychology, Association of Arab Educators, 107, 387-433.

Al-Adeem, M. A. A. (2023). The extent of the availability of 21st century skills among graduate students at the University of Hafar Al-Batin. Journal of the Arab Journal of Educational and Psychological Sciences, 31, 357-408.

Al-Eaifi, H. A., & Al-Harbi, I. S. (2022). The degree of mastery of mathematics teachers of the necessary teaching performances for developing 21st century skills among first-grade intermediate students. Arab Studies in Education and Psychology, 141, 105-144.

Al-Baz, M. M. (2013). Developing the science curriculum for the third preparatory grade in light of the 21st century skills. Egyptian Association for Science Education, Journal of Science Education, 16(6), 7-49.

Al-Eid, Sameeha Ibrahim (2019). Analysis of the content of technology textbooks for the basic stage in light of the 21st century skills, and the extent of the acquisition of tenth-grade students. Unpublished master's thesis, Faculty of Education, Islamic University, Gaza.

Abdel-Aal, Mohamed Sayed (2018). The effectiveness of a program enhanced with web2 tools in developing 21st century skills among students of mathematics teachers at the Faculty of Education. Journal of Mathematics Education, Egyptian Association for Mathematics Education, Arab Republic of Egypt, Vol.21, No.6, pp. 214-269.

Al-Shahrani, Badriya Muhammad, and Al-Mouhafidh, Muhammad Zidan (2020). Evaluation of the content of science curricula in the middle stage in light of the 21st century skills. Educational Journal, (27), 417-468.

Haja, H. R. (2018). The extent of the inclusion of science textbooks for the upper basic stage in 21st century skills. Studies in Educational Sciences, University of Jordan - Deanship of Scientific Research, 45(3), 163-178.

Hassan, S. M. A. (2015). Developing the mathematics curriculum for the sixth grade elementary school in light of 21st century skills. Journal of the Faculty of Education, Port Said University, (18), 229-313.

Mansour, Aarin Suleiman (2018). The degree of inclusion of science textbooks for the basic education stage in Jordan in 21st century skills. Unpublished master's thesis, Faculty of Educational Sciences, Al-Bayt University, Mafraq, Jordan.

Mahmoud Merif (2015). Sources of developing mathematics education. De Bono Center for Thinking Education.

Razk, F. M. M. (2015). Using the STEM integrated approach to learning science in developing 21st century skills and decision-making skills among first-year students in the Faculty of Education. Arab Educational and Psychological Studies, (62), 128-79.

Rashed, A. M. A. R. (2017). The role of science teaching in developing 21st century learning skills. The 18th Scientific Conference, Science Education and Sustainable Development. Organized by the Egyptian Association for Science Education, Dar Al-Diafa, Ain Shams University, Cairo, pp. 225-238.

Rabat, Bahira Shafeq (2018). The effectiveness of integrating between thinking maps strategies and the double-sided learning model to develop some 21st century skills in the study of geometry among first-grade preparatory students. Journal of Mathematics Education, Egyptian Association for Mathematics Education, Arab Republic of Egypt, Vol.21, No.12, pp. 277-368.

Ken Key (2010). 21st Century Skills; Why They Matter, What They Are, and How we Get There?. http: www. Innovation Iabs. Com psd resourses Ken Kay. pdf.

Sabhi, N. H. (2016). The extent of the inclusion of 21st century skills in the revised science curriculum for the first intermediate grade in the Kingdom of Saudi Arabia. Journal of Educational Sciences, Prince Sattam bin Abdulaziz University, 1(1), 9-44.

Saleb, Amal (2018). 21st Century Skills and the Vision of Saudi Arabia 2030. Retrieved on August 2019 from the website https://www.new-educ.com/author/amal-saleh.

Yūnus, I. S. (2016). Evaluation of the geography curriculum in the general secondary stage in light of the 21st century skills. Journal of the Educational and Social Studies Association, Ain Shams University - Faculty of Education, Cairo, 76, 63- 92.