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An Exploratory Study on the Awareness of Early Childhood Professionals Regarding the Concepts of Digital Intelligence

Dr. Maryam Jamal ALharthi

Assistant Professor in Childhood Studies department, Taibah University – Madinah, Saudi Arabia

Email: mjharthy@taibahu.edu.sa

Abstract

Technology is surrounding children, and they are engaging with it from an early stage. This reality raises concerns among professionals and educators. Several recommendations have been published regarding children's time spent in front of the screen based on their age. Such daily involvement of technology among kids created a new type of intelligence: Digital intelligence (DQ). This research aims to delve into the DQ arena and explore its awarenessamong professionals in the early childhood sector. Concurrently, the study explores to what extent professionals in the early years use DQ during their daily work schemes with children. This study took place in AL-Madinah, Saudi Arabia, and was conducted under the qualitative approach with four in-depth interviews with professionals. The key finding of this study is that the term DQ is still not well established among early childhood professionals and, hence there is a need to carry future studies on this topic. To the best of the author's knowledge,

this research is one of the first studies to investigate DQ's role in early childhood context within the Arab context and is thus able to offer new insight into the related field among professionals.

Keywords: Early childhood, Kindergarten, education in the early years, digital intelligence, technology in childhood, Professionals in early years, and qualitative research.

Introduction

Every academic year, kindergartens and other forms of early childhood institutions have children enrolled. Nowadays, educators acknowledge the vital role technology has in kids. Most importantly, the continuous and evolving changes in the technical field and its close link with the child's life require educators and professionals focusingon early childhood to be informed continuously about digital developments around them. Besides, they have to be at the forefront of understanding the mechanism and strategies for transferring experiences, knowledge, and skills that children need to prepare them fully according to the current century's requirements.Consequently, the Digital Intelligence (DQ) Institute has indicated that providing children with access to the digital world is one of their rights in the twenty-first century (DQ Institute, 2018). In this case, Al-Dahshan (2019) pointed out the impact that the artificial intelligence revolution can have on the running of various works. For instance, for years and centuries, jobs that remained at the core of human labor are being replaced rapidly by robots or specialized programs. Therefore, there is a growing importance of early childhood professionals' awareness regarding DQ's concept and the mechanism of its application in the school environmentcentury (DQ Institute, 2018). Such knowledge equips them with the required channels to provide children with necessary digital competencies. Since there is an urgent need for a deeper understanding of this type of intelligence,
the DQ Institute has appeared in Singapore, which is the nucleus of an alliance between many public, private, academic, and civil sectors in that region. According to DQ Institute(2019), it has partnered with Australia to provide smart digital education to all children; the institute established a movement named DQ (DQ Institute, 2019).

Additionally,unlike before, people have minimized warning children against using technology at an early age. Instead, the demand for the legalization and regulation of children's use of technology is increasing. This situation implies that providing children with digital skills is necessary for their proper use in the future. According toJamjoom (2019), the DQ concept emerged from such notions as the concept refers to the set of technical, mental,

and social competencies essential for digital life that enable the individual to face challenges and adapt to the digital experience.

Further, Al-Dahshan (2019) defined DQ as a new concept added to the theory of multiple intelligence since children need such training to develop their cognitive abilities of digital skills in this growing technological era to keep pace with the revolution and the applications of artificial intelligence. According to the DQ Institute (2019), this concept has three levels, eight domains, and twenty-four competencies or abilities, which require a transfer of knowledge to children (this part will be discussed later in the study's theoretical framework). However, there is the necessity of recognizing that the concept of DQdiffers significantly from artificial intelligence. The latter is a type of computer science that enables mechanisms and programs to perform tasks, instead of people by simulating human thinking and doing roles with organized, logical mental processes (Al-Hadi, 2015 and Al-Sharqawi, 2011).

Research Problem

Children spend some of their time using technologies and digital media; however, their utilization differs from that of adults around them. Reports have shown that the internet and the digital technologies associated with kids present some difficulties in controlling its content and communication methods. As a result, they are exposed to many dangers, such as electronic bullying, pornographic or obscene material, violent or exaggerated content, electronic theft, or harassment. Such challenges are the ones that led to the emergence of DQ. In this case,

the study's problem lies in the awareness of early childhood professionals about this relatively new concept. Also, it looks at how professionals perceive young learners' use of technology and how they can assess them to get the most of this technology.

Research questions:

Given the novelty of the concept of DQ, the primary questionfor the current study is:

• How do early years professionals perceive DQ's concept, and what are the applications and strategies used?

Several sub-questions have emerged from this primary question, which is aiming to study the pivotal phenomenon deeply:

• How do professionals assess the use of technology on preschoolers?

• What are the strategies professionals use/suggest for controlling young children's use of technology?

• To what extent does the term digital intelligent spread among the professionals of the early years?

To understand the phenomenon of the study and answer its questions, a qualitative research methodology was implemented.Mohajan (2018) defined this type of study based onthe participants' collected opinions who were asked broad questions. The gathered data was made up of words or texts that they received from the participants. Later, the researcher analyzed them based on specific criteria from which he derived answers to their questions. Essentially, qualitative research aims to deeply understand the phenomenon in its natural context without any investigator interference or any changes or modifications to the study environment. However, this study does not aim to produce generalizations(Ahmadi & Reza, 2018). The limits of the current spatial research were restricted to early childhood professionals in the Madinah region, in the Kingdom of Saudi Arabia. Simultaneously, the temporal boundaries were defined to the academic year 2019/2020 in its first and second semesters.

Theoretical framework and literature review

The theoretical framework of the current study deals with the theory of multiple intelligence and DQ's emergences as one of its types. After that, this theoretical framework moves to the DQ and the difference between it and artificial intelligence. Finally, it looks at DQ, its levels, and competencies.

Intelligence, its concept, and its types:

Psychologists have varied definitions of intelligence, and some see it as only one general ability. Thorndike believes in his theory of "multiple factors" that it consists of mental elements. Each element represents a separate ability, which means that mental activities require a standard set of features grouped into clusters.

Therefore, the current meaning of intelligence was influenced by Thorndike's identification of these clusters, thus he divided it into three types; abstract intelligence, mechanical intelligence, and abstract intelligence (Hassan, 2016). As the present study looks at DQ, it is a relatively new concept that is necessitated by the era's developments and the prevailing lifestyle. Also, Howard Gardner's theory of multiple intelligence played a significant role in determining the conceptual framework of the study (Mellado et al., 2017)explained that human being has diverse mental capabilities that represent multiple intelligence, which is subject to growth and change, augmentation, and person's needs. Concurrently, the theory of multiple intelligence focuses on individual differences and the importance of taking into account learners' characteristics, abilities, and potentials.

According to Gardner's classification, there are nine types of intelligence, which are subject to increase. First, linguistic intelligence is the ability that individuals havethrough their language usage relating to vocabularies, sentence synthesis effectiveness, and pronunciation of sounds. Also, Jaber (2003) claimed that it relates to people's excellent use of standing positions when speaking and their voice tones. Secondly, mathematical intelligence can understand logical relationships, deal with numbers, arithmetic operations, numerical formulas, and link results and their causes. (Hussein, 2003). Concurrently, physical/motor intelligence isnot specific to athletes only. Rather,

Afaneh and Khazindar (2004) mentioned that it is the synergy between the body and the mind as people use such interaction to express their opinions and ideas. Nofal (2010) formulated that visual-spatial intelligence shows individuals' understanding of the visual spaces around them, which results in the coordination of spatial images and a deep understanding of colors, shapes, lines, spaces, and the relationships between them.

Another one is natural intelligence, which shows the ability to understand nature and distinguish between its components, various natural environments, and characteristics. Afana and Khazindar (2004) reported that this situation is essential as it helps understand and classify natural phenomena alongside providing insight into their relationships. Individuals use interactive social intelligence to show their abilities to perceive others' feelings, accommodate their multiple moods, and understand their motives, facial expressions,

And body movements. On the other hand, internal self-intelligence refers to the capability of individuals to understand themselves with good self-control, emotions, and motives alongside effective comprehension of their strengths and weaknesses (Nofal, 2010).

Consequently, musical intelligence (rhythmic) is considered as people's perception of rhythm and melody that enables them to distinguish between sounds and their different layers; thus, the proficiency in understanding music, analyze it, and express it (Mahmoud, 2006). Further, I noted that spiritual intelligence appears through persons' understanding of cosmic issues, their interest in super-sensory experiences, and awareness of their relationships. Most importantly, existential intelligence is famous for its crucial role in making human beings meditate on matters related to death, life, and religions. Nofal (2010) added that existential intelligence makes people understand the relationships between them and think about the universe and creation. As a result of society's dynamic characteristics, multiple intelligence has played a significant role in building the conceptual framework for the current study, which adds DQ to the associated model. Therefore, this study looks at DQ as an aspect that falls within multiple intelligence theory, which may require some professional efforts. This claim implies that applying its practices and strategies in the educational field needs a professional's assistance. In this case, this paper investigates how professionals in the early years perceive DQ before seeking their help.

Artificial intelligence and DQ

In examining artificial intelligence and DQ, recognizing that both fits in modern intelligence are necessary. Tayback et al. (2003) believe that although artificial intelligence is considered contemporary science, it was used for the first time by a scientist called John McCarthy in 1956 AD. Therefore, this concept has existed for four centuries BC, where philosophers define the mind as an organ similar to a machine that works through coding knowledge with a particular language to reach the right decision. Notably, artificial intelligence means computer systems and software that imitate human behavior (Ajam, 2018).Huang AND Rust (2018) established that these programs and courses are among the most intelligent, which tend to have two directions. The first direction depends on increasing information processing,

while the second one is to intensify the understanding level of the resulting information. Shaiba (2019) stated that artificial intelligence might reach a level that simulates human intelligence by learning from the experiences it goes through and developing software according to the obtained data with scientific and technical development.

Previous definitions indicate that artificial intelligence depends on the computer and its software and the extent to which it can simulate the human mind, thus relatively performing actions recently monopolized by people. However, DQ is fundamentally different from artificial intelligence. It includes the competencies and capabilities that individuals possess to optimally use the digital and technical requirements around them. Al-Dahshan (2019) defined DQ as "a term referring to the extent to which individuals possess a set of social, emotional, and cognitive capabilities that enable them to face challenges and adapt to the requirements of digital life." Also, it is defined by the DQ Institute in Singapore (DQ Institute, 2019) as a set of technical, mental, and social competencies necessary for digital life that enables the individual to face challenges and adapt to the requirements of digital life. In general, when children acquire the necessary digital skills,the practice is likely to transform risks into opportunities and create an ethical ecosystem, which supports them to invest and prosper in their future.

This benefit is based on the researcher's definition of DQ as a type of modern intelligence that falls within multiple intelligence theory. This concept is related to mental, social, cognitive, and technical competencies and capabilities, making the learner able to use technology effectively and safely.

DQ Levels and Skills

By looking at the reality of children's use of the digital world around them, acquiring DQ skills enable them to gain three levels of digital capabilities (DQ Institute, 2019 and Jamjoom, 2019).

Level 1: Digital Citizenship: An individual can effectively use technology and digital media in safe and responsible ways and under an ethical cover.

Level 2: Digital creativity: People's ability to integrate into the digital system and to create modern knowledge, technologies, and content that transform ideas into facts through the use of the associated skills.

Level 3: Digital leadership: Human capability to face global challenges through technology that creates new opportunities.

These digital capabilities include eight digital skills, including a set of competencies and abilities. Below is their illustrations, as mentioned by the DQ Institute (DQ Institute, 2019 and Jamjoom, 2019):

First: Screen time management: Screen time is the duration people take to use various electronic devices. Essentially, screen time management is the best use for individuals to use the technology available to him.

Second: Digital footprint: A digital footprint is a type of data created through people's use of the internet due to the sites they visit and the messages they send by means of multimedia digital.

Third: Privacy Management: It refers to the digital skill through which users can protect their private information and communication mechanism.

Fourth: Managing cyberbullying: It is a digital skill that enables users to recognize cyberbullying, how to properly deal with it, and seek help if needed.

Fifth: Critical Thinking: It is the skill through which the individual undertakes mental activities to distinguish between beneficial and harmful content.

Sixth: Electronic security management: This concept refers to the skill through which an individual can create and maintain strong passwords and avoid cyber-attacks.

Seventh: Digital Empathy: It is the digital skill with which a person can empathize with others through digital media.

Eighth: Digital Citizen Identity: This digital skill enables an individual to build an online personality with integrity.

Since these skills are essential to be transferred to children at an early age due to the reality of technology in contemporary life, Al-Dahshan (2019) clarifies many of the justifications

behind the importance of teaching DQ to kids, starting from kindergarten and then extending to the advanced stages. Among these justifications are;

1. The increasing need for practical guidance to develop strategies that help children acquire a set of skills and abilities to effectively and safely deal with digital and technological developments.

2. Due to the higher rate of kids using the information network, the DQ Institute (2018) report indicated that the number of children utilizing the internet had reached one third. This state makes them vulnerable to electronic risks that require proper digital preparation for their security. Despite the importance of family plays in alleviating this problem, there is a gap between the intervention of the new generation and the old generation educational institutions, which fails to effectively guarantee a child's right to safety.

3. The school environment has been dramatically affected by the digital revolution. This condition reinforces the occurrence of new patterns and strategies in line with the requirements to enable students to deal with these technological products and how it might affect their lives.

Before delving into the strategies that professionals can use in providing children and students in general with the digital skills they need in dealing with technology surrounding them, there is the requisite of emphasizing that the term DQ is still a recent trend among working professionals. In the field of education, and accordingly,

this study explores the extent of professionals 'awareness of the concept of DQ by adopting qualitative research methodology.

Research methodology and analysis

Most commonly, qualitative research seeks to reach an understanding of the phenomenon in its natural context for deeper understanding and describe it without adding any variables. Despite the importance of qualitative research in educational fields, its usage among Arab researchers is still limited (Oplatka& Arar, 2017).According to Basias and Pollalis (2018), qualitative research does not depend on generalizing results or relying on prior assumptions. On the other hand, this methodology focuses on a pluralistic view of

knowledge, and this situation may be the reason for the reluctance of many faculty members to apply it.

Moreover, qualitative research is characterized by being diverse and closely linked to the researchers and their personal experiences. Interest in the current study stemmed from the fact that the researcher is one of the specialists in childhood studies and child education. The investigator noticed some questions from childhood workers and parents about kids' handling of technology at an early age. Those working in qualitative research do not deny the investigators' role in interpreting and extrapolating the information they collect, not for generalization, but to understand the pivotal phenomenon through natural interaction in the adopted environment.

The research sample

The current study was concerned with knowing the extent of awareness of professionals working in early childhood education about DQ.

Based on this element, the sample was chosen intentionally. In this case, the research participants have been related to early childhood education. This type of sample is frequently used in qualitative research. It depends on the researchers' choices of the participants in their studies in a way that helps to understand the phenomenon and obtain information, which helps explain it(Basias & Pollalis, 2018). The case study approach was relied upon in the qualitative research domain, which entailed presence of several small cases studied within the basic one. The current study aims to investigate the phenomenon in its natural context.

Besides, qualitative methodology has found its purpose in applying the case study as it gives the researcher an opportunity to ask "what" and "how" questions to fully gather detailed information concerning the respondents' perception of the phenomenon under study There are criteria for reliability that characterize this research since the qualitative study is a reliable scientific technique in education and social sciences. In particular, credibility is one of the essential criteria sought by qualitative research(Fletcher, 2017). This aspect can be achieved by learning about the participants' culture and gathering information through more than one tool. Such a goal is also attained by giving the respondents the freedom to participate or withdraw from the study.

Also, there is the importance of asking the participants questions to reach the accuracy of the information. Thus, researchers reach a level where they are satisfied with the reliability of the collected data. Consequently, collecting data using one tool is not sufficient, but the researcher seeks to investigate evidence through more than one source of information. Hence, the process of triangulation appears in data collection and then analysis (As-Saadi, 2018). Triangulation is inspired by trigonometry, and Campbell and Fisk were the first to use this concept in social sciences. The definitions of triangulation are varied, but the common one is that it refers to collecting data from a variety of sources to gain deeper information that increases the reliability of the study and its results.

To achieve this objective, the study relied on the following data collection tools:

First: Documents: The study of documents as a research instrument enhances the depth of evidence gathered from other tools. Majid and Vanstone (2018) claimed that this method adds a new dimension and inferences that may not be collected through other research tools. Descriptions of bachelor's curricula in Saudi universities and reliance on reference comparisons made the researcher look at current programs related tokindergarten and childhood to consider courses linked to the phenomenon under study. This technique also included versions of kindergarten curricula issued by the Ministry of Education and approved by it.

Second: Observations: Direct observation of kindergarten activities presented through the official social media of these schools and also the official website, if available, was relied upon. The observation tool's application helps to add depth to the information gathered about the subject of the study (Smolkowski et al., 2020).

Observing technology in the study environment is vital as it adds a new dimension that helps to better understand the phenomenon under study. For the observation to achieve the desired credibility, it should be done more than once. In the current study, the approach was relied upon to observe what is shown in the official electronic channels of kindergartens for children over three separate periods; on the National Day, on the National Defense Day, and during school suspension due to COVID-19.

Third: Interviews: Interviews are considered as one of the primary tools in qualitative research. McKenna (2017) asserted that it could either be a one-on-one interview or an electronic interview. The advantage of electronic interviews is that they allow participants to answer at a convenient time. The current research relied on semi-structured interviews, which focused on the study's main topics and with the same strength, allowing both the investigator and the participants to add and enrich them according to the data and information shared (Basias &Pollalis, 2018). The current research relied on the application of four individual interviews based on open questions directed to the participants separately. The interview duration ranged from forty to sixty minutes. In this case, electronic interviews were followed when needed. Before starting the interviews, each participant in the research was provided with a consent form, which included the ethical consideration for dealing with the provided information and the right to participate or withdraw from the study upon their request(Vallejo et al., 2017). The participants were assured of the confidentiality of the information provided and that it will be used for scientific research only.

Selecting participants in the interview was based on its association with the standard of professionalism in early childhood. On the one hand, information was gathered through the applied field and daily dealing in the preschool field by interviewing a kindergarten principal and a preschool teacher. On the other hand, two academies were selected in the Department of Childhood Studies (Basias & Pollalis, 2018). One of them is an assistant professor and has more than five years of experience teaching technology-related courses in early childhood. The other one was chosen as a teacher from the same department with one-year teaching experience in a kindergarten.

The aim was to collect information about the phenomenon “the extent of early childhood professionals’ awareness of the concept of ‘DQ’ by drawing information from the practical and academic sides through the use of interviews as a primary tool to collect the required data. This method encouraged the respondents to explore their willingness to share information from experiences in their personal views regarding the research topic(Basias & Pollalis, 2018). Due to the nature of the qualitative analysis, each of the participants was

given a false name to preserve the information's confidentiality. Also, the educational institutions were not explicitly mentioned in the study, thus posed as a satisfying scientific description that helped understand and analyze data.

Concerning data analysis, the coding method has been relied upon to study the data and place them in lists related to research questions and topics. Most commonly, an in-depth and focused reading of various data packages helps the researcher extract the codes to fully understand the phenomenon under study (Basias & Pollalis, 2018). Afterward, the researcher set out from the phenomenology of qualitative studies. In this case, the current study sought to describe the participants' ordinary meaning in the research about a particular phenomenon through their experiences of the phenomenon or concept to be studied. Phenomenal philosophy begins with the identification of the essence of things or their identity, as reflected in the experience of the individual himself as it appears through the person's awareness of the phenomenon to be studied (Howell & Thompson, 2017). This aspect is what this study applied, as the researcher began collecting data through intentional interviews. She was relying on the respondents' experience and understanding of DQ and its mechanism before presenting to them the information that she had developed on the topic and then providing them with the opportunity to share their opinions and ideas. One of the axioms of qualitative research is that it does not depend on the principle of generalizing the results, but rather it relies on the transition (Howell & Thompson, 2017). Since qualitative research is concerned with studying phenomena in their natural context, this situation coincides with the perception of this type of social truth analysis. What helped the investigator to achieve reliability is to clarify the research procedures.

Results and discussion

The study began with a question about the awareness of professionals working in early childhood about the concept of DQ. The data shows that there is some confusion between the concept of DQ and artificial intelligence. Accordingly, the academic plan for the nineteen early years of bachelor programs was studied. These programs vary and are included within the faculties of education by 74%.

Besides, several interviews were held with the participants in the research. They began to discuss the reality of technology in children's lives in the early childhood stage. Afterward, the professionals' viewpoint of technology was examined and then the concept of DQ was addressed. In the end, the researcher realized that even though the early years' professionals were not familiar with the concept of DQ as the DQ Institution describe it, they drew on their experiences to determine the best strategies to use technology.

Technology and early childhood children

Technology inevitably left its imprint on the early childhood stage. The debate is no longer about whether or not to present children with technology. Still, the question has become about how children are prepared to deal with this technology. To investigate the situation, the views of professionals working in the field of childhood were explored. Much research has indicated that technology has become an integral part of children's lives(Gassama et al., 2017). To obtain in-depth knowledge about the specialists' opinion, they went to one of the governmental kindergartens in the Madinah region. An attempt was made to explore the impact of technology on children's lives in early childhood by asking Professor Wedyan, director of a kindergarten, about its effect on children in early childhood. Her answer was:

> Technology is a double-edged sword, either negative or positive. It is noticed that its negative impact overwhelms the positive and increases physical, kinesthetic, or behavioral diseases.

Given Ms. Widian's educational role as a leader for early childhood learning programs, she explained both the advantages and disadvantages of using technology on children at this stage.

> The positive impact lies in developing thinking skills and intelligence, as accurately using technology develops information and enriches knowledge for the child. In contrast, the negative impact can appear physically, such as low vision and the spread of eye diseases. Some children suffer from convulsions as a result of playing too much with electronics. It may affect the child's physical and social development.

> It may cause the child to be shy or introverted, confront and express their feelings, and a lack of communication with their peers.

Based on principal Widian's answer and justification of the benefits and challenges of using technology, she, in turn, presented an outline picture. This image may be influenced by her perception of children who come to her school every morning. Hence, her interpretation of technology's use came from the reality of her experience and children's behaviors. Several studies on technology in early childhood show a consensus between this study's findings that there are some adverse effects of using technology at this stage (Hardell, 2018).They indicated a difference between countries that provide technical resources according to children's needs and development requirements. Consequently, they exhibited a difference between countries that offer this technology without considering their age and conditions, which may have a negative impact on young learners.

The researcher realized that the classroom teacher's reaction changed when she asked the same question. The answer of Nouf, a kindergarten teacher with more than ten years of experience in this field, came in much detail as can be seen in the following quote:

> From my practical experience, I noticed that technology has positive effects and adverse effects. I noticed that a group of children have an outcome of English words due to the programs attached to their devices, and most of them have the ability to deal with devices with more capability than adults. As for the negatives, the kid may sit for hours on devices, which affects the child's concentration and tension, while not discharging the motor energy. All this would negatively affect the child's mental, motor, and even behavioral development.

By looking at teacher Nouf's answer, her focus is on mentioning the positives through the reality of her contact with the kid during the school day and her observation of the impact of children's linguistic outcome through technology in their lives. A point worthy of attention raised is the children's awareness of how technology is being used around them andtheir ability to interact with this vast digital world.

Simultaneously, Ms. Nouf warned that technology has another side; if children are not directed correctly, it may affect their health, integrated development.

> Parents' role is essential and has a significant impact on the way children are exposed to technology. Whether by selecting programs aimed or regulating the hours of children using their devices and monitoring them.

Speaking about parents' role in legalizing children's use of technology and guiding them towards the use of technology, Teacher Nouf addressed one of the dimensions that DQ seeks to impart to them concerning managing screen time. Despite the importance of what teacher Nouf mentioned, which is in consistent with the basics of DQ and how to prepare a conscious generation, the study showed that teacher Nouf has focused on parents' role. Her experiences drive her opinion both at work as an instructor of the early years and at home as a young children's mother. Scientific studies, especially in the early childhood stage, hardly differ with the findings of the current study regarding the role that parents play in choosing the technical programs that benefit their children. Also, their role in determining the appropriate time that the child spends in front of the screen, for example, the study mentioned, which used 137 participants. Such a study indicatedthat 45% of all participants whose children use smart devices, 23% of the kids spend more than three hours a day on them.

Professionals' awareness of the concept of DQ

When talking about technology's reality in children's lives in early childhood, there is almost an unspoken agreement that it has left its mark at this stage. Commonly, technology is an essential part of the system, progress, and development of human society. Educational institutions play a vital role in providing children with the necessary skills to prepare them for life. Currently, most people have acknowledged that children are ready to use technology sufficiently, in addition to preparing them socially, linguistically, cognitively,

and physically (Hardell, 2018). Given that the concept is still recent, the current study was interested in exploring the extent of early childhood workers' awareness. The question that arises is whether early childhood professionals are qualified to prepare children with the necessary skills for use.

The majority of specialists in childhood know the basics of technology and its application in childhood(Jung, 2018). Still, there is no evidence that there is sufficient preparation for the mechanism of applying intelligence skills. The digital program is part of the preparation curriculums for women specialists in the field of childhood. By looking at the bachelor's curriculums for preparing professionals working in early childhood, whether they are in educational programs or others, the study found that the number of courses related to technology education in their entirety ranges from one or two.

An early year's bachelor's program in which four technology-related courses are taught is affiliated with one of the local universities in a college restructuring. According to the education minister's decision, no. (88247), entry to this program was suspended from 3/8/2018 to stop admission in teacher preparation programs at the bachelor's level. Kindergarten programs are excluded from this suspension, provided that universities develop all existing courses to be early childhood education programs, following the frameworks approved by the Teacher Preparation Programs Development Committee. As a result, another program was opened in the College of Education. The educational technology course is a compulsory college requirement, the simulation course, and educational computer games as an optional program course. The researcher noted that most undergraduate programs teach the educational technology course or similar courses as college requirements. These courses are not explicitly directed towards teaching the child how to use technology or what skills can be provided to the kids to use technology in the right manner. However, its focus centered on delivering the child specialist with the necessary skills that make her able to take advantage of the available technology in designing and implementing technical media, which will facilitate the kids' education process. When asked about the use of technology in preparing early childhood specialists,

Dr. Sabah explained that the undergraduate program teaches technology-related courses:

> The program is concerned with providing students with many technical skills that allow them to use the computer and the available applications in preparing educational programs and educational games that

> help develop children's cognitive abilities. We start with the students in the technology course in childhood activities at simple levels and then progress to the advanced level in the simulation and computer games course.

Dr. Sabah explained that the program she taught five years is concerned with providing her with the essential skills to design technical programs and games that enhance childhood learning. She also indicated that when many students reach the end of their academic career and start applying their capstone project, they resort to empirical research related to technology.

> As academics, we noticed that even though the program is not focusing on educational technology, our students show great interest in technology-related subjects. Moreover, when they reach the eighth level and start preparing their graduation projects, many students resort to technology-related projects. They are keen to design educational games or educational activities and apply them.

By browsing the platform of The Third Scientific Forum of the Department of Childhood Studies on one of the national universities in the Kingdom of Saudi Arabia, the investigator found that thirteen of the twenty-nine projects dealt with topics related to technology (Scientific Platform, 2020). The projects vary; some look at the impact of technology on developing children's skills. At the same time, others explore the use of technology as a means of education. According to what Dr. Sabah explained, this situation corresponds to teaching the courses in the program. To gain a comprehensive understanding of technology and professionals' association with it in the early childhood stage. Several official accounts of social media sites were observed for governmental and private kindergartens in the Madinah region, and the convergence of views between the academic and the practical side is evident. During the observation, the study found that one of the private schools, "Ahali A," through its official account,

indicated the schools' interest in modern education and mentioned that educational centers had begun a gradual shift toward e-learning. She further stated that e-learning is now integrated into kindergarten classes,

And these leaning contexts are provided with LCD screens and computers. "Ahli A" schools placed two posts on children's Instagram account using computers. There were seven pictures in the first post, while the number of images in the second post was ten pictures. The images were collected, showing children looking at the camera, and in front of them, the computer screen was open on one of the drawing programs. The children applied the use of drawing on the computer. Whereas, "Ahli B" schools focused on their educational services in addition to providing an e-learning program. "Ahli B" schools defined the program as "an electronic system that enables students to conduct experimental tests and follow up their daily duties and class schedule. Also, it allows parents to follow up on their children and be informed about their academic achievement level. According to the latest technologies, the "Ahali B" school's description may be similar to "Ahali A" about the financial capabilities of educational institutions. The study showed that social media accounts revolve around various activities that schools hold, whether within the official working hours or outside it, which exposed prejudice to private life through the misuse of cameras or mobile phones.

Moreover, through the way kindergartens presented their use of technology and Dr. Sabah's explanation of its courses within the undergraduate program, the focus is on the existence of technology as a tool for education. None of the academies or professionals demonstrated sufficient knowledge regarding DQ's concept, as indicated at the beginning of this study. When lecturer Fidaa was teaching, a junior lecturer in the Department of Childhood Studies at a national university in the Western Region in Saudi Arabia indicated that she was hearing him for the first time, and she linked it to children's understanding of mathematical concepts.

> I expect that it is related to numbers. Like children's understanding of arithmetic and the processes related to it, and the child's ability to perceive the relationships between numbers quickly and through various techniques, such as watching children's clipsin UC Mas and other programs, which enhance the child's digital skills.

The previous experience that the lecturer Fida acquired before joining the academic field played a role in interpreting DQ's concept.

There was a preconception among the researcher that the number of years of experience might have a role in explaining female professionals' awareness of this concept. Still, this perception was quickly changed according to a short answer from Professor Wedian about the concept in which she explained that she had not heard it before and added:

> Until now, this kind of intelligence has not spread as desired among early childhood professionals.

Wedian was a kindergarten principal who had nearly thirty years of experience in the early childhood stage; she has served as an educational leader for eleven years. The other years consist of her experience as an early year's teacher in private and public kindergartens and as an educator for the first grade of primary school. Although she did not deny the reality of technology, as shown in the previous section, DQ's concept was utterly new.

Teacher Nouf's response was influenced by the fact that she was a mother of four children and her profession as a teacher for nearly ten years. When she clarified the concept of DQ, her response came from the reality of her educational and parental experiences:

> *My understanding of DQ is what education aspires to achieve. The concept of education has changed from the physical to the mental aptitudes. Due to technological development, devices and computers have become mimics of the human mind. It is necessary to take advantage of this development and employ it for our benefit.*

Teacher Nouf's interpretation was based on her daily practice in the classroom as she noticed the significant role that technology plays in children's lives. However, she did not explain the concept of DQ as it is known, according to what the Institute of DQ in Singapore knew. Still, her interpretation of the concept is driven by her daily work with children; her observation of technology affects the building of their experiences and behaviors. Technology-enabled her to apply some of the skills classified by the DQ Institute. This application was consistent with what was mentioned previously about the parents' role in guiding their children towards technology use. Based on some policies that she uses with her children, she stated that;

First: Activating the restrictions on their devices while specifying the age group. Second: We set a time for using the electronic devices to be agreed upon in advance. Third: We have decided that downloading any new program or game will take place after viewing it. I would love to discuss with them what if someone tried to talk to us on chat if they ask for our friendship over the internet. First and foremost, I instill in them the fear and observation of God. God is the best of the keepers.

The term DQ is considered new in the scientific literature and its association with the competencies and abilities that must be taught to children under the modern lifestyle and technology exposure. This study shows that despite the lack of overall concept of DQ among early childhood professionals, the application of some strategies and skills is directly related to the experience acquired by women workers in the field of early childhood. This situation shows the importance of the study on the need to spread awareness of DQ. This claim is consistent with Al-Dahshan (2019), who mentioned a digital divide between children and the adults around them, including educators and parents, which shows the need for a responsible party concerned with spreading and increasing awareness about the importance of DQ. Also, protecting children from technology risks and providing them with the necessary skills and competencies make them digital citizens. They can confront the dangers of the digital world with the right science. They have opportunities to sail in this world.

Artificial intelligence versus Digital Intelligence

The conducted interviews showed that DQ's concept is defined by the DQ Institute in Singapore (2019) as "a set of technical, mental, and social competencies necessary for digital life that enables the individual to face the challenges and adapt to the requirements of digital life. This definition differs from what the early childhood professionals envisioned. Also, the collected data showed an overlap between the concept of artificial intelligence and DQ. This claim can be validated by Dr. Sabah, assistant professor in the Department of Childhood Studies specializing in educational techniques and DQ, who said that;

DQ is a set of numbers that symbolizes information; we can say DQ is technological numbers. This intelligence is related to technology,

which appears in the form of digital code. So DQ is part of artificial intelligence and depends on it.

By explaining DQ's concept in early childhood, Dr. Sabah clarified that there is a difference between artificial intelligence and programming and DQ. Dr. Sabah referred to the difference between DQ and artificial intelligence. Despite the importance of using technology in education, DQ's concept is still very recent among workers in the early childhood field.

> Here, even at the university, the concept is still new. It is the first time I hear about it frankly, but I feel that it is necessary through our discussion, and we must all learn it.

In the previous quote, Dr. Sabah explained that the concept of DQ is new and that there is a need to learn it, and teacher Nouf agreed with her:

> Kindergarten teachers and those in charge need to develop DQ skills and apply them atthis stage. This practice is an essential building block in a child's life. Still, in return, we urgently need to provide kindergartens with DQ tools to apply it, guide the child, and modify his skills.

Through in-depth interviews with early childhood professionals, this study concluded that DQ is not well spread in the educational field. The study argued that despite the shortage of information regarding DQ, professionals have their strategies in setting boundaries and roles for children to use technology. There is an agreement between the study's findingsand the DQ Institute's attitude toward the importance of teaching children the skills necessary to have the minimum level of competence and ability to benefit from what is presented in the digital world in safety atmosphere. The outcome is consistent with what Al-Dahshan (2019) called for regarding the importance of teaching children about DQ skills as technological know-how has become a prerequisite for developing the digital economy and the digital world. Besides, using the internet is rapidly cropping up, and they attract attention in the local and international domains. The existing gap between educators' and children's generation requires strategic plans compatible with the educational systems to protect the kids and ensure their rights to a safe life.

Conclusion

By presenting and discussing the results of this study, recognizing that technology plays an excellent role in educating children in early childhood is important. There is an increasing awareness among professionals working in this field that the use of technology presents positive and negative effects. This study argues that most of the skills and strategies that early childhood professionals use in dealing with technology stem from their personal and life experiences and their skills through studies and work fields. As a result, the need for the concept of DQ emerged. This new concept can be one of the types of multiple intelligences emanating from Gardner's theory. The current study is one of the first researches that dealt with this concept. According to the DQ Institute's definition in Singapore, there is a need for more research on preparing early childhood professionals to include this type of intelligence within their teaching and mentoring strategies. There are various ways that those interested and decision-makers must follow to develop a policy and mechanism to spread the concept of DQ among women workers in the early childhood field first. They should later strive towards spreading this concept through various community partnerships to involve parents and families to raise awareness about it.

Given the importance of spreading awareness among educators in general and early childhood professionals, particularly the importance and necessity of DQ, its applications, and skills, the researcher believes that there should be channels for official cooperation between specialized academics and workers in kindergarten early childhood schools. Several sessions can be organized to spread the awareness of DQ and its application in the field. Besides, workshops and focus group meetings can be arranged to support exchanging experiences among professionals on DQ strategies and their application in line with the local environment and the teachings of the Islamic religion. The COVID-19 crisis and public education shift towards e-learning showed an urgent need to take rapid steps to spread DQ knowledge. Also, the importance of teaching students from an early age the necessary strategies and mechanisms that will help them achieve digital citizenship can be obtained through:

1- Holding workshops and training courses for early childhood workers to familiarize themselves with DQ and its importance.

2- Producing informative videos to explain DQ's importance in educational institutions and then directed to educators and parents.

3. Publishing awareness-raising videos on DQ skills in various versions that suit children's ages from kindergarten to the older stage.

With the concerted efforts of academics and workers in early childhood, solid research and awareness programs can be launched concerned with DQ's reality in the Arab world and seek to add information and contributions to educators in this region. This research is only a starting point towards contributing to spreading awareness of the importance of DQ. We recommend future research that looks at applied experiences of teaching children DQ skills. The essential strategies followed identified the available opportunities and difficulties that may arise through qualitative field studies.

References

Abdeen, Z., Greenough, G., Shahin, M., & Tayback, M. (2003). Nutritional Assessment of the West Bank and Gaza Strip, 2003. *Jerusalem: Ministry of Health, Al Quds University, US Agency for International Development and Care International*.

Afaneh, Izzo, and Khazindar, Naila (2004). Multiple intelligence levels among students of basic education in Gaza and their relationship to mathematics achievement and tendencies towards it. Islamic University Journal, (12) 2, 323-366.

Ahmadi, D., & Reza, M. (2018). The use of technology in English language learning: A literature review. *International Journal of Research in English Education*, *3*(2), 115-125.

Ajam, Ibrahim Mohamed (2018). Artificial Intelligence and its implications for high-performance organizations - An exploratory study at the Ministry of Science and Technology. Journal of Management and Economics, (115), 88-102.

Al-Dahshan, Jamal (2019). Development of DQ Digital intelligence for our children is one of life's requirements in the digital age. International Journal of Research in Educational Sciences, 4 (2), 51-88.

Al-Sharqawi, Muhammad (2011). Artificial intelligence and neural networks. Alexandria Library: Alexandria.

As-Saadi, Ahmed. (, 2018).The role of the Triangulation strategy in improving scientific research in the field of educational technology. The International Journal of Specialized Education, 7 (9), 68-78.

Basias, N., & Pollalis, Y. (2018). Quantitative and qualitative research in business & technology: Justifying a suitable research methodology. *Review of Integrative Business and Economics Research*, *7*, 91-105.

Basias, N., & Pollalis, Y. (2018). Quantitative and qualitative research in business & technology: Justifying a suitable research methodology. *Review of Integrative Business and Economics Research*, *7*, 91-105.

Damyati, A. R. (2010). *The sources of knowledge in Islam: a study on the philosophical ideas of Syed Muhammad Naquib al-Attas* (Doctoral dissertation, University of Malaya).

Doabler, C. T., Clarke, B., Kosty, D., Turtura, J. E., Sutherland, M., Maddox, S. A., & Smolkowski, K. (2020). Using Direct Observation to Document "Practice-Based Evidence" of Evidence-Based Mathematics Instruction. *Journal of Learning Disabilities*, 0022219420911375.

Dooly, M., Moore, E., & Vallejo, C. (2017). Research Ethics. *Research-publishing. net*.

DQ Institute, (2019). *Global Standards for Digital Literacy, Skills, Readiness*

DQ Institute. (2018). *Global Standards for Digital Literacy, Skills, Readiness*

Fletcher, A. J. (2017). Applying critical realism in qualitative research: methodology meets method. *International journal of social research methodology*, *20*(2), 181-194.

Guest, G., Namey, E., Taylor, J., Eley, N., & McKenna, K. (2017). Comparing focus groups and individual interviews: findings from a randomized study. *International Journal of Social Research Methodology*, *20*(6), 693-708.

Hassan, Haider (2016). The theory of multiple intelligences, a theoretical study. Journal of Educational and Psychological Research, (51), 281-299.

Howell, R. J., & Thompson, B. (2017). Phenomenally mine: In search of the subjective character of consciousness. *Review of Philosophy and Psychology*, *8*(1), 103-127.

Huang, M. H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research*, *21*(2), 155-172.

Huda, M., Jasmi, K. A., Hehsan, A., Mustari, M. I., Shahrill, M., Basiron, B., & Gassama, S. K. (2017). Empowering children with adaptive technology skills: Careful engagement in the digital ınformation age. *International Electronic Journal of Elementary Education*, *9*(3), 693-708.

Hardell, L. (2018). Effects of mobile phones on children's and adolescents' health: A commentary. *Child Development*, *89*(1), 137-140.

Jung, H. (2018). Finding the Research Possibilities of Computer Technologies in Art Education. *International Journal of Advanced Culture Technology*, *6*(2), 51-57.

Izzo and Khazindar, Nayla (2004). Classroom teaching with multiple intelligences. Palestine: the horizons.

Jaber, J. A. H. (2003). Multiple Intelligences and Understanding: development and deepening. *Dar El-Fikr Al-Arabi, Cairo, Egypt*.

Jamjoom, Mounira (2019). Digital intelligence. The grapes of the Arab teachers' platform.

Mahmoud, Saladin (2006). Thinking without borders: contemporary educational insights into teaching thinking and learning. Cairo: The World of Books.

Majid, U., & Vanstone, M. (2018). Appraising qualitative research for evidence syntheses: a compendium of quality appraisal tools. *Qualitative health research*, *28*(13), 2115-2131.

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment, and People*, *7*(1), 23-48.

Nofal, Muhammad Bakr (2010). Multiple Intelligence in the Classroom: Theory and Practice. Amman: House of the March for Publishing, Distribution, and Printing

Oplatka, I., & Arar, K. (2017). The research on educational leadership and management in the Arab world since the 1990s: A systematic review. *Review of Education*, *5*(3), 267-307.

Sánchez-Martín, J., Álvarez-Gragera, G. J., Dávila-Acedo, M. A., & Mellado, V. (2017). What do K-12 students feel when dealing with technology and engineering issues? Gardner's multiple intelligence theory implications in technology lessons for motivating engineering vocations at Spanish Secondary School. *European Journal of Engineering Education*, *42*(6), 1330-1343.

Shaiba, Omar (2019). Employing artificial intelligence techniques in the service of forensic science. King Saud University Journal, Educational Sciences, and Islamic Studies, 2 (25), 1-14.