An iTunes U App for Development of Metacognition Skills Delivered in the Enrichment Program Offered to Gifted Students at the Secondary Level

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Abstract—This research aimed to measure the impact of the use of a mobile learning (iTunes U) app for the development of metacognition skills delivered in the enrichment program offered to gifted students at the secondary level in Jeddah. The author targeted a group of students on an experimental scale to evaluate the achievement. The research sample consisted of a group of 38 gifted female students. The scale of evaluation of the metacognition skills used to measure the performance of students in the enrichment program was as follows: Satisfaction scale for the assessment of the technique used and the final product form after completion of the program. Appropriate statistical treatment used includes Paired Samples T-Test Cronbach's alpha formula and eta squared formula. It was concluded in the results the difference of $\alpha \leq 0.05$, which means the performance of students in the skills of metacognition in favor of using iTunes U. In light of the conclusion of the experiment, a number of recommendations and suggestions were present; the most important benefit of mobile learning applications is to provide enrichment programs for gifted students in the Kingdom of Saudi Arabia, as well as conducting further research on mobile learning and gifted student teaching.

Keywords—Enrichment program, gifted students, metacognition skills.

I. INTRODUCTION

THE growing use of different technological devices in the world has contributed to the use of mobile educational environments in the study process.

Mobile educational systems have become the largest information platform in the history of humanity [1]. Actually, many indications denote that mobile educational techniques will provide global education to the community and the general educational system, especially with increasing time restrictions on learners and as well as many other diverse constraints [4]. A greater interest in mobile & e-learning applications has emerged as a way of increasing the teachers' ability to provide broader services to gifted and talented students [5]. This will enhance the ability for talented and gifted student to achieve their aim, especially where circumstances prevent these students from physically attending the classroom.

Mobile applications are not only used to provide scientific content to students, but they also allow them to share information and methods of thinking by tackling a certain topic or solving a particular problem.

One of these mobile applications, which mimic a classical classroom, is known as iTunes U; it offers a direct and dynamic way for educators at all levels, from kindergarten to secondary school, the possibility to design, implement and deliver complete courses supported by visual and audio tutorials.

The introduction of new technologies in the enrichment programs for talented students will enhance their skills in general and particularly that of metacognition, which led to the emergence of the concept (thinking about thinking) by Flavell (1979) at the beginning of the seventies, and introduced a new dimension in cognitive psychology. The importance of metacognitive thinking's skills has taught the students on how to think, plan, monitor his/her performance, and evaluate his/her own learning. Therefore, it improves the capacity of assimilation of learners at different learning stages and allows them to take full responsibility and control of their learning skills [2] while Sternberg [3] defines metacognitive thinking as "super control processes of planning, monitoring, and evaluating the individual's performance in solving the problem".

Based on the above, the author observes that the acquired skills form a natural path that gifted students have experienced to use their knowledge towards the possibility of their personal development and evaluation. The author has based his research on Steinberg's classification of metacognitive thinking skills (planning - monitoring & implementation - evaluation).

The author faced a problem during the research in scheduling meetings with the talented students within their classrooms, which did not provide a suitable environment for the reflective thinking. This requires considerable time and urgency to find a solution to the said problem. This has reflections on the value of thinking faced by gifted learners too.

The author puts a lot of emphasis on the importance of the investment of mobile educational and the iTunes U application in order to develop the skills of the gifted students based on the enrichment programs to which they are exposed.

II. THE OBJECTIVES OF RESEARCH

The main objectives of the author are described hereunder:
- Assessing the impact of the iTunes U application in providing an enrichment program aimed at developing the metacognitive thinking skills of gifted and talented

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secondary school students in Jeddah.
- Assessing the extent of self-satisfaction of the talented students in the use of the iTunes U mobile app.
- Developing the metacognitive thinking skills of the gifted and talented students.

III. PREVIOUS STUDIES

Reference [6] is one of the earlier studies that author makes use of; it is a comprehensive study that highlights the most recent researches and suggestions for future researches in the field of gifted learners' care. Published during the period 2000-2012, it targets the progress of technology in talents education, and focuses on the best applications and experimental researches in that field. The purpose of this study is to evaluate the experimental researches related to the use of technology with talented learners and their teachers, including learning, development, evaluation, curriculums, learning environments, and professional development.

The general findings of the study indicated that talented students have positive tendencies about using technology in learning. It focused primarily on the impact of technological devices on learning adapted to critical thinking and curriculum adaptation.

In [8], the researcher used iTunes U application with the Padagogy Wheel; its title: Will using an iTunes U course with the Padagogy Wheel result in effective individualized learning? The study sample consisted of 116 primary school-aged students in Sydney, Australia. Out of 116 students, 58 were in grade six (January 2013) and had prior experience in using these devices. The iTunes U application was used in teaching sciences via a questionnaire to assess the students' satisfaction in using the application.

The results of the survey showed that 91% of male students and 11% of female students agreed using iTunes courses in learning compared to traditional learning techniques. In conclusion, the study also showed that the use of iTunes in teaching was effective, the students became more responsible in self-learning in the subject, and they were more motivated and demonstrated increased desire to learn, despite their young age.

Reference [9] explored how students can apply metacognitive thinking skills for learning through screen casting in mathematics via iTunes U. The author set a series of hypothesis to enhance metacognitive thinking skills through tasks, which the learners found made learning easier; the tasks include:

Setting learning goals, giving opportunities to each learner and the possibility to develop an effective learning plan for problem solving, as well as to provide effective learning support via screen casting and recording video on their computer.

In this study, interviews were carried as a tool and include questions to manage the students' learning on the use of screen casting via iTunes to support metacognition, and whether they apply metacognitive thinking skills in planning, as well as controlling, monitoring, and evaluating the learning process. In addition, the author used the experimental

approach of interviewing one group before and after the process. The results demonstrated that the students showed increased self-confidence, and the quality of their performance improved. The study also recommends the use of tools such as personal reports and self-evaluation of studies, and it is considered as a launching point for the promotion of the metacognition of students at all stages of education.

In [10], the purpose of this study was to explore confidence in using metacognition for both gifted & talented and normal students. The survey focused on 22 schools for boys that were randomly selected from the Ardabil city schools for both groups of talented and normal students. A questionnaire was used to test metacognition skills as a study tool; the findings of the comparison showed that there was a significant difference in the metacognitive thinking skills between talented students and their normal peers, especially in the skill areas of self-awareness and control of their ideas. Accordingly, it recommended employing metacognitive thinking skills in teaching talented learners (due to their self-awareness) more than normal students.

The findings of the current research confirm those of previous studies. The skills of metacognitive thinking may be developed through objective educational programs and the importance of developing the skills of the cognition of talented learner pursuant [6], [10] The talented students outperformed the normal ones in using three skills of metacognitive thinking [10], and differed in that they would present a model for an enrichment program for talented students via the proposed mobile app and is designed in an appropriate way to develop student's skills of metacognitive thinking and it is not a subject in the curriculum.

IV. METHODOLOGY

The author seeks to verify the following hypotheses:
- There is a difference that has statistical significance at the level of $\alpha \leq 0.05$ within the average of performance assessment of female students in metacognitive thinking skills before and after using iTunes app for the advantage of using the iTunes U app.
- There is a statistical correlation at the level $\alpha \leq 0.05$ of the students' satisfaction of using technology and the average of performance of metacognitive thinking skills after using the iTunes U app.

The current research uses a quasi-experimental methodology for realizing and defining the role of the independent variable (iTunes U app) over the dependent one, and using the design of one group with pre- and post-assessments. Table I shows the empirical design of the research using the composition of one group with pre- and post-assessments.

TABLE I
EMPIRICAL DESIGN

Group	Pre-Assessment	Processing	Post-Assessment
Experimental	Assessment of metacognitive thinking skills	Using iTunes U Apps	Assessment of metacognitive thinking skills

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The research consists of secondary stage female students in Jeddah who have succeeded in the National Project for Gifted Identification (NPGI). The sample is selected intentionally through the complete census from the NPGI database of the King Abdul-Aziz establishment (foundation for giftedness and creativity in K.S.A. for female students). The mobile education for development of metacognitive thinking skills is utilized through the proposed enrichment program to assess the role of the independent variable and to observe the findings of the experiment.

The research includes the following variables:

Independent variable: using mobile education (the free iTunes U app).

Dependent variable: development of metacognitive thinking skills via the proposed enrichment program, and the students' satisfaction with using the technology.

Research tools:
- Assessment of metacognitive thinking skills.
- Assessment of students' satisfaction.

The experiment was based on the utilization of the free iTunes U app supported with enrichment content and several educational materials, as well as different sources of cognition such as video, audio, presentation templates, PDFs.

The assessment aims to measure the metacognitive thinking skills of gifted students. It consists of 38 multiple-choice questions with three typical answers (Regularly, Likely, Unlikely); where the participant has to select an answer that matches their view via a link [11].

The scientific background which this assessment relies upon is as below:
1- Planning skills for solving the problem, covering 19 questions.
2- Monitoring skills for solving problems, covering nine questions.
3- Evaluation skills for solving problems, covering 10 questions.

The scores of answers were marked based on a Likert-type scale so the respondent obtains 3 marks when she answers "Regularly", 2 marks for "Likely", and only 1 for "Unlikely".

Assessment of the students' satisfaction with the use of technology: The author set up the assessment by utilizing the criteria obtained from Umm Al-Qura University. This criteria is used for educational software evaluation. This survey contain 21 multiple choice questions, where the participants are asked to choose one of possible answers ("Agree" "Somewhat agree", and "Disagree") [12].

The scientific approach which this assessment relies upon is as follows:
1- Satisfaction with using the app, covering 10 questions.
2- Satisfaction with operating the software, covering 11 questions.

The scores of answers where marked based on a Likert-type scale so the respondent obtained 3 marks when she answers "Agree", 2 marks for "Somewhat agree", and only 1 for "Disagree."

V. THE EXPERIMENT

After accomplishing suitable sampling for the research and ensuring the correctness and verification of the research tool, the application can begin with the following procedures:

The scales of satisfaction with the technique used: The author set up the assessment by utilizing the criteria that obtained from Umm Al-Qura University. This criteria is used for educational software evaluation. This survey contains 21 multiple choice questions, where the participants are asked to choose one of possible answers ("Agree" "Somewhat agree", and "Disagree") [12].

Based on the survey the scale is developed, which consists of two scenarios given below:
- First scenario: The satisfaction for the application used, consisting of 10 questions.
- Second scenario: The satisfaction for the software operation, consisting of 11 questions.

The answers are spread accordingly in the method of Likert, where the respondent obtains three marks when in case of "Agree", two marks in case of "Agree to some extent" and one mark in case of "Disagree".

In the experiment execution cycle, after applying the research on the survey sample, and ensuring veracity and the tool's stability, the process will begin according to the following procedures:

Assessing metacognition skills prior the application of iTunes U: The author applied the prior scale on the research group before starting. This scale was corrected as per a Likert scale together while counting the results in order to be statistically treated, the arithmetic means standard deviation and T value for the experimental group through a T test for one group was applied.

Assessing metacognition skills post the application of iTunes U: The author began the experiment where the scientific content was available using iTunes U for three weeks and projects were delivered.

Following completion of the program by the experiential group, post-application of the tools is reviewed and the relevant results are assessed.

Table II states that the students' average performance in metacognition as a whole in the post-application (110.74) more than the prior application degrees' average (92.21); it is noticeable that the difference is statistically significant.

TABLE II
PAIRED-SAMPLES T-TEST FOR THE DIFFERENCE BETWEEN THE AVERAGES OF THE STUDENTS' PERFORMANCE

Application use	#	AVG	STD deviation	T value	Level of significance	η2
Pre	38	92.21	10.169	-10.815	- 0.0	0.76
Post	38	110.74	3.768			

VI. RESULTS

The first hypothesis states that "there is a statistically significant difference at the level **α ≤ 0.05** between the averages of the female students' performance in metacognition before and after using the application (iTunes U)".

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Table II shows the results of the paired-samples T-test for the difference between the averages of the students' performance in metacognition before and after using the application (iTunes U).

According to the result, the author concludes that the hypothesis which states: there is a statistically significant difference at the level (**α ≤ 0.05**) between students' performance in metacognition before and after using iTunes U for the benefit of the application. This result shows that the use of mobile learning through iTunes U has its own positive impact on the development of metacognition skills as a whole.

Accordingly, the fundamental question about the impact of using the mobile learning by iTunes in revealing the role of the program on metacognition skills development with the high school gifted female students is clear and can thus confirm the positive impact of the study.

The second hypothesis states: "There is a statistically significant relation at the level (α ≤ 0.05) between the students' satisfaction in using the technique and the students' performance average in metacognition skills after using the application iTunes U".

To confirm this hypothesis, a Pearson coefficient is used to find the relation between the students' satisfaction in using the technique and the average between the students' performance in metacognition skills after using the iTunes U application. The results are shown in Table III.

TABLE III
PEARSON COEFFICIENT

Dimension	Planning	Control and execution	Evaluation	Meta-cognition skills
Satisfied with application usage	0.648	0.557	0.406	0.644
Satisfied with software operating	0.601	0.646	0.327	0.569
Overall satisfaction	0.648	0.529	0.379	0.629

From Table III, the following conclusions are drawn:
- There is a positive relation between the dimensions of satisfied with general application and with the metacognition skills.
- There is a positive correlation between the satisfaction with the software operating and with metacognition skills.

Assessing the level of satisfaction in using the technology: To answer the question: "What is the level of satisfaction of the gifted female students in using mobile learning iTunes U?"

The arithmetic averages, standard deviations for the talented female students toward using the mobile leaning through applying iTunes U were determined by the researcher in two scenarios.

Based on the above, it can be concluded that the students' satisfaction using the technique is 94%. This answers the question about the level of satisfaction of the gifted female student's towards using mobile learning through applying iTunes U

By completing the previous statistical analysis, the author ensures the effectiveness of the mobile learning applications in the thematic program provided to the talented female high school students in Jeddah.

TABLE IV
TALENTED FEMALE STUDENTS SATISFACTION

#	Dimension	Mean	%	Standard deviation	Dimension arrangement	Level of satisfaction
1	Satisfied with using the application generally	2.88	94%	0.233	2	Agree
2	Satisfied with software operating	2.89	95%	0.238	1	Agree
	Satisfaction as a whole	2.89	95%	2.226		Agree

Table IV shows the arithmetic means and standard deviations for the talented female student's satisfaction level (sample individuals) towards the use of mobile learning through applying iTunes U.

VII. RESEARCH RESULTS AND CONCLUSION

After completing the analysis, the author concludes the following:
- There is a statistical significance difference at the level **α ≤ 0.05** between the female students' average performance in the metacognition skills before and after using iTunes U which has its own effect on the post-application benefits.
- There is a statistically significant correlation at the level **α ≤ 0.05** between the students' satisfaction with using the technique and students' performance average in the metacognition skills after using iTunes U.
- The gifted students' level of satisfaction towards using the mobile learning application iTunes U is positive, where the total general average is 2.89 and standard deviation is 0.226 and 95%.

This research aims at designing and preparing a proposal to use mobile learning to provide talented female high school students in Jeddah with a thematic program and discovering its impact on the development of metacognition skills, as well as to measure the level satisfaction of the students with the technique used. Through the processing of the data statistically, the validity of the hypotheses were verified.

The satisfaction results of the current research is the same as the field literature review [4], where it proved the efficiency of using mobile learning to improve the students' knowledge. This is in addition to a study [8], which proved that using iTunes U in teaching is very efficient. The study [7] demonstrated the satisfaction of university students in using mobile learning in education. This study [10] stated that there is a clear difference in the metacognition skills of the talented students compared to their normal peers, especially in planning skills.

The author believes that the said difference is due to the following reasons:
- The availability of different knowledge sources in using the suggested mobile learning application, where every female student is able to learn according to her needs.
- Easy navigation between the sources contributes to forming a positive orientation toward learning, and then

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general satisfaction with the suggested application usage.
- Enjoyable educational environment which increases motivation.
- Removing time and place restrictions offers greater freedom in learning, which is welcomed by the female talented students.
- Mobile learning enhances the studying capacity of the students, particularly the talented students. It also provides a good supporting environment for continuous and self-education that encourages knowledge under the current realities of education.
- Mobile learning creates an open and flexible environment, which in turn allows the female talented students to analyze and search the solution to the problems creatively.

VIII. RECOMMENDATIONS

The current research suggests the following results:
- To utilize mobile learning applications in the improvement of thematic programs provided to the talented female students in Saudi Arabia.
- To provide the teachers with the necessary trainings and workshops on how to develop software and the use of mobile learning applications in teaching.
- To encourage the teachers to use the mobile learning applications and iTunes U as it provides an open and flexible environment in the field of teaching.
- To draw attention of the high ranking officials and general directors of the Ministry of Education for them to understand the benefits of the features of the mobile applications and its importance in the thematic programs.
- To encourage the female talented students to benefit from the courses provided through mobile learning and distance education to support their fields and find solutions to the problems they faced.

IX. SUGGESTED RESEARCH

In light of the current research, the author suggests the following subjects:
- Using mobile learning applications in the development of the creative abilities of female talented elementary school students.
- The impact of using mobile learning in the development of the auto-learning skills of female talented students in the fourth class at the elementary school level.
- Using mobile learning in the development of teacher skills in terms of designing electronic thematic programs for female talented students at the elementary school level.

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