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The Effectiveness of Computerized Instructional Packages on Concept Acquisition and Improving Academic Achievement among Female Deaf Students in KSA

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Abstract
The current study aimed to investigate the effectiveness of computerized instructional packages on concept acquisition and improving academic achievement among deaf students in Saudi Arabia. The sample consisted of (16) third-grade female deaf students in prep stage for the first semester of the academic year 2013/2014, randomly selected from schools in the city of Jeddah, Saudi Arabia and distributed evenly to two groups: control group (n = 8) and experimental group (n = 8). Quasi-experimental method used to achieve the objective of the study. Computerized instructional packages, test of concept acquisition and academic achievement test were utilized to collect data. The results showed statistically significant differences between the performances' mean of the control group and experimental group in the concept acquisition posttest and academic achievement posttest and differences were in favor of the experimental group. The study recommended the need to provide computerized instructional packages in all institutes and programs for people with special needs, especially the deaf, and with concern for the provision of modern methods that take into account the easiness and performance effectiveness. The study also recommended the need to train teachers of students with special needs, specifically the deaf, on the use of computerized instructional packages, in addition to the need for an education technology specialist for the deaf in each institute.
Keywords: computerized instructional packages, concept acquisition, academic achievement, female deaf students.

1. Introduction

Modern technology is one of the most important methods used in modern educational process, based on practical application, which helps create an interactive learning environment oriented and focused too heavily on the role of the learner through interactive activities investing the true extent of his energies and abilities; prompting many centers and educational institutions to invest technology in education through the use of technological methods and tools for designing educational programs based on the use of interactive software as a method for interactive education.

Paying attention to methods of modern technology has led to the emergence of new concepts in the world of education, such as e-learning, e-book, virtual university and e-library that helps the learner learn anywhere at any time that suits him/her without attending the classroom in specific times (Almousa and Almubarak, 2005). These emerging concepts are within the circle of educational technology, known as a systematic methodology process structured in the design of teaching and learning process, its implementation and evaluation, in light of specific targets, which mainly based on the results of research in various fields of knowledge, using all available human and non-human potentialities to get more effective and adequate Education (Al-Heyala, 2004).

By the availability of modern technology in educational institutions, processes of integrated education based on technology started, such as programs of computerized instructional packages, which marked with the diversity of knowledge of the learner which relies mainly on the use of modern teaching strategies as problem solving, the survey and cooperative learning, thus reinforcing self-learning, which requires the presence of multiple and ready sources, and software to sources, methods, tools and content appropriate to the learner in the light of learning needs (Ghabayen, 2001).

Modern trends appeared to qualify the teacher, as director and facilitator for the student to provide educational subject and knowledge, and preparing the student for computerized learning in all its forms through the mastery of teachers and students for the necessary skills of computer, the proper access to required knowledge and its development through the production of certain software to facilitate the learning process and make it interesting (Mehlinger and Susan, 2002).

Huang (2000) added that the computer is the most appropriate device for learning in a multi-media lab, which provides boundless communication for knowledge and learning compared to the facts and the written traditional reports. This was confirmed by Stigler, Gallimore and Hiebert (2000) and Earle (2002) that the successful educational technology requires focusing on the task of developing education and improving it for all learners, including adopting the right tools, and the application of good practices through focusing on the choice of successful curriculum and effective method.

In the field of special education, instructional technology used in the education of those with special needs, and their teaching cadres were keen on utilizing new technology in education (Al-Khatib, 2005). Education technology has contributed to playing an important role in giving people with special needs the right of learning and education suitable to their abilities, potentials, needs and characteristics; because they suffer from a lack or loss of one of their senses, prompting them to compensate this disability (Sewidan and Al-Jazar, 2007). Hence, the hearing impaired students are in a bad need to software to provide them with an explanation of the concepts and information to develop their linguistics and achievement. This is recommended by pieces of literature review Fung, Chow and Chang (2005), Oramas, Moreno, and Chiluiza (2006), Mortenson (2009), Cannon (2010) and the study of Moursi (2013).

Kaplan (2003) emphasized on general considerations when using technical assistance for educating deaf students, such as ad hoc text, and the employment of images and shapes that represent the concept. Al-Heyala (2004) saw that such technique used in computerized instructional package, which enables the teacher to express their information in more than a means, such as animations. Batson (2003) indicated that the computerized instructional package allows for monitoring academic requirements and methodological activities based on visual art in the presentation process; which contributes to the development of the cognitive construction of those with hearing disability, and increase their experience and prospects to acquire concepts.

It is difficult to compare academic achievement of the hearing disabled students to that of hearing students, especially low performance in reading achievement, this is due to the impact of disability in the verbal side (Qaryouti, 2005). The disparity in hearing disabilities has an important role in achievement, which is also affected by the mental and personal abilities, age and parents' support (Immam and Qamsh, 2006), which in turn requires means and methods to maintain the concept in mind of the deaf, such as a movie and motion picture projector, mirrors, mobile and fixed blackboard and computer (Qaryouti, 2005). This is referred to by Ebeid (2001) that, through the use of a computer, the user's voice converted to an image that can be seen, and then assessing the skills of people with hearing loss, hearing impaired and those with receptive and expressive language problems. Jimmy (2007) also confirmed that the computer technologies help transfer some real phenomena for hearing-disabled students who rely more on the sense of sight, especially phenomena that are difficult to view for being away from them or rarely to happen in their environment. Thomson and Wilson (2006) assured that computerized instructional packages contributed to increasing the degree of motivation among deaf students, as the survey results indicated that they learn how to discover new information and skills and increasing of attention and concentration.

In this regard, research and literature review have confirmed the importance of the use of computer technology in education of the deaf and training them such as Qaryouti (2002), which revealed the effectiveness of the use of computer in the education of children with hearing disabilities in teaching of Arabic language. Gaad and Qaryouti (2002) assured the impact of the use of computer programs in education of deaf students and improving their classroom performance instead of the traditional methods of education. This is also shown by Mulaly (2002) that revealed the impact of the software programs in the education of deaf children reading and writing skills in English. Takahashi, Arai and Katagiri (2003) revealed the effectiveness of software program in the development of communication skills among deaf students. Abadi (2004) demonstrated the effectiveness of a software program in the development of creative thinking skills among deaf children. Oramas, Moreno ,and Chiluiza (2006) confirmed the effectiveness of the role of computer technology in the development of understanding sign language and the use of expressive language among the deaf. Mortenson (2009) demonstrated the effectiveness of using a computerized program/DVD discs on the expressive language development among deaf children. Cannon (2010) demonstrated the effectiveness of a computerized instructional program to improve language skills and expressive language skills among deaf children. Moursi (2013) showed the importance of software programs in development of academic achievement and inclination toward it among the hearing-impaired students.

Hence, the study problem summarized in designing of computerized instructional packages, and investigating its effectiveness on acquiring the concepts and academic achievement among deaf students in Saudi Arabia.

2. Statement of the problem

The study problem lies in answering the following two questions:

1. Are there any statistically significant differences at the level of (a = 0.05) between the control group and the experimental group in posttest of concepts?
2. Are there any statistically significant differences at the level of a = 0.05) between the control group and the experimental group in posttest of academic achievement?

3. Objectives

The present study aimed to prepare computerized instructional packages and measure their effectiveness on

acquiring the concepts and improving academic achievement among female deaf students in the city of Jeddah, Saudi Arabia.

4. Significance

The present study contributes to increasing human knowledge about the importance of computerized instructional packages and their effect on the acquisition of concepts and improving academic achievement among female deaf students, and it can be the foundation for researchers and scholars. The importance of the study lies in revealing the effectiveness of computerized instructional packages on the acquisition of concepts and improving academic achievement among female deaf students; thus contributing to attract schools and specialized centers to the education and training of the deaf for the application of these computerized instructional packages, and to facilitate the study process and time management and permanently organizing the scientific curriculum of the school, as well as acquiring various concepts. This study also gives a vision for the officials of the educational process about the importance of computerized instructional packages; which contribute to draw their attention to the development of plans, programs and methods that locally and regionally help meet the educational needs of the deaf students.

5. Methodology

This study adopted a quasi-experimental approach, and "Nonequivalent Control Group Design" was used, based on the causal relationship between two variables: independent and dependent; this design used in this study to measure the impact of the effectiveness of the independent variable of computerized instructional packages on the dependent variable of acquisition of concepts and academic achievement through the formation of two groups: The control group has been taught according to the traditional normal method, and the experimental group has been taught through computerized instructional packages with pre and posttest of concepts and academic achievement.

5.1 Sampling

The study sample consisted of (16) female deaf students in third grade prep stage of the first semester for the academic year 2013/2014, randomly selected and distributed to control group and experimental group, the two groups have been taught the lesson of (*Land changes*); but the experimental group taught through the computerized instructional package and the same lesson taught by the normal way for the control group. The participants are of close economic, social and cultural level in Jeddah, as shown in Table (1), which shows the distribution of participants according to teaching method.

Table (1): Distribution of participants

Variable	Category	Frequency	Percentage
Group	Control group	8	%50
	Experimental group	8	%50
Total		16	100%

5.2 Instrument

The following instruments used to achieve the objectives of the study:

First, Test of Acquisition of Concepts:

- *Description*: This test focused on the content concepts, it is true (√) or false (X) test. The test consisted of (30) items with one mark for each; thus the highest mark is (30) and the lowest mark is (0). Choosing the right phrases has been taken into account in the test preparation, and identifying the concepts to be measured, such as (scientific facts, earthquakes, volcanoes, tectonic plates and their relationship to earthquakes and volcanoes, the power of God and the scientific article).
- *Validity*: To check the validity of the content of the test, a number of reviewers and referees, more experienced in the education of the deaf, evaluated the test for the linguistic and wording appropriateness of each phrase to achieve the objective of the test.
- *Reliability*: (test and retest) method. To verify the reliability of the test, it has been applied to a pilot sample in Al-Amal Institute for the deaf. The participants retested with interval time duration (14) days, and reliability coefficient calculated through Pearson correlation coefficient that was (0.85) which shows the appropriateness of the reliability of the test.

Second, Academic Achievement Test:

The achievement test involved multiple choices, in addition to the one article question. After verifying the validity and reliability of the test, it consisted of three questions. The total test scores (40), the highest mark, and (0), the lowest mark.

The test prepared from the science book for the prep stage third grade. Paragraphs of the test were appropriate for the objectives mentioned in the unity plan. A number of specialists and experts assessed the test questions to

express their views on the appropriateness of the test and its linguistic wording; based on their review, the final draft formulated well for the validity of the test. The method of test and retest conducted to verify the reliability of the test, reliability coefficient calculated by using the correlation coefficient (Pearson) that was (0.90), this is appropriate value for the purposes of the study.

Thirdly: Computerized instructional Package

The computerized instructional package is appropriate mostly for more than a discipline or academic semester. The package preparation in the training session involved the following steps:

1. Provide a computer lab and guiding materials such as a book and CD-ROMs for the project.
2. The project started with selecting a unit of study.
3. Creating a folder for each trainee, involving four sub-folders including files and designs for the package.
4. Each trainee began analyzing the unit in terms of choice of an interesting title, then writing the basic question and the questions of the unit in the unit plan of the package.
5. There are points in the plan indicating the targeted age group and educational frameworks and objectives to be achieved and the methods used with keywords.
6. The application conducted by trying to answer the basic question, and questions of the unit.
7. Each stage of applying the package is well planned, implemented and evaluated. The package has been introduced and reviewed by a number of referees and specialists in the field of special education, education technology, curriculum and psychology, science, geography, who commended the content of the package.

5.3 Application and Procedures

1. The unit of (*Land changes*) was analyzed by the author in accordance with objectives, main lines of the curriculum through unity plan in the package, commensurate with the files and folders within the package.
2. The author of the study made achievement test for the unit analyzed; this test is an essential prerequisite as a file in packages before and after the study to measure the effectiveness of the package.
3. The author diligently searched for acquisition of concepts, skills and methods for the preparation of concept acquisition test for female deaf students, pre and posttest applied to measure the effectiveness of computerized instructional package.
4. Equivalence for control and experimental groups before applying computerized instructional package:

To ensure the equivalence of the control and experimental groups, T-test was conducted for the post performance of the two groups for the tests of achievement and concepts separately. Means, standard deviations, "T" value and statistical significance calculated as shown in Table (2).

Table (2): Means, standard deviations and T-test according to the variable of group to the two posttests: the acquisition of concepts and academic achievement among female students deaf

Test	Group	No.	Mean	St. D	T-value	Freedom degrees	Sig. level
Posttest of concepts	Control	8	15.5	1.9	0.435	10	.085
	Exp.	8	16.2	3.6			
Posttest of academic achievement	Control	8	18.4	2.6	0.217	10	.829
	Exp.	8	18.0	4.4			

Table (2) showed that there were no statistically significant differences (a = 0.05) between the means of female deaf students in the posttests of the acquisition of concepts and academic achievement due to the group variable (the control group and the experimental group); indicating the equivalence of the two groups.

1. After conducting a meeting with the targeted deaf students to explain the package and its application, computerized instructional package applied to the experimental group (n = 8).
2. Post measurement made for the experimental and control groups on the two tests of the study.
3. Data entry in the computer and (SPSS) conducted to analyze the data and get results.
4. Discussing the results, and making appropriate recommendations in the light of the findings.

5.4 Statistical analysis

Quasi-experimental method used in this study, the participants randomly selected and distributed into two groups: the control group and the experimental group, where the control group was not statistically analyzed, as shown in figure (1).

Control group	O2	———	O1	G 2
Experimental group	O2	X	O1	G 1

Figure (1) Study design: the control group and the experimental group

Arithmetic means, standard deviations, and Mann Whitney U Test were used in the statistical analysis

to get the study results.

6. Results

Results related to the first question: Are there any statistically significant differences at the level of (a = 0.05) between the control group and the experimental group in posttest of concepts? To answer this question, arithmetic means and standard deviations for the two experimental and control groups to the posttest measure for the test of acquisition of concepts, as indicated in Table (3).

Table (3): Means and standard deviations for the two experimental and control groups to the posttest measure for the test of acquisition of concepts

Posttest of concept acquisition	Group	Mean	St. D
	Control	23	3.40
	Experimental	27	2.10

Table (3) revealed that the mean of performance of the control group to posttest of concepts was (23) while the experimental group was (27), and to verify that the difference is statistically significant, Mann Whitney U Test used as illustrated in table (4).

Table (4): Mann Whitney U Test results

Group	No.	Mean	Sum	Mann Whitney	Sig.
Control	8	5.22	36.50	-2.02	0.02
Experimental	8	9.76	68.50		
Total	16				

Table (4) showed statistically significant differences on posttest of acquisition of concepts in favor of the experimental group, where statistical value of Mann Whitney at the level of statistical significance (a = 0.05) was (-2.02) with statistical significance (0.02), indicating the effectiveness of the computerized instructional packages on improving the acquisition of concepts among female deaf students.

Results of the second question: Are there any statistically significant differences at the level of a = 0.05) between the control group and the experimental group in posttest of academic achievement? To answer this question, arithmetic means and standard deviations for the two experimental and control group on the posttest of academic achievement as shown in Table (5).

Table (5): Means and standard deviations for the experimental and control groups on academic achievement posttest

	Group	Mean	St. D
Academic achievement posttest	Control	24	2.70
	Experimental	33	1.98

Table (5) indicates that the mean of performance of the control group on academic achievement posttest was (24), while the mean of performance of the experimental group on academic achievement posttest was (33), Mann Whitney U Test conducted to verify that the difference is statistically significant between the control and experimental groups, as shown in Table (6).

Table (6): Mann Whitney U Test results for the difference in the level of academic achievement between the control and experimental groups among deaf students

Group	No.	Mean	Sum	Mann Whitney	Sig.
Control	8	4.00	28.00	-3.14	0.00
Experimental	8	11.00	77.00		
Total	16				

Table (6) reveals that there are statistically significant differences on academic achievement posttest in favor of the experimental group, where statistical value of Mann Whitney at the level of statistical significance (a = 0.05) was (-3.14) with statistical significance (0.00), indicating the effectiveness of the computerized instructional packages on improving the academic achievement among female deaf students.

7. Discussion

The current study is an attempt to identify the effectiveness of computerized instructional packages on the acquisition of concepts and academic achievement among female deaf students in Saudi Arabia.

With regard to the first question: Mann Whitney statistical results pointed to the existence of statistically significant differences in concept acquisition between the mean of performance of the experimental group and that of the control group in favor of the experimental group. The results showed the role of utilizing instructional software and packages in providing the right meaning on the one hand, and in maintaining the proper brain's concept on the other hand, to be an assistance to the deaf for the upcoming concepts, and thus reinforcing the previous educational experiences. Very high differences to acquire concepts due to focusing on presenting slides with moving pictures and shapes, with minimal text, which is the standard method through

which the deaf student can learn well, such method has a great role to maintain and keep a clear picture of this concept in the memory of the deaf.

The author found that the contents of the package helped achieve the terminology of cognitive theory, such as memory, attention, perception and revision, all of which helps achieve perceiving visually the concept, and then accessing the brain image, which in turn promotes the acquisition of concepts and their development, where this concept has become a fixed brain image in the mind of the deaf. The current study is consistent with Mankoff, Jennifer & James and Landay (2003), which referred to the presentations of PowerPoint software, and its role in the visual perception of deaf students, and thus identifying the image of intended concept. It also agreed with Kaplan (2003) in the development of cognitive experiences through computer programs, which in turn helps acquire concepts, as well as the study of Cannon (2010) which showed the effectiveness of a computerized educational program to improve language skills and expressive language skills among deaf children.

Regarding the second question, the results showed statistically significant differences between the mean of performance of the experimental group, which have been taught the unit through the computerized instructional package, and the mean performance of the control group, which have been taught the unit itself in the normal way for academic achievement.

The author of the current study believes that the environment provided by the computer during the teaching and learning process in terms of communication and interaction between the learners produces positive attitudes among them toward computerized instructional packages as an educational method from the one hand, and toward the subjects they learn from the other hand, which increases their motivation toward learning and thereby increases their academic achievement.

The female deaf students' attitudes towards the use of computerized instructional packages as an educational method influenced to a large extent by the efficiency of computerized package and its effectiveness. This study is consistent with Peljhan and Matjaz (2004) in the use of web pages and designs of Publisher Program. The study also agrees with Takahashi et al. (2003), which assured the cooperative learning as computer-supported strategy. This study is also consistent with the Qaryouti (2002), Mulaly (2002) and Abadi (2004), which proved that the use of computers and electronic method of education improves reading skills among deaf students. It is also in consistence with the study of Moursi (2013), which demonstrated the effectiveness of the different intensity of visual stimuli in the computer software on academic achievement among hearing impaired students.

8. Recommendations

Based on the results, the study recommends the following:

1. The need to provide computerized instructional packages in all institutes and programs for people with special needs, especially the deaf, and with concern for the provision of modern methods that take into account the ease of use and performance effectiveness.
2. The need to train teachers of students with special needs, specifically those of the deaf, on the use of computerized instructional packages, in addition to the need for an education technology specialist for the deaf in each institute.
3. Further studies should be conducted to investigate the impact of the use of computerized instructional packages on developing the skill of problem-solving and creative and critical thinking among deaf students.

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