Towards Effectiveness of Math Educational Applications: FaraAzmoon

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Abstract

Although the research on the use of special applications for learning mathematics has increased in the last decade, the number of researches on the effectiveness of these programs from the students' point of view is insufficient.This paper traces an endeavor to explore the way utilizing FaraAzmoon App and the highlights and qualities understudies find essential. Drawing on data gotten from tests and interviews, it was observed that understudies who utilized FaraAzmoon app had a inside and out predominant execution compared to the understudies who did not utilize FaraAzmoon app.Participants' responses to questions were analyzed to select characteristics that students consider essential for mathematics learning programs. This research highlighted several characteristics that are necessary for an effective mathematics learning program. The disclosure of these features provides information to curriculum developers and educators about what is dominant in math learning programs from the users' perspective.

Keywords: Application, learning, mathematics, characteristics, effectiveness

1. Introduction

The use of smartphones has grown rapidly in the last decade[1]. As smartphones become part of the daily social and personal life of an increasing number of students, there is a growing expectation to see the widespread integration of smartphones and educational programs into student math learning[2].Regarding the nature of well-designed instruction and approaches to enhance student achievement, it is suggested that effective program which assisted math learning requires well-designed software programs that aim to improve students' academic achievement[3]. This requires the development of a solid knowledge base on the essential features of such applications.

Mobile Assisted Math Learning Research (MAMLR); however, it has largely focused on teacher- or researcher-led intervention studies that examine the effectiveness of a specific mobile learning course or system in formal classroom settings[3]. Studies that systematically examine the required features of math learning programs from the students' point of view remain largely scant[4].

Considering the newness of math learning with the help of the smartphones, it seems natural to considering that it is necessary to check the quality of educational materials and technologies used for educational purposes in math learning[4]. Considering the decisive role that students play in the success of technology-assisted education, it seems very important to investigate the effective design and content features of mathematics education programs from their perspective[5].

Diverse apps are being outlined and presented to the showcase for distinctive purposes counting math learning[4]. In line with such development, the pace of learner engagement with and utilize of apps has

expanded (see[3]). They contention with respect to the quintessence of well-designed pedagogies and approaches for improving understudy accomplishment, it is recommended that successful app-assisted math learning requires well planned program apps that point at making strides users' scholastic accomplishment[2]. This requires the improvement of a strong knowledge-base on the fundamental highlights of such apps [4].

Considering the newness of app-assisted math learning, I believe this scarcity appears completely natural phenomenon. Exploring the quality and technologies used for educational purposes is essential [5] and considering the role students play in the sustainability of technology, exploring the effectiveness of math learning apps from their lens appears crucial role[6].

To shed more light, the productivity of app-assisted math learning was explored drawing on test results obtained from 9 studentsat east Azerbaijan province in Iran. Additionally, the characteristics of an effective math learning app were explored, based on their experience of using FaraAzmoonapp. Thispaper offers useful insights and implications for the design of smartphone apps for math learning purposes.

2. Introducing FaraAzmon application

The purpose of preparing this application is to increase the "readiness" of "talented" students in order to pass the "entrance" test of schools for students with brilliant talents (Sampad, Tizhoshan, Farzangan).

✓FaraAzmon application can be used by everyone. But its main purpose is for fifth and sixth grade elementary school students to prepare for the seventh grade entrance exam for gifted students. This application completely covers both the intelligence and analytical aptitude test booklets.

✓ For eighth and ninth graders, one of the notebooks of the "10th grade school entrance exam for gifted students" is "Analytical Talent". In fact, most of the "intelligence questions" of 10th grade and 7th grade are "similar" to each other.Hopefully, with the help of this program, dear parents and teachers can take important steps towards "discovering talent" and "improving the intelligence and necessary skills" of the student, to enter the world of smart people and future elites.To achieve this goal, various facilities have been placed inside the program so that you can use them depending on your needs in each of the following areas:

✓ Classic and modern "Raven's IQ test" universally valid tests for "talent assessment"

✓ "Multimedia" trainings (videos, articles, and textbooks... including techniques and tricks for solving various intelligence tests) in an "exam-oriented" format. Tests with random questions chosen from multiple types of intelligence (verbal, mathematical, visual, speed and accuracy).

✓ simulation of "talented entrance exams" with explanatory answers in an "educational" way (with full coverage of Sampad exams held in recent years),Providing tools for "exam management" and "exam analysis" assessing and measuring the rate and process of the student's "progress" (by providing statistics and graphs)

✓ The possibility of sending "exam records" to professors and advisors (and parents) for review and analysis and providing feedback

✓ Presentation of samples of global intelligence tests (which are usually used as sources and references for designing intelligence tests of future tests by some designers).In the Figure 1, the main page of Farzamon is shown.

Fig. 1.The main page of the FaraAzmoon App

Experience has shown that an important part of the questions of each exam are similar to previous years' exams, and getting to know them and fixing weaknesses and increasing testing skills will lead to better results.By using this application, the possibility of self-examination at "any time" and "any place" has been provided for the student to familiarize himself with the sample questions of standard aptitude tests and to learn various "creative and innovative" methods to solve them descriptively. And in addition to strengthening intelligence, increase the speed of action.The text of the exam questions and their fully descriptive answers, typed and readable (and with all the relevant images) are always available without the need to connect to the Internet.To "reduce the volume" of the program, the videos are called by the link and when connected to the Internet.Various tools designed for test management and answer sheet analysis, (such as marking selected questions for review and further review or showing only questions that you have not answered yet, or showing only questions that you have answered incorrectly, or...) are introduced in the visual guide inside the program.

3. LITERATURE REVIEW

Mobile as a mobile tool has been discussed in educational research (see [1, 4, 5]). While mobile phones for educational purposes have been a gradual phenomenon, the development of smart devices has been touted as the fastest growing technology in the high-tech industry [2]. Nowadays, smart phones have gone beyond the traditional capabilities of the phone by providing a wider range of multimedia potentials [3]. These features, together with the possibility of accessing a wider range of online and offline resources [3] and applications, make mobile phones suitable technologies for supporting and developing mathematics learning [5].

As researchers pointed out, emerging mobile devices and technology can act as mediating tools in the math learning process[1]. Mediation is very important in the process of constructing mathematical knowledge [3]. Through specific activities and content created for educational programs, which extend the learning experience beyond the boundaries of the physical classroom and provide opportunities for personalized learning, smartphones can fulfill this role as mediators between individuals who intend to learn mathematics and his peers to perform. By engaging with technology activities using smartphone applications, users can engage in a learner-centered, lifelong, location- and time-independent learning process [5].

The compactness and universality of mobile phones makes them useful for learning at any time and place [1]. These features help active learners make their learning relevant to their lives [5] or personalize their learning feedback [3]. A developing consensus on the potential of smartphones to support math learning has promoted the use of applications [4].

A math learning program, whether as a supplement to education or as self-study, must include a set of quality highlights to be viable[6]. As they states, mobile learning is undeniably different from other technology-based learning methods because it requires carefully planned content rather than on-the-go learning at leisure be done. Math learning programs, when successfully planned, place students in an organized environment for meaningful learning beyond the confines of the classroom [5]. Therefore, ensuring that the program is appropriately designed to meet students' learning needs is of utmost importance. As [5]states, with more research on the highlights of apps and how they can be compelling for learning math, better apps will eventually be available to interested people.The rapid speed of development and use of mathematical learning applications has increased the agreement of researchers about the need to gather more knowledge on how to design applications[2]. Few attempts have been made to investigate the educational value of smartphone applications for learning mathematics (eg, [5]). Indeed, less attention has been paid to students' views of the underlying qualities of programs (eg, [3]).

4. METHOD (Participants)

5th and 6th grade students can take gifted education courses. These courses are not mandatory and are offered only to students interested in participating in the entrance exam of Sampad schools. Common gifted education courses usually include 15 students. A smart learning program was held along with the post-test application to study the students' views regarding the highlights of the basic design of math learning programs.

5. Instrumentation

The tools used in this research included the pre-test for math geniuses, which included 40 multiple-choice questions. The questions were selected from the Tizhoshan question bank, which were selected by the instructors based on the content of the training course. Exam questions were designed and finalized through several rounds of discussion between instructors to achieve a similar level of difficulty.To address the characteristics of mathematical applications, subjective information obtained from a semi-structured session

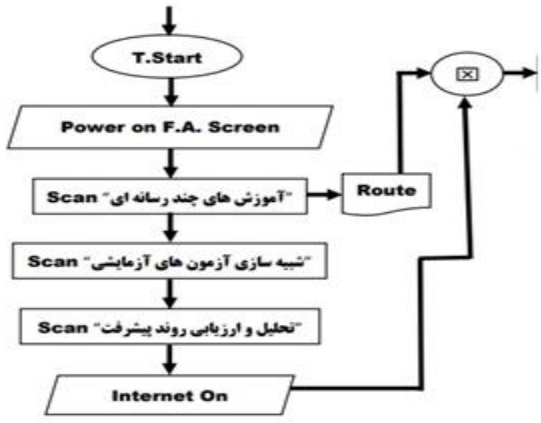
(open-ended) was focused. Open-ended questions correspond to considerations that examine the usability of an application [2]. Also, such questions allow the participants to comment unconditionally on the properties of the application and help the analyst to gain a deep understanding of the learner's approach. This article contained a declaration of consent of the participants so that the data collection was done with their consent. In addition, there was a table that asked the participants to name the features of the test application that they used during the course. Next, the students were asked to verbally explain the features that they have discovered for a math learning application due to facing theFaraAzmoon application. As [5] points out, interviews are successful for data collection, especially when the analyst cannot observe participants' behavior and other overt cues about their feelings.

Data Analysis

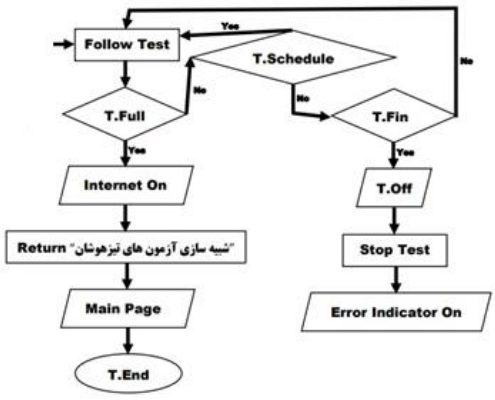
Out of a total of 15 questionnaires provided, 9 were completed and 6 were not returned, which represents a response rate of 60 % and represents the total number of students in the face-to-face interview who used the FraAzmoon application.

To address the research question about the essential content and design features of math learning applications from the students' lens, the participants' answers to the interview questions were examined. First, descriptive statistics (i.e. frequency and percentage) of interviews were calculated. In the following, the general structure and content focus of the interviews are discussed.

The answers given by the participants to the interview questions were analyzed using quantitative and qualitative methods. After that, the several features that students consider essential for math learning programs were extracted. Finally, this research has highlighted four characteristics that are essential for an effective math learning program. The researchers believe that disclosing these characteristics will provide curriculum developers and educators with information about what is dominant in math learning programs from the users' perspective[5]. In the following, these four features are described: (1) stand-alone of the internet, (2) learning like playing, (3) collaborative and (4) test-oriented trainings and training-oriented tests.



the simulation of new learners



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stand-alone of the Internet

The first feature extracted from the interviews is the lovely appearance and easy training of the application. See Figure 2.

Fig.2. Simulation of tests without the need to connect to the Internet

The participants in this research want an independent application that can be easily implemented in all mobile phones. In addition, the interviewees also said that "it is good that the application does not need to register or exchange history with a server." In other words, they prefer that there is no need to connect to the Internet to run the application, and if a mobile device is available, it can be run anywhere and anytime without the need for the Internet.

In the FaraAzmoo App, the text of the exam questions and their fully descriptive answers, typed and readable (and with all the relevant images) are always available without the need to connect to the Internet.

From an educational perspective, such programs contribute to self-directed learning. There have been more approaches since [5], or [6]. However, the main focus on self-directed learning began with [2] and definition [1]:self-directed learning is a process in which an individual, with or without assistance, takes the initiative take . Others are involved in identifying learning needs, formulating learning objectives, identifying human and material resources, learning strategies and evaluating learning outcomes... Learners can use such programs to strengthen their knowledge about a specific subject without further training. They decide for themselves. On the other hand, it is good if the instructors have the possibility to follow the learning process. In order for teachers to receive information about the performance of learners.

learning like playing

This point is the opinion of the interviewees about learning through games. That is, the participants in this research like that learning mathematics "is like mobile games." Game-based learning (GBL) is very similar to problem-based learning (PBL) in which different problem scenarios are framed in a game [7]. Given that games generally include many problem-solving features (eg, an uncertain outcome, multiple paths to a goal, framing the problem, etc.), they also add elements of competition and chance do, it can be said that it has a huge potential for learning [5] which has more details for incidental learning. Furthermore, [3]

summarized three basic characteristics of computer games to answer the question of what makes working with a mobile application enjoyable: challenge, fantasy, and curiosity[8]. See Figure 3.

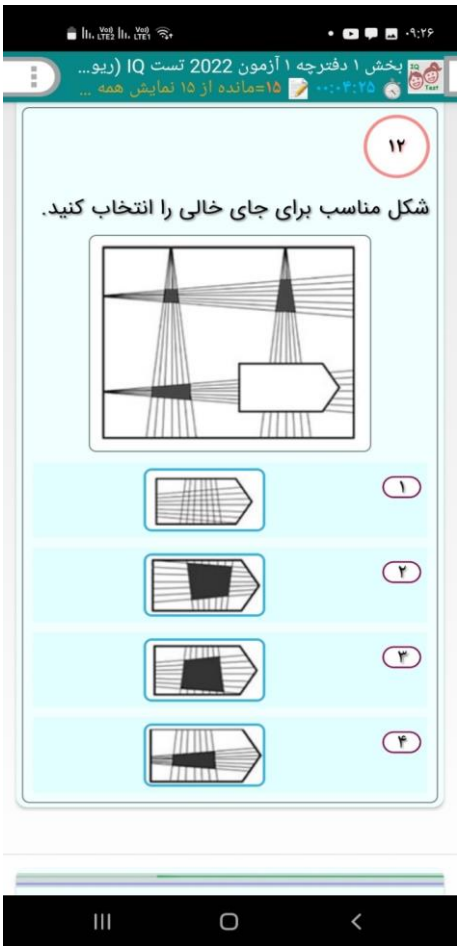

Fig. 3. Visual design of intelligence problems similar to games

Collaborative

The next goal of the interviewees is applications that "promote cooperative learning." The goal of collaborative learning is to contribute to learning through a coordinated and cooperative activity, through social interactions among group members [6]. Through its ability to stimulate social interaction and learning among members of a group, cooperative and cooperative learning is often considered a stimulus for cognitive development. Also, [5] pointed out that social interactions are necessary to achieve optimal learning. So far, a collaborative learning approach has been demonstrated by connecting one learner with another learner. But if mobile devices are added to the collaborative scenario, this collaboration connects not only people, but also their devices. From a technical point of view, it's just the idea of using WiFi or Bluetooth to exchange data between different mobile phones.The lack of this feature is one of the weaknesses of FaraAzmon application and it is necessary to solve this problem in the next versions.

Test-oriented trainings and training-oriented tests

Applications usually teach and then test the students. This training and test cycle is familiar to anyone who has used the FaraAzmon application. Tests seek to see what students have learned. However, there can be other, more complex reasons why students use apps. Applied applications are used to determine whether students are learning what is expected or to determine the level or degree to which students have learned material. FaraAzmon application is used to measure progress. According to the participants in this research, training-based tests and test-based training are "one of the principles of the effectiveness of mathematics education applications." Also, "programs that measure student progress toward stated improvement goals or determine student placement are more practical."Examining the tests held by the student himself helps to advance targeted and planned learning. This is test-oriented education. See Figure 4.

Fig.4. Examining the tests held by the student himself helps to advance targeted and planned learning

Those who support the teaching-testing program view them as an objective measure of student performance[6]. They support teaching-testing as a way to improve learning[5]. Those who are against the teaching-testing programs consider them too burdensome[3]. They hate testing because they believe it is too time-consuming and prevents innovative learning[7]. They claim that students are under pressure to prepare for tests, which can limit mathematical conceptual learning. See Figure 5.

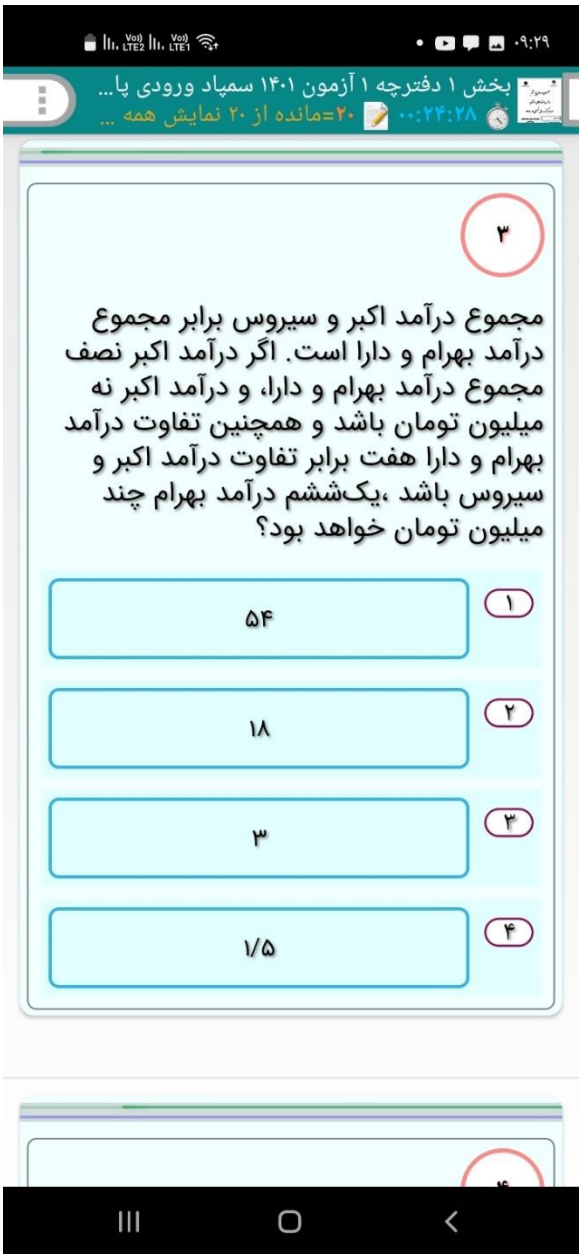

Fig.5. Education-oriented tests evaluated students' learning.

Additionally, they argue that some students may be at a disadvantage when taking practical tests[1]. Even taking an exam can increase anxiety in some, if not all, people[2]. Test fear may be related to the idea that testing can be a double-edged sword.Education-oriented tests should evaluate students' learning. The main point of the test should be to evaluate the students' learning after the training. When tests are written well with lesson objectives, the program can analyze the results to see where most students did well or where they need more work. This information may help to use different teaching strategies[3]. Instructors can also use learning-based quizzes as a teaching tool, especially if a student has not understood the questions or instructions[2].The study showed that the students who used the FaraAzmon application obtained better performance in the results of the tests. In addition to these interviews, it showed that students who have access to the FaraAzmoon application show more self-confidence to solve problems. This finding is consistent with the research results. (See [5, 6, 7])

Conclusion

Teaching mathematics using applications has become a necessity[8]. In this article, we introduced FaraAzmon application, which is designed for Android mobile phones. Both technical and educational strategies of this software are explained. In addition, a detailed look at some of the critical facts that essentially make a program a math learning program is described. In short, it can be said that the successful use of math educational programs is nothing but the careful design of an educational approach based on a suitable learning strategy[7].Research on mobile-assisted mathematics learning, however possible, has been overwhelmingly focused on instructor- or researcher-led mediated reflections that examine the viability of a particular course or interactive learning framework in formal classroom settings. [4]. Considers that systematic examination of the intended salience of mathematics learning programs and/or student choice of them is largely lacking (e.g., [5]).

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Appendix

As a visual representation of data flow, flowcharts are very useful in writing a program or algorithm and explaining it to others. You can use an algorithmic flowchart to express the logic behind the program before you start coding the process. Getting to know the hidden logic in this flowchart is as useful as getting to know the arguments used in artificial intelligence. A programming flowchart can help organize your code and provide a complete guide when it comes time to code. In general, with flowcharts, you can do the following things in programming: show how the code is organized, visualize code execution in a program, show the structure of a application and understanding how users move through a app.

To draw this flowchart, I will use different symbols, each of these symbols have their own meanings.

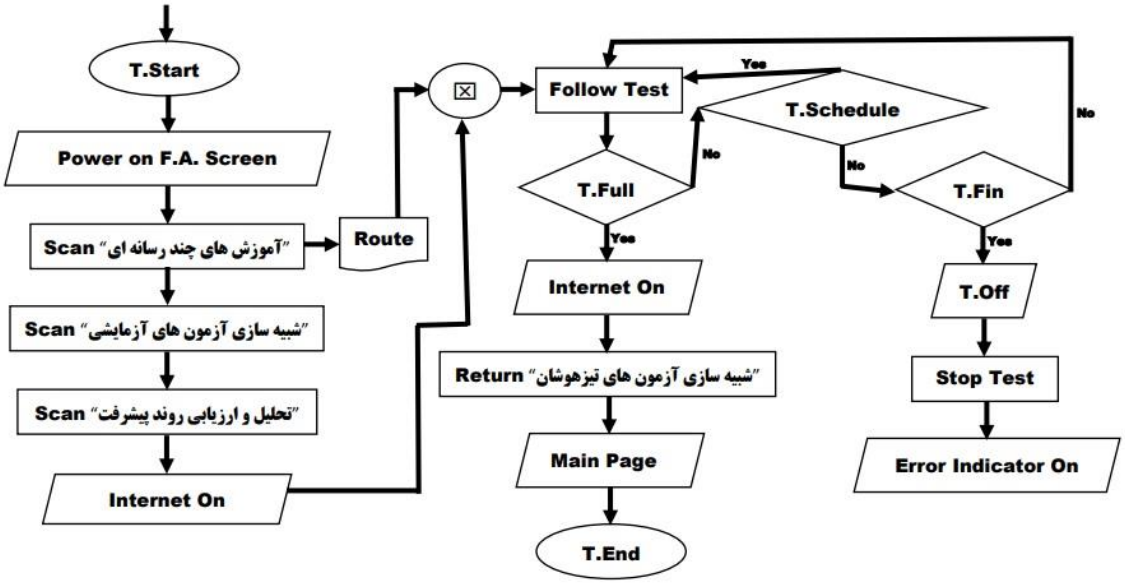
The oval symbol indicates start and stop in the logical flow of the program. A pause/stop is typically used in program logic under some error condition. Ellipse is the first and last symbol in this flowchart.

Parallelograms in the programming flowchart represent any input/output function. Program instructions that receive input from input devices and display output on output devices are represented by parallelograms in this flowchart.

The rectangles represent operations in this flowchart. All operations such as addition, subtraction, multiplication, and division are represented by rectangle symbols.

The diamond symbol represents a decision point. Decision-based operations such as yes/no questions or true/false are represented by a diamond in this flowchart.

Flow lines indicate the exact order in which instructions are executed. The arrows show the direction of the control flow and the relationship between the different symbols of this flowchart.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Power on F.A. Screen
Scan "آموزش های چند رسانه ای"
Route
Scan "شبیه سازی آزمون های آزمایشی"
Scan "تحلیل و ارزیابی روند پیشرفت"
Internet On
Follow Test
T.Schedule
Yes
No
T.Full
No
Yes
Internet On
Return "شبیه سازی آزمون های تیزهوشان"
Main Page
T.End
No
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Yes
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Stop Test
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