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The Effect of the Software Test Survey for Students in Developing the Arabic Language Skills of Third-Grade Students in Qatar

Hiba Naccache, Mayamin Altae, and Fatima Abdulla Al-Own

Abstract

This paper studies the effect of implementing a new Arabic language learning software Test Survey for Students (TSFS) developed by the researchers and marketed as brain training software for primary students on language skills using Science, Technology, Arts, and Mathematics (STEAM) subjects. The teaching of Arabic language via computer-assisted language learning (CALL) takes place for the first time in Qatari schools specifically for primary students. The researchers included a theoretical analysis of current trends in CALL and Arabic language skills. Reading skills, learning word and sentence skills, and dictation skills were the three Arabic basic skills tested to measure the effectiveness of developing these skills and improve achievement for third-grade students using CALL in STEAM subjects. Mixed models analyzed using the statistical software for social sciences suggest that teaching Arabic language skills with STEAM topics using educational software is effective and has a promising potential to be extended to the whole of middle east and north Africa region.

Keywords

STEAM, CALL, language learning, educational software, Arabic language

Educational Sciences, Qatar University College of Education, Doha, Qatar

Corresponding Author:
Hiba Naccache, Educational Sciences, Qatar University College of Education, Doha, Qatar.
Email: hnaccache@qu.edu.qa

Introduction

The world has witnessed many challenges throughout the 21st century that resulted in rapid developments in the field of sciences and technology. Such challenges affected all the sectors of life including education hence attracting the attention of educators and making them work toward keeping pace with the changes to address the needs of future generations. A new tendency was formed in the education field, as a result, that focused on utilizing technology in education to reinforce the educational process and achieve its objectives as part of the six Cs (critical thinking, collaboration, communication, creativity, citizenship/culture, and character education) concepts that have recently emerged as a new trend in education.

Researchers in the education context believe that technology has become a critical factor in the field due to its capabilities to support education stakeholders through enriching the whole process so that education programs, activities, and criteria reflect the elements of technology (Al-Subaye & The bonus, 2014). The latest application of technology has transformed the teaching methods and strategies beyond the sole images and plain texts into a more interactive implementation of technology and virtual reality. This method provides learners with effective and enjoyable learning experiences and replaces the traditional learning concept with a more up-to-date concept based on a thinking method that enables learners to adapt to the nature of the era (Zaghloul & Beni Ahmed, 2020). Researchers have become aware of the vast technological revolution that is having an impact on various sectors of life, forcing people to adapt to it and utilize it for the benefit of the modern society. Educational software has emerged as a modern method of learning in the educational field supporting the integration of various sources such as scientific materials to facilitate effective learning, mainly in the field of Arabic language learning. Sources such as scientific materials and audio and visual learning aids have become useful in interactively linking the written texts, images, and graphics. They have also created a diverse, positive, and attractive learning environment for learners, enabling them to interact with the scientific material effectively. Owing to the increasing usage of educational software in learning, new patterns and teaching methods entered the field. The new approach increased the need for multisource learning environments that can support the acquiring of the skills needed for the 21st century such as the students' self-learning skill that is considered as one the most important skills under the requirements of using technology (Hashem, 2012).

Using educational software as teaching aids can achieve accurate, enjoyable, and quality educational content and provides learners with an environment that utilizes the learning materials effectively and addresses the learners' requirements based on their age groups and individual needs (Al-Shamrani & Al-Adeel, 2019). Al-Matroudi (2016) believes that educational software can also provide teachers with facilities that save time and effort, encourage positive interaction for learners, develop their skills and positive attitudes, and promote modern educational concepts

that develop students' skills mainly in Arabic, which is the cornerstone in understanding other materials (Al-Subaye & The bonus, 2014).

Computer-Assisted Language Learning

This study deals with computer-assisted language learning (CALL), which has been increasingly used, in language education, including Arabic language education.

CALL is the use of computer technology to support language learning and teaching. CALL includes a variety of applications, software, and online resources to support language learning and practice. CALL's history dates back to 1960s, when researchers began exploring the potential of computers in language learning. Initially, the CALL program was simple and limited to exercises that provided learners with repeated language practice to reinforce vocabulary, grammar, and pronunciation. However, with advances in multimedia and interactive technology, CALL programs incorporate multimedia elements such as audio, video, and interactive exercises to increase learner engagement and provide a more authentic language experience. The spread of the Internet and online resources has further expanded the reach of CALL. Today, CALL is evolving in parallel with technological advances. This includes various approaches such as adaptive learning systems, gamification, virtual reality, and natural language processing. Researchers and practitioners in the field of language learning and education continue to study and evaluate the effectiveness of various CALL applications and methods for optimizing language-learning outcomes. The researchers in this study believe that CALL will transform the language learning landscape by providing learners with new opportunities for self-directed, personalized, and interactive language instruction, and by enabling educators to build dynamic and engaging learning environments.

Besides boosting the learner's motivation, self-confidence, and independence, CALL also offers the advantages of being adaptable to the learner's schedule, providing immediate feedback and error analysis, and allowing for individualized syllabus. Additionally, it serves as a source of exposure to the target language and encourages students to become more self-reliant. However, before implementing CALL, it is important to take into account its limitations such as financial constraints, inadequate program quality, and users' lack of equipment, knowledge, and self-discipline (Ozturk, 2013).

Arabic Language

Arabic language is one of the most important subjects taught in schools in the Arab world, especially in the early stages of education. The teaching of the Arabic language in the most effective and up-to-date method is a pure civilizational indicator because language is what distinguishes human beings from other creatures, and it is the main means of communication. Language is also a means to understand various sciences

and through which individuals satisfy their learning needs by finding the required space and freedom to develop their thinking and broaden their perceptions. This becomes clear when it comes to reading skills because child development is normally linked to the ability to read and understand what is read (Abdul Halim, 2009).

Al-Shamrani and Al-Adeel (2019) indicate that students can effectively learn the Arabic language skills through educational software due to its suitability for such method of learning. Arabic language has certain characteristics that make it easily programmed due to the compatibility of its written and readable aspects. Therefore, Arabic language is most compatible with educational software due to the distinctions in its various skills, and learners can successfully develop multiple skills such as listening, reading comprehension, grammar, dictation, and other skills in an integrated manner without one skill being dominant over another.

The teaching of the Arabic language in the primary stage is significantly important because it paves the way to the development of students' knowledge, especially in the third year of primary school when the child starts to learn some important skills such as the reading comprehension, spelling, and syntactic. Many educational institutions look at the teaching of Arabic language in primary schools as significantly vital, and they work toward implementing the most effective strategies to enable children to obtain the basic language skills needed for their development. Nonetheless, it has been noted that children still struggle to master these skills and they continue to experience many difficulties. The research in the field of developing effective methods and strategies to effectively teach Arabic language in the primary stage shows that there is a reoccurring problem in finding the most appropriate methods to teach Arabic language at this stage (Al-Ghamdi & Aaron, 2012; Al-Shamrani & Al-Adeel, 2019; Zaghloul & Beni Ahmed, 2020).

In addition, a change in the learners' preferences shows that learner are in favor of using technology rather than using the traditional learning methods that rely on textbooks and the old teaching aids. Hence, it has become necessary for education officials to address the new learners' trends and make the required adaptations in the educational process in order to successfully achieve the desired educational goals mainly in the primary stage and in the third year in specific where teaching should focus on play and interactive methods rather than the traditional style.

Based on the importance of Arabic language, and to keep pace with the requirements and interests of learners in the 21st century, this study endeavored to explore the impact of using educational software in developing Arabic language skills for third-year primary students in Qatar using an integrated manner in providing knowledge compared to the traditional method.

Literature Review

Many studies in the middle east and north Africa (MENA) region investigated the use of educational software, Al Tarifa and Ahmed (2013) conducted a study aimed at

identifying the effectiveness of using computerized educational software to develop dictation skills for Year 6 students. Using an experimental approach, the researchers divided the study sample selected into a control group that studied Dictation in the traditional method, and an experimental group that studied Dictation using educational software. They applied a pretest to ensure that there were no differences between the two groups. The results showed the effectiveness of the educational software in developing the students' dictation skills compared to traditional method.

Ahmed and Al-Jarrah (2014) sought to measure the impact of Camtasia software on developing Arabic language reading skills in Year 2 students and explore students' attitudes toward reading. They followed the experimental approach and chose a sample made of 44 students that were divided into a control and an experimental group. The experimental group used Camtasia software, and data were collected using a note card and a questionnaire. The results indicated that there were statistically significant differences in the development of Arabic language skills that were attributed to the benefit of the experimental group.

A study by Al-Shamrani and Al-Adeel (2019) looked at the effectiveness of educational software in developing the Dictation skill of Year 3 intermediate students. To achieve the objectives of their study, the researchers followed the quasiexperimental approach and chose a sample of 56 students in Year 3 intermediate level. They divided the students into two groups control and experimental. The experimental group was taught using the Articulate Storyline program, and the learning tools consisted of a list of Dictation skills prepared in a multiple-choice test. The results showed the effectiveness of the educational software in developing Dictation skills for Year 3 intermediate students.

Zaghloul and Beni Ahmed (2020) investigated the effectiveness of educational software in developing initial reading and achievement skills in Arabic among Year 3 students in Jordan. The researchers used quasiexperimental approach, and they chose 40 students from Year 3 who were divided into control and experimental groups. Each group consisted of 20 students, the experimental group was taught using educational software, and data were collected using an achievement test for both groups. The results showed that there were statistically significant differences in the mean scores in favor of the experimental group.

Yacoubiya et al. (2021) also tested the effectiveness of virtual reality software (Mozaik 3D) in teaching Arabic to develop speaking and visual thinking skills for Year 4 students. They used a quasiexperimental approach based on two groups control and experimental. Two tools were used—the first was an oral performance analysis card to measure speaking skills, and the second was a written test for visual thinking. The experimental group was taught using virtual reality software. The results showed the superiority of the experimental group over the control group, which indicated the effectiveness of the educational software in developing the target skills for the study sample.

The quasiexperimental approach that is based on the design of two groups, a control group, and an experimental group is widely used in previous literature. This indicates

that such approach is valid in identifying the effectiveness of educational software in developing Arabic language skills; therefore, this study adopts this approach. The previous studies also focused on primary school students due to the importance of developing and strengthening students' skills in this particular stage being the stage upon which their learning in the advanced stages is built on. Therefore, this study has chosen Year 3 students because students in this stage begin studying Arabic language skills such as reading comprehension, word and sentence, and advanced dictation skills. None of the previous studies combined Arabic language skills (reading comprehension–word and sentence–dictation) in one software as an integrated academic unit in the Arabic language book. Therefore, the focus of this study will be on teaching an integrated unit through educational software. The data collection tools in the previous studies varied depending on each research objectives and what was suitable for the target skills and the studies samples.

This study aims to know the effect of educational software in developing Arabic language skills based on Science, Technology, Arts, and Mathematics (STEAM) for the students in third grade of primary school in Qatar. Therefore, it follows the quasiexperimental approach.

The interest in studying the effect of using software in education increased exponentially during the pandemic and many researchers highlighted the importance of digitization on education, they described it as underestimated strategy of learning with mentioning accessibility, motivational and social issues (Aboagye et al., 2021; Lai & Widmar, 2021). Although the technology spread was wide in the recent years, students still have problems with digital literacy (Chigisheva et al., 2021). Moreover, the popularity of virtual and augmented reality is increasing among education technology and considered as good enhancement in learning through gaming but still new to educators who marked problems related to the use of these technologies (Elmqaddem, 2019; Horváth, 2018; Volkova et al., 2020). Researchers argue about the increase in students' motivation, engagement and productivity while using gaming in learning (Alsawaier, 2018; Buckley and Doyle, 2016; Chapman & Rich, 2018; Gamlo, 2019). This study focuses on the advantages of the new educational software Test Survey for Students (TSFS) app's for skill-based linguistic for Arabic language specifically with time visualizations, motivation, and achievement. Although similar application were tested for motivation and control only (García Botero et al., 2019) and emphasized the self-control as a key for achieving (Hidayah, 2021), this app tests in class the engagement of students, their adaptation in new learning environment, and their achievement according to language skills. Further studies showed that when students learn using gaming, the phenomenon leads to standardization, which prevents the development of language skills (Im et al., 2019). This study uses a control group and limit the skills to language skills instead of general skills, which improves the outcomes. Literature review confirms the frequent studies about digitization in learning languages but no such studies apply this in primary classes in Qatar. It is known that developing software and creating common framework for curriculum designers

require a high budget and they are time consuming. The present study uses a free new software that can be used on mobiles or computers to test its quantitative efficiency to increase motivation and achievement of the student in Arabic language skills, as well as reporting the feedback about this process directly from the students.

Significance of the Study

Teaching reading and writing skills using technology has a clear effect on increasing students' motivation and their sense of independence and self-esteem (McCarrick & Li, 2007) and also helps them increase their academic achievement, especially in these skills, as increased motivation works on acquiring and developing language skills (Clinics & Tahat, 2009). The results of studies that tested the skills of students in the State of Qatar showed weakness in reading performance and its various skills (Ibrahim et al., 2020). Accordingly, it was necessary to work on developing an educational software to teach reading skills in the Arabic language and to diversify the usual teaching methods to help increase students' motivation to learn.

Arabic teaching and learning have both benefited from the widespread usage of CALL. The literature on the use of CALL for Arabic language acquisition still has certain limitations, nevertheless. Researchers emphasized that more study is required to determine the best pedagogical strategies to include CALL in Arabic language training. Different CALL tools, such internet platforms, mobile apps, and virtual reality, can be used in a variety of ways, but it is crucial to find out which strategies are best for Arabic language learners. The strategy used in this study focuses on the three skills of the Arabic language and included them in the new software. In addition, this study provides adaptive and personalized learning experiences by adapting training to the requirements of individual learners. However, research on how to effectively design and implement adaptive CALL systems for Arabic learners is sparse. More research is required to create intelligent CALL systems that can adjust to learners' competency levels, learning styles, and unique language needs, and this study will provide this intelligent system especially when later the researchers add the artificial intelligence (AI) part. The researchers in this study designed this software according to the need of Qatari scholars in early classes, specifically third grade, and the design and content were carefully implemented after many reviews with teachers of this grade in Qatari schools. Another gap in learning Arabic language in literature is choosing the material authenticity for Arabic language learning. While certain CALL resources for Arabic are available, there is a scarcity of authentic and culturally appropriate materials that reflect real-world language use; in this study, researchers develop and assess CALL resources that provide learners with authentic Arabic language input as well as culturally relevant information, and this appears in the STEAM material used in the software. The culture in Qatar is somehow different of the rest of Arabic countries so the researchers adjusted the STEAM materials to embrace it. Another gap in CALL literature is designing the best software to boost motivation and engagement

among Arabic learners where this software should have the ability to improve learner motivation and engagement in Arabic language acquisition. However, research on how to create CALL environments that effectively boost motivation and engagement among Arabic learners is sparse. According to the interviews done by some of the students after using this software, it succeeded in designing components that can boost learners' interest, enjoyment, and persistence when utilizing CALL for Arabic language acquisition. Another achievement of this software is its ability to offer automated assessment and fast feedback, while researchers agreed that further research is needed to determine how properly integrate these aspects into Arabic language acquisition, this software succeeded in doing this part where students can see their progress during the intervention. The plan to use the AI later in this software can develop trustworthy and valid evaluation tools for CALL environments, as well as investigating the effects of automated feedback on learners' language progress, which represents a critical area of research. The last gap filled by this software is the learner autonomy and self-regulation, CALL has the potential to encourage learner autonomy and self-regulation, allowing students to take control of their learning process. However, there has been little study on supporting student autonomy and self-regulated learning through CALL in the context of Arabic language learning. This research develops CALL settings that allow learners to set goals, check their progress, and make informed learning decisions.

Theoretical Framework

CALL theory is a collection of perspectives, models, frameworks, and specific theories that provide generalizations to account for phenomena related to computer use and the pursuit of language learning goals, to ground relevant research agendas, and to inform effective CALL design and practice (Hubbard, 2021). It is large enough that any attempt to characterize it without a detailed understanding of how technology influences that environment and the learning process will fall short. Unlike second-language acquisition (SLA), CALL does not have a specialized theory and instead draws from a number of sources, including SLA theories, general learning theories, linguistic theories, and human–computer interaction theories. The theoretical basis of CALL differ greatly, with no dominant hypotheses.

There are various approaches to computer assisted language learning (CALL), including behaviorist, cognitive, communicative language teaching (CLT), sociocultural, constructivist, and task-based language teaching (TBLT). These approaches are not necessarily separate, and many educators use a combination of them depending on their teaching objectives, the needs of their learners, and the technology available to them.

In this study, the researchers utilize both cognitive and TBLT approaches. TBLT is a technique that emphasizes the use of practical and significant tasks as the main building blocks of language learning, and the task in this study is the use of the new software

and practice the three skills in the Arabic language. TBLT method motivates learners to engage in communication and problem-solving activities that simulate real-life language usage, which appears in the communication of the students with each other while solving the STEM problems in the task needed. The use of TBLT in this study encourages the use of authentic language, meaningful learning experiences, and the cultivation of communication abilities, learner independence, and the integration of language skills, the promotion of language awareness, collaborative learning, and alternative methods of evaluation. In general, TBLT in this study provides a learner-focused approach that fosters effective language instruction and acquisition.

Moreover, the development of CALL applications has been greatly influenced by cognitive theories such as information processing theory and constructivism. CALL refers to the use of technology in language learning and teaching. Cognitive theories emphasize the role of mental processes and active knowledge building by learners, which has led to the creation of tailored learning experiences through adaptive software, intelligent tutoring systems, and interactive multimedia resources. In this study, TSFS focuses on specific cognitive skills, promotes meaningful learning through real and contextualized language activities, incorporates metacognitive methods, and encourages collaborative learning through synchronous or asynchronous communication platforms. Overall, cognitive theories have had a significant impact on the design and implementation of TSFS app to enhance language-learning processes.

Educational Software

Educational software is one of the electronic means that have recently emerged in a response to the requirements of the modern era. It is all the materials that include educational content such as texts, video clips, music, still and motion graphics, and various sounds. These elements interact together and are displayed using the computer (A. Ibrahim & Mohammed, 2010).

It gives greater effectiveness to teaching different sciences. Zaghloul and Beni Ahmed (2020) see the possibility of using educational software effectively in teaching Arabic language due to its affordability in utilizing learning opportunities as a modern method of education. It provides learners with a diverse and positive learning environment, enabling them to interact with the scientific material and receive feedback in multiple forms as and when needed. Abboud (2007) refers to educational software as being similar to lesson contents that are organized, produced, and computerized to achieve the desired educational goals. Al-Jarrah et al. (2014) also see that educational software is a set of logical, intangible components, presented in the form of educational materials of various styles via the use of computer. The interaction between educational software and learners is exciting and positive because such software provides feedback to students, which helps in achieving important educational goals.

Furthermore, educational software provides learners with the skill of self-learning, as it allows them to learn on their own and access intensive and relevant knowledge

without the need to be experts in using computer (Zaghloul & Beni Ahmed, 2020). The use of the computer and its various software is one of the most appropriate ways to learn digitally due to its various advantages. The speed in searching for information, accessing it, and displaying it in different formats are all useful features. The accompanying visual and audio effects also increase the motivation of learners and enhance their abilities to follow up and continue learning effectively (Bataineh, 2006).

Research argued that the implementation of educational software and media into learning language would lead students to master competencies and language skills needed in society (Rüschoff, 1999). Looking at the different types of materials presented as tools for learning languages, one can notice that the market is full of traditional computer-based training packages. The designers focus on impressive multimedia to attract customers with simple traditional exercise formats in electronic forms, very few covering more than two skills in language learning. The educational software used in this study covers the four skills needed to learn language, and it is the only software in Arabic language covering STEAM subjects.

Reading Comprehension Skill

Reading is one of the basic skills for all ages. The teaching of reading skills is very important, especially for children at early ages because mastering reading skills efficiently is closely linked to students' development and to their ability to contribute to their communities. Almost everything that learners would learn in schools and the knowledge they acquire depend largely and fundamentally on the degree of their mastery of the reading skill, starting with letters recognition and ending with advanced skills such as understanding the purpose behind it, criticism, preference, writing, and expression (Abdul Halim, 2009). Reading is the ability to comprehend the meanings of the text and the ideas it carries, regardless whether the meaning is apparent, implicit, or remote. This adds value to the reading skill and enables it to become a mental process linked to thinking (Ashour & Al-hawamdah, 2007).

The concept of reading was first understood as being confined to a narrow area limited to the visual perception of written symbols and their transformation into spoken sounds, but new concepts of reading emerged as a result of the development of communities and their needs, and the expansion of educational research in the field. Reading has become a mental process and a means of solving problems through understanding, that is, it is a process equivalent to the thinking process, and its goal is to translate symbols into their meanings and understanding the ideas that they carry (Dbisiyeh, 2012). The concept develops further into reading becoming a linguistic skill that is based on communication. This skill is a mental process in which a group of visual, mental, and performance processes work together to enable the reader to interact with the text and its context in order to construct meaning, formulate understanding, and reach a solution to problems (Ayasra & Bani Abdul Rahman, 2015).

Reading is not a simple mechanical process that involves decoding written symbols and translating them into spoken sounds only, but rather a complex process involving the senses, skills, experience, and intelligence of the individual to reach the desired goal of reading. This is what educational systems seek to achieve nowadays where the goal of reading is to divert students' attention from simply translating written texts into enabling them to understand the meanings of the text and reflect on life issues that societies face and then finding solutions for them (Ashour & Al-hawamdeh, 2007).

Word and Sentence Skill

It is the skill about the relationships between words in a phrase, and between sentences in a phrase. Word and sentence skill is a grammar part where grammar is the foundation of all known language skills. Grammar plays a fundamental and an important role in speech fluency because it helps learners master the production of words and phrases correctly by compiling their thoughts in easy-to-understand sentences (Muizo, 2020). Muhammad (2015) define grammar as a set of rules and regulations that govern how words are placed and arranged in sentences and the way they are pronounced in relation to the grammatical formations and then producing the intended explanation of the meaning.

The main objective of teaching grammar according to Ashour and Al-hawamdah (2007) is to understand the purposes of speech and to understand what is being read, heard, written, or spoken with a correct understanding that leads to the stability of concepts in the mind of the performer or recipient, and the formulation of clear meanings and ideas. Educational institutions, in teaching grammatical rules, aim to correct the distortion of the tongue and clarify concepts by training students on using phrases, sentences, and words correctly. This is in addition to enabling learners to read and write with less effort and with fewer linguistic errors by training them on checking that the formulation of methods and structures is free from grammatical errors that might distort the beauty of the language (Muizo, 2020).

Dictation Skill

Writing and converting spoken sounds into written symbols is one of the means of communication that individuals use to express their feelings and thoughts. It is defined as the correct writing of words and organizing letters within a word. Therefore, writing is a learning process, an essential element of the formulation of human cultures, and one of the requirements that societies use to convey and express specific ideas to others. Linguistic systems (phonetics) have adopted a set of writing rules that link specific symbols to each sound that is pronounced, as well as associating symbols to each other and arranging them to form words (Hafiz & Atiyah, 2006).

The skill of dictation, similar to reading, is related to mental processes. Students' awareness of the relationship between symbols and the written signs does not take place in isolation from thinking and is normally accompanied by previous experience with symbols, and the ability to understand and interpret them. In addition, the child needs to use many mental operations while learning the dictation skill including the realization of the spatial relationships of letters and their sequence in the word, and understanding the relationship between the sounds of speech and the forms of symbols used in writing (Zayed, 2009).

Al-Ibrahim (2017) defines the skill of dictation as a transformation of the sounds of the spoken language into written symbols, if the letters are placed in their correct positions in the word to produce correct pronunciation and achieve the desired meaning. Al-Ibrahim (2017) argues that paying specific attention to dictation helps students develop and improve language skills and cultural awareness as well. The Dictation skill is one of the skills that makes students able to write words in the correct manner agreed upon by linguists. This skill help to avoid making Dictation errors that would distort the writing and hinder the reader's understanding of the meaning behind the sentences.

Methodology

In this study, the researchers used the quasiexperimental approach to study the effect of educational software (TSFS) on developing the Arabic language skills: reading comprehension, word and sentence, and dictation skills using STEAM subjects for Grade 3 students in public schools in Qatar in the academic year 2022.

In addition to the quantitative method, the researchers conducted interviews with some of the students to check the impact of using TSFS on the improvement of their skills in Arabic language, the questions also include the effect of the use of TSFS on students; motivation; and communication skills.

The study sample consists of randomly chosen 42 female students, from different levels of achievement, and different cultural backgrounds. The sample consisted of only female students due to the separation of schools in Qatar into females and males, and due to this, it is difficult for female researchers to enter male schools. The researchers were present during the intervention and they did the interviews. The group was divided into experimental and control. To achieve the objectives of the study and answer its questions, the researchers applied the new educational software (TSFS) designed in compatibility with the standards and the contents of lessons. The Ministry of Education and Higher Education (MEHE) in Qatar approved that the tool is suitable for the age group targeted in this study. In addition to the educational software, the study uses a pre–post achievement test; the test is compatible with the objectives of the study. The reliability of the tool was tested in the pre and posttest by applying it to an exploratory sample of Year 3 female students, and using the Cronbach alpha. The results showed that

the reliability coefficient of the tool to be 0.9, which indicates a high reliability rate that would lead to the possibility of reliable results of the research.

The intervention was repeated twice during the semester to ensure the lasting impact of the use of TSFS on the three Arabic language skills. The repetition of the intervention was accompanied by the posttest to the experimental and the control group.

The objectives of the study is to test the use of the educational software TSFS on developing Arabic language skills and in particular reading comprehension, word and sentence, and dictation skills. Therefore, the study aims to answer the following questions:

1. To what extent TSFS helps increasing achievement in comprehension skills for third-year primary school students compared to the traditional method?
2. To what extent TSFS helps increasing achievement in word and sentence skills for third-year primary school students compared to the traditional method?
3. To what extent TSFS helps increasing achievement in dictation skills for third-year primary school students compared to the traditional method?
4. Is there any significant difference in the achievement between traditional method and TSFS in learning Arabic language skills for third-year primary school students?
5. If there was a significant difference between the experimental and control group, does this difference still exist after repetition?

In the qualitative part of this study, the researchers conducted interviews with some of the students in the experimental group and the questions were:

1. Did this software help you develop your Arabic language skills? In what way?
2. Did this software increase your motivation and improve your communication with your friends? In what way?

This study keeps pace with the requirements of the 21st century in line with achieving the desired educational goals. It addresses the problems linked to poor Arabic language skills among learners, especially in the primary stage. Moreover, this study is one of the few studies that developed an interactive educational software suitable for Qatari culture and collecting most of the Arabic language skills for the third grade of primary school.

The results of the study would benefit those in charge of the educational process, the planners of Arabic language curricula, and the specialists in the field of computing curricula by presenting some evidence of the importance of using educational software in teaching Arabic language skills and the impact it has on the development of the student's skills. Education officials could formally introduce this interactive software for teaching Arabic language skills to third-year primary school students.

Intervention

The study conducted the experiment during the month of February 2022 at a primary school in Qatar and addressed all the steps needed by the MEHE in Qatar. That study carried out a full IRB at Qatar University before applying the intervention. The intervention was repeated in the month of April and May, after finishing the intervention, the researchers conducted interviews with some students in the experimental group. The teacher of the class who happened to be one of the researchers in this study prepared the material included in TSFS. A pretest was given to both groups before using the software; the test contains the three skills covered in the study. The strategy used in the intervention was the group work where the students join in groups to play the game for 10 min then each student solves the posttest. In the repetition of the intervention, different STEM problem and posttest were used but covered the same objectives and skills needed in the study; the teacher obtained the answers from the software to examine the weaknesses and strengths of the students in the three skills addressed in this study.

The study applied the appropriate statistical methods to compare the results of the pretests and the posttests for the control and the experimental groups. The results were determined and interpreted, and recommendations were drawn based on them.

Results

In this study, the researchers aimed at knowing about any changes in developing Arabic language skills for Year 3 students in Qatar after using educational software. Therefore, this research aims to introduce students to the course of integrating STEAM via educational software for teaching Arabic using mobile phones and websites. This software also serves as an aid to teachers inside classrooms and a complementary to their teaching because it offers support to designing "study units" in line with the principles of STEAM integrative.

The researchers question the use of educational software in developing language skills in three skills areas: reading comprehension, teaching word and sentence, and dictation skill. The researchers divided the groups into experimental and control groups. A thorough test was carried out to ensure there was no difference between the two groups regarding the three skills areas tested. This was done prior to starting the lesson using the educational software with the experimental group. The data did not follow a normal distribution so the researchers had to use the nonparametric tests.

The comparison between each skill before the intervention is carried out to check whether there is a difference in the level of skills for the two groups; the results are shown in Table 1.

The table shows no difference between the experimental and the control group before conducting the experiment, which ensures having equal groups.

Table 1. Arabic Language Skills Before the First Intervention.

	Reading skill before	Word and sentence before	Dictation skill before
Mann–Whitney U	180.500	199.500	200.000
Wilcoxon W	411.500	430.500	431.000
Z	−1.021	−0.564	−0.532
Asymp. sig. (two-tailed)	0.307	0.573	0.595

After the three interventions, the researchers compared the results of the two groups using Mann–Whitney test for independent groups, Table 2 is presenting these differences.

Table 2 shows the difference in the three skills after applying the interventions of TSFS. While the results shows a significant difference in the two groups for the reading, word and sentence skills at 0.05 level of significance, the difference appears significant at 0.1 level of significance for the dictation skill after the first intervention then the difference increases in the second and the third intervention.

Then the researchers summed the scores of the students before the first intervention and after the third intervention. The results appear in Table 3.

Table 3 shows a significant difference in the sum of scores between the control and experimental groups after using the software for three interventions which did not exist before this use, the two groups at the beginning of the intervention had approximately same levels of skills.

The above results showed a significant change in the language skills for students in the third grade after using the educational software TSFS and no significant change for students who used the traditional method of teaching. The three skills areas of the language skills were significant.

The authors conducted a paired sample *t*-test to check whether the interventions improved the grades of the students. Table 4 reveals that using TSFS in learning Arabic language skills increases students' achievement.

Looking at each skill to examine the effect of the intervention on each skill, we can notice in Table 5 that the three skills are significant in favor of the intervention and this appears clearly in Figure 1.

Table 5 shows the high significance difference in each skill after using TSFS where p-value $< .05$. Wilcoxon signed rank is used since the data is not normal and mean grades are compared.

Table 6 reveals the increase in the mean grades for each skill after implementing TSFS.

These results appeared also in Figure 1, where each skill appears to increase after using the software.

Figure 1 shows the difference between the two groups in favor of the experimental group, and the improvement of the skills after using the educational software.

Table 2. Arabic Language Skills After the Three Interventions.

	Reading skill after interventions			Word and sentence after interventions			Dictation skill after interventions		
	First	Second	Third	First	Second	Third	First	Second	Third
Mann–Whitney U	151.5	160.5	170	122	123	133	184.5	190.5	200.5
Wilcoxon W	382.5	390.2	392	353	375	380	415.5	455.5	655.5
Z	−1.783	−1.92	−2.1	−2.585	−2.715	−2.62	−1.042	−1.342	−1.953
Asymp. sig. (two-tailed)	0.035[a]	0.002[a]	0.001[a]	0.01[a]	0.001[a]	0.001[a]	0.097	0.065	0.002[a]

[a]Grouping variable: control/experimental.

Table 3. Results of the Difference in the Achievement Test Between the Experimental and the Control Group Before and After Using TSFS.

Hypotheses	Mann–Whitney	Significance	Results	Results of hypothesis
1. Difference in total sum of scores before using TSFS	230.0	0.790	Fail to reject the null	No significant difference between the two groups before using TSFS
Difference in total sum of scores after using TSFS	114.0	0.001	Reject the null	A significant difference between the two groups after using TSFS three times

Note. TSFS = Test Survey for Students.

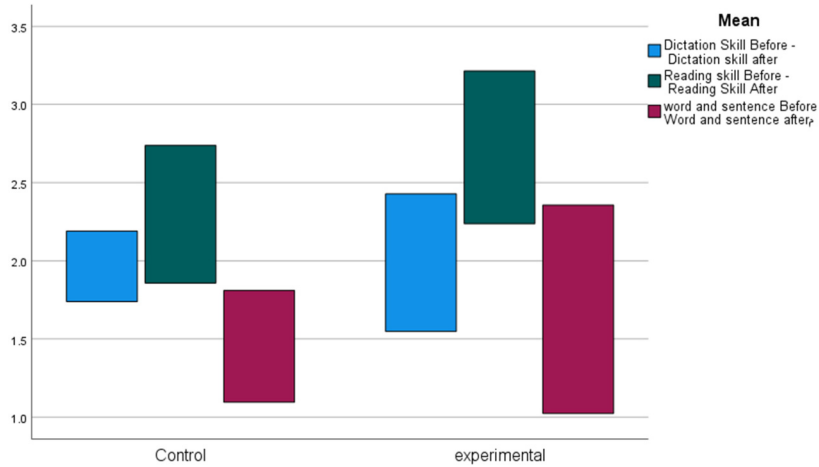

Figure 1. Control vs experimental groups in the three Arabic skills.

Therefore, this study proved that the use of this software TSFS could increase the three main skills of the Arabic language which can help teachers in their classrooms.

Interviews

The researchers conducted interviews with some of the students to ask them about the impact of using TSFS in improving their Arabic skills and its effect on their motivation and communication skills.

Table 4. The Sum of Grades Before and After the Three Intervention.

		Paired differences							Significance	
					95% confidence interval of the difference					
		M	*SD*	*SE M*	Lower	Upper	*t*	*df*	One-sided *p*	Two-sided *p*
Pair	Before–after	−2.870	1.6254	0.2444	−3.1244	−2.2457	−10.13	41	<.001	<.001

Table 5. Wilcoxon Signed Rank Test for Each Skill.

	Reading skill after −reading skill before	Word and sentence after −word and sentence before	Dictation skill after −dictation skill before
Z	−4.210	−.512	−3.256
Asymp. sig. (two-tailed)	<0.001	<0.001	0.003

Table 6. Mean Grades for Each Skill Before and After TSFS.

		M	*SD*
Pair 1	Reading skill before first intervention	2.048	0.9866
	Reading skill after third intervention	2.984	0.7479
Pair 2	Word and sentence before first intervention	1.060	0.7002
	Word and sentence after third intervention	2.2743	0.6724
Pair 3	Dictation skill before first intervention	1.643	1.143
	Dictation skill after third intervention	2.413	1.253

Note. TSFS = Test Survey for Students.

The agreement among participants regarding language skills was particularly strong in reading and word and sentence skills. While similar results were observed for dictation skills, participants were less confident in their acceptance of TSFS aid during the learning process. The questions focused on the usefulness, convenience, and importance of TSFS in improving the students Arabic language skills, as well as learners' apprehension, autonomy, excitement, and attraction to use TSFS in learning these skills. Participants unanimously agreed that TSFS promotes autonomous learning and improves their motivation to learn and communicate with their peers. Although, the participants of the study showed a combination of positive and indifferent attitudes toward using TSFS to enhance their self-assurance, a significant majority of the participants reported that TSFS did not cause them any discomfort or anxiety.

Some of the responses to the first question concerning the usefulness of TSFS in improving language skills students had different point of view. While Dalal agreed on its usefulness, "Yes, it helped me a lot, especially in reading difficult words in the new reading lessons, as I was able to enjoy reading the word more than once from the recorded voice, seeing its written form, and repeating behind it until I was able to read it correctly. I did not have to ask my teacher about the correct pronunciation of these words. Mashael had a different opinion: "Although I benefited from it in reading comprehension questions, I had to go back to the text to extract the correct answers because my eyes cannot follow the lines of the online papers. It is more enjoyable for me to have it on paper."

Concerning students' improvement of their communication skills, all students' agreed on the improvement of their motivation and communication skills with their peers. Nada reported, "Yes, I loved studying the lessons through this site. It was very interesting, especially the voices that encouraged me when I answered correctly." Nora agreed on the improvement of her communication skills "I was excited to complete the lesson with my friends because we were communicating so well. I also encouraged and searched the Internet for all the information in the text to learn more about it." Ola expressed her opinion in using TSFS and suggests to always using it in Arabic language "I had anticipated that incorporating technology into our learning methods would be a challenge. But to my surprise, I discovered that it was easy to learn using this software and I hope my school will use various tools for instructional purposes, including TSFS."

To summarize, based on students comments in the interviews, the participants believed that incorporating technology into the classroom would make classroom activities more interesting and motivating for the students and will help them improve their skills.

Discussion

This research investigates the impact of using a new Arabic language software (TSFS) on the achievement of primary Qatari students in the three main Arabic skills. The study showed a significant change in students' grades after using the software. The results of this research can help educators diversify the activities for the primary curriculum. Moreover, the outcomes can maximize the effectiveness of the training in Arabic language for both teachers and students. In addition, the results can add new contribution to the literature and provide a theoretical base for educational technology, where it is the first time an educational software is used in Qatar for Arabic language and more specifically in primary level of education. The results of this study are concomitant with multiple studies. The results are consistent with AL Tarifa and Ahmad in 2013 in the MENA region who showed an effectiveness of using educational software in dictation skill for six-year students. In addition to the mentioned study, dictation skills were studied by AL-Shamrani and Al-Adeel in 2019 and showed an effectiveness for Year 3 intermediate students. Moreover, in the same region, the results agreed with AL-Jarrah in 2015 who measured the impact of different educational software in Arabic skills between Year 2 students. The results of this study were also consistent with Zagloul and Bani in 2020 who showed a high effectiveness of educational software in the achievement of reading skill in Arabic language for Year 3 students. The outcomes of implementing the new software agreed with the study of Al-Yacoubiya in 2021; this study proved that a virtual reality software is effective in developing speaking and visual thinking skills in Arabic language.

In this study, the researchers focused on the improvement of students Arabic skills while applying digitalization in teaching these skills and realize how the improvement

is well established. This result agrees with Lai and Widmar, and Aboagye et al. (2021) who emphasized the effectiveness of using digitalization in improving language competencies.

Although the results showed an increase in the scores of students using the educational software, there have been some limitations faced by the researchers related to time, availability of technology in the classroom, and some Internet connections concerns. These limitations appeared also in previous studies where Chigisheva et al. (in 2021) reported students having problems with digital literacy.

Such limitations can be addressed through securing a high-speed Internet and better availability of technological tools at schools, hence paving the way to making educational software crucial at each stage of students learning.

The review of students' perceptions after using the educational software indicated a high motivation to learn using the software and more enthusiasm, which can lead to encouraging self-directed learning style and a more personalization in the learning process.

Despite one student preference for paper-based learning, most students acknowledged the significance of TSFS in aiding students in their Arabic language skills. Educators and teachers must address the challenges posed by new technologies, such as the incorporation of CALL into school curricula, as highlighted by Dweik and Safadi (2007).

In the end, it is important to point out the fact that educational software cannot fully replace the traditional method of teaching but it represents a useful addition to the learning process, which might encourage students to improve their understanding and enhance their motivation.

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ORCID iD

Hiba Naccache https://orcid.org/0000-0003-4643-7921

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