Journal of Education and Practice www.iiste.org
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.4, No.16, 2013

Developing the Mathematical Skills among Sample of Down syndrome by Education Technology

Prepared by: Saida Qaftan Abdel-Aziz Al Edwan

Abstract
The purpose of the current study is to know the influence of a program based on education technology in developing mathematical operations (subtraction and addition operations) for a sample of (50) male and female students of Down Syndrome in the National Association for Mentally Disabled. The method used in this study is the quasi-experimental approach and a computerized program had been promoted to develop e the mathematical skills. The results indicated that the effect of this program on the members of the sample were for the benefit of the experimental group. Furthermore, there were statistical significance differences (α=0.05) attributed to gender in favor of females. On the other hand, the results of the study showed the absence of statistical significance differences (α=0.05) attributed to the effect of the interaction between the program and gender in the skills of addition and subtraction besides the impact of gender.
Key words: Education technology program, mathematical skills (add, subtract), Down syndrome.

1. Introduction

The present time witnesses significant development in methods of educating and teaching children with special needs in general and children with Down syndrome in specific. This is as a result of several factors and variables social, educational, or constitutional that calls for the rights of these children. We sense this development in activating the role of normal schools in the field of educating and teaching the special needs students and expanding the role of private education centers along with improving the human resources working with children of special needs and activating the role of scientific researches in the field of special education. These things and others contributed in developing special education and children with Down syndrome become human wealth that should be developed and take advantage of their abilities.

Using computers in the present time is considered a good educational tool. Many teachers thought earlier that using computer can help in isolating students from learning but in the present time, they are fully aware that using technology provides excellent opportunities for children to work with each other (Ryba, Ken, Selby, Linda & Nolan, Pat 2002).

Using technology is important in teaching and learning math among children as technology affects in the process of teaching math and reinforces their learning. It appeared that we must use technology widely with a focus on enriching learning of math in children as technology increases the visual fantasies for mathematical ideas. Also, technology makes organizing and analyzing data easier as well as helping children to think and solve problems (Aboud, 2007).

Computer can improve the level of basic cognitive processes (Attention, perception, and memory) and save students time in the direct study of their academic materials. Therefore, computer has the ability to provide individual and stimulating practice much more than traditional learning. The field of teaching math has received with the progress of systems and software a large share of computer technology. It is considered a visual and educational method which helps improving thinking in general and mathematical thinking in specific with all its different aspects. It also reduces the time required for learning either in individual or group levels. The computer is an effective learning tool to gain Basic Academic skills to enable special needs students increasing their abilities to cope with this rapid progressive life. In the light of the computer importance and its multiple uses, it becomes a tool to improve and develop culture and social skills as well as their academic achievement. Mentally disabled children suffering from mild or multiple difficulties can use technology in all aspects of their educational life. Besides, there are optional ways available for students with mild mental disability who cannot deal with the keyboard to access to computer. Also, computer is an effective way to improve the performance of these children (Aboud, 2007).

On the other side, we find some negative aspects of the old math curriculum (the traditional method) which lacks the elements of motivation and lack of technology-assistance in performing missions of educating and teaching either as teachers or educators. So, the duty of the authors of the curriculum is to take into accounts each individual needs and preparations and work on the appearance of the curriculum in a more attractive and organized logically as well as adding teaching aids mainly the computer. Hence, the effectiveness of using computer appears as an aid in the teaching process especially mentally disabled children. This refers to the ability of computer to attract their attention and stir their thinking through its several means which play an effective role in improving their academic performance from one side and cope with their levels and abilities from another side (Saraya, 2007).

Down syndrome is considered one of the most common syndromes and easy to identify its characteristics. The first to identify and know this syndrome was John Langon Down in 1866. (Zreiqat, 2012).

Down syndrome occurs as a result of a chromosomal disorder where the individual with Down syndrome has (47) chromosome instead of (46) chromosome, the plus chromosome is adjacent to chromosome (21) which causes imbalance in the cell division and leads to mental disability.

The growth of the cell from- sperm, clot of blood, lump, and embryo depends on two factors: safety and work of chromosome. Any error in chromosomes or its function leads to biochemical disorder that destroys brain cells and harms the nerve system. One of these errors is the increase in the cell chromosome or the absence of another chromosome that is not counterpart to it. (Abbeduto, Steven, and Frances 2007).

Chromosomes errors result from the failure of the separation of pairs of chromosomes during division of the cells of the body if the failure occurred during the first cell division resulted a cell with (47) chromosomes and other with (45) chromosomes and usually the recent cell dies. As for the cell with plus chromosome, it is divided into two cells each includes (47) chromosomes. Thus, the cell proliferation process will continue until the embryo is made of cells in each a plus chromosome and the disease in this case appears pure.

However, if the cell split into two healthy cells, and the chromosome separation failure occurred in one of the cells division (but did not happen in the second cell), four cells will be produced; Two healthy cells, the third has (47) chromosomes, and the forth has (45) chromosomes. In this case, the recent cell dies and does not proliferate usually and as for the two healthy cells they divide into four healthy cells. The sick cell divides into two cells with (47) chromosomes in each. The process of cell proliferation continues until the body of the embryo is composed of healthy and sick cells, and the disease in this case appears not pure. The chromosomal errors cause biochemical disorders that affect the metabolism of the cell and lead to its death, non-continuation of pregnancy, or it might cause embryo malformation and mental disability (Deborah & Nadel 2007).

Health references in Jordan estimated the ratio of incidence is 1:700 live births although there are no accurate statistics for the prevalence rates of Down syndrome, but the statistics records of the Early Diagnosis of Disabilities Center subsidiary of the Ministry of Health recorded (113) cases of Down syndrome between the 2160 cases of various disabilities . Furthermore, the distribution of the number of children checked the center in the period (1990-2003) indicates that the total number checked is (21180) cases of disabilities and (14840) cases were Down. This may suggest that the proportion of their deployment among other disabilities can be estimated at about (7%). (Ammari, 2004)

The computer has a strong relation with math since the modern computer arose as a result of the search for a tool to facilitate mathematical and logical operations in math. Besides, most of the pioneers in the field of computer were mathematicians and math with its accurate results and clarity of its objectives was able to become an appropriate subject for computer applications. (Al Moughirah, 1991).

There are several educational methods used in teaching math, and the most important and the most presence in the educational field in our present time is the computer. It is possible through computer to use several multimedia which uses motion, colors, and other effects that attracts students to study the content of the math curriculum. (Rofaeal and Youssef 2001)

2. Statement of the Study and Questions

The use of computer becomes very important in the educational process for all students including special needs students. The category of mild mental disability including Down syndrome students is considered one of the categories that need computer in order to gain a basic academic skill which is an interesting and enjoyable way for them. We can through using computer achieve the desired goals because the computer depends on the individualized education which is characteristic for educating students with special needs.

Through watching Down syndrome students in the field and by virtue of my work in teaching university students (Specialization of Special Education) I have seen that is necessary to employ computer skills in educating this category of students with special needs. Those students have the ability to learn in the normal ways as the rest of the categories that have learned different skills through the computer and the results were positive.

This study will try to answer the following questions:

- Are there any statistical significance differences at the level of significance (α=0.05) between the control group and the experimental group in developing the simple additional skills according to gender, program, or the interaction between them?
- Second question: Are there any statistical significance differences at the level (α=0.05) between the experimental group and control group in developing simple subtraction skill due to gender, program, or the interaction between them?

- Third question: Are there any statistical significance differences at the level (α=0.05) between the experimental group and the control group in developing the simple mathematical skill (adding and subtracting) which is due to gender, program, and the interaction between them?

3. Significance of the study

The significance of the current study is to illustrate the use of computer in the simple mathematical operations to Down syndrome students. Since the computer is characterized by large ability in terms of accuracy, speed and control in producing educational material and which appears in two domains:

First: Theoretical significance

. It highlights the role of the computer in teaching the mathematical skills for Down syndrome student in a different way than the traditional one which helps in confirming the information.

. The current study enriches the theoretical literature regarding Down syndrome students and how they benefit from computerized programs and to apply that practically.

Second: Application significance

. The possibility of taking advantage of the current study instruments (measurement and program) to help the Down syndrome students learn the mathematical skills in a computerized way after checking the results of this study.

. Get benefit from the results that the study will reach when preparing programs for the development of other concepts to the Down syndrome children.

4. Procedural definitions of the terms of the study

. Computerized program: A set of computerized activities, and mathematical problems related to addition and subtraction skills that function by following the symbolic reinforcement strategies that is offered to Down syndrome children. (Al Far, 2002).

. Simple mathematic skills: The skills of addition and distraction.

. Down syndrome children: Down syndrome occurs as a result of chromosomal disorder where the person with Down syndrome has (47) chromosome instead of (46) the plus chromosome is adjacent to chromosome (21) which creates imbalance in cell division which caused mental disability.

5. Limitations of study

The current study is determined as follows:

. Human and spatial limits: This study was limited to Down syndrome children of the National Association for Mentally Disabled in Amman.

. Temporal limits: This study was done in the second semester of the academic year 2012/2013.

6. Previous studies related to current study

Davi, M.Nelly, T. and Agnes, L, (1992) conducted a study aimed at discovering the effectiveness of using computer to improve the basic addition and subtraction skills of the children with mental disabilities. The sample of the study consisted of (94) students. The researchers used a computerized program and followed a traditional way that consisted of paper and pen. The method used is the pre and post record to verify the effectiveness of the program plus the (T.Test).

The results of the study explained that students with mental disability in the two groups were trained by using computer gained the skills of addition and subtraction with fewer mistakes when compared with the two groups of children with mild mental disability or the ordinary students who had been trained in the traditional way (paper and pen).

Dube, R. Diana, H. joseh, F, (1995) conducted a study aimed to compare between computer- based explanation and a teacher way explanation in developing the visual differentiation in mathematics to individuals with mental disabilities. The sample of the study consisted of (22) individuals with mental disabilities and were divided into two equal groups (control and experiment). The results of the study showed that explaining by using computer in solving mathematical problems is more effective than the teacher way as members in the experiment group learned the visual differentiation in a better way by using computer.

Another study conducted by Mastropieri, Margo A. Scruggs, Thomas E. And Shiah, Rwey-Lin (1997) aimed to determine the extent to which children with mental disabilities benefited from computer-assisted learning. The sample of the study consisted of (4) children with simple mental disabilities (two girls and two boys). The results of the study indicated that children with mild mental disabilities are easy to learn solving mathematical problems successfully through computerized program designed that contained effective educational staff and animation.

Patra, J. Rath, P. (2000) in their study examined the effectiveness of the use of computers in teaching simple math skills and the concept of number. The sample of the study consisted of (4) children with mental disabilities. The comparison showed average grades in the two applications in the pre and post. The members of the sample benefited statistically significant manner from computer-assisted learning.

Al Kashef (2002) conducted a study and its purpose was to identify the impact of training a group of mental disability children and educate them through computerized program prepared by the Ministry of Education and compare them with their colleagues who are learning the traditional way in classes. The sample of the study consisted of (16) students divided into two groups (8) experimental group and (8) control group. The results of the study reached to the effectiveness of computerized program in learning the skills of addition to students with mild mental disability which appeared in the experiment group than the control group that did not use the interactive software.

Dyab (2001) in his study aimed at teaching a group of mental disabled students the skills of addition and subtraction by using computer. The sample of the study consisted of (28) males and females students with mild mental disabilities (Students of Nazek Al Hariri Center in Jordan). The students were divided into two equal groups experimental and control group. The results of the study showed the importance of teaching through computer which helps to save time, and effort and outline the lesson. The results showed the importance of the method of teaching through computer in reducing the level of emotional turmoil for students in classrooms. Also, teaching through computer helped in forming knowledge and understanding it by children especially abstract concepts and increased motivation to learn.

Similarly, Hawsawi (2002) conducted a study and its purpose was train teachers working with mentally disabled student to realize the technical skills of the computer in teaching. The sample of the study consisted of (17) teachers in (12) schools representing the elementary, primary, and secondary stages. The results of the study showed that students with mild mental disability can benefit from computer in different ways so that raised their level of academic achievement in reading, writing, and math plus computer skills. Students with special needs greatly enjoy using computer as well as the positives and benefits of using computer for students with special needs in general and for students with mild mental disability in specific are too many.

Al Rassees (2003) conducted a study and the purpose of the study was to know the effectiveness of an educational program with the help of computer on the performance of a sample of children with mild mental disability with ages from (8-12 years) in solving the basic addition facts with less than or equal (10) and find out the existence of what they learned after the completion of computer-based learning program. The study was implemented on a sample of mild mental disabled students. The sample of the study consisted of (13 male and female students) from Amal Institute for Disabled Children (Education section) in the Kingdom of Bahrain. The results of the study were as follows: the presence of statistical significance at the level (0.01) at least between the average degrees of the study sample in the pre- test and the average degrees in the post-test for the benefit of the post-test. There was a difference with statistically significance at the level (0.01) at least between the average degrees of the study sample in the pre-test and the average degrees in the post-test for the benefit of the post-test. There were no differences with statistical significance between the average degrees of the study sample in the pre-test and the average degrees in the post-test.

7. Comments on previous studies

Through a review of previous studies, the researcher found the following:

The researcher benefited from previous studies in how to prepare and identify the skills that will be developed. The researcher noticed that programs that were addressed in previous studies which aimed at developing adding and subtracting skill was limited only on training students within the number (9) as the cases in the studies of Dyab (2001) and Al Kashef (2002). While the current study trained students with Down syndrome the skills of adding and subtraction within the numbers (9) and (99) which was among the advantages of the current study. The researcher also noticed the lack of Jordanian on Arabian studies (According to the researcher knowledge) that dealt with Down syndromes which is considered a new addition since previous studies concentrated on mental disabled students in general and this what distinguishes the current study. This distinguishes this study from other studies being dealt with the impact of educational technology in the development of simple mathematical operations among a sample of Jordanian children with Down syndrome. Hence, the current study (According to the researcher knowledge) is not a repetition to any of the previous studies but came as supplement and complement and was useful in adding new link and worked on enriching the shortfall in this aspect.

8. Population and sample of the study

The population of the study consisted of all Down syndrome students with mild stage in The National Association for Mentally Disabled which numbered (50 male and female students) for the academic year

2012/2013. The sample was chosen purposefully then had been distributed randomly into two groups experimental and control table (1):

Table (1)
Members of the study sample distribution

Gender	**Center**	**Female**
Experimental group	The National Association for Mentally Disabled	15
		10
Control group	The National Association for Mentally Disabled	17
		8

9. Equivalent of groups in the addition skill

In order to check the equality of groups in the pre-test for the students' performance in addition skills, the arithmetical means and the standard deviations were calculated according to the variables of group and gender as in table (2).

Table (2)
Arithmetical means and standard deviations for students' pre-test performance in addition skills according to the variables group and gender

Group	Gender	Arithmetical means	Standard deviations	Numbers
Experimental	**Male**	8.89	3.018	15
	Female	8.57	1.272	10
	Total	8.75	2.352	17
Control	**Male**	7.63	2.387	8
	Female	8.38	1.996	15
	Total	8.00	2.160	10
Total	**Male**	8.29	2.733	17
	Female	8.47	1.642	8
	total	8.38	2.254	50

To indicate statistical significance differences between these arithmetical means an analysis of variance duo had been used as shown in table (3)

Table (3)
Two- way ANCOVA to show the impact of variables group and gender and the interaction between them on the students' pre-test performance in the addition skills

Source of variation	Sum of squares	Degrees of freedom	Average squares	P value	Statistical significance
Group	4.231	1	4.231	0.788	0.382
Gender	0.371	1	0.371	0.069	0.795
Gender x group	2.261	1	2.261	0.421	0.522
Error	150.353	28	5.370		
Total	157.216	31			

Table (3) shows the followings

-Absence of differences with statistical significance (α=0.05) attributable to the impact of the group.
-Absence of differences with statistical significance (α=0.05) attributable to the impact of gender.
-Absence of differences with statistical significance (α=0.05) attributable to the impact of interaction between group and gender. This shows the equality between groups in terms of group and gender and the interaction between them in addition skills.

10. Equivalence of groups in subtraction skills

In order to check the equality of groups in the pre-test for the students' performance in the subtraction skill the arithmetical means and the standard deviations were calculated according to the variables group and gender as shown in table (4).

Table (4)
Arithmetical means and standard deviations for the students' pre-test performance in the subtraction skill according to the group and gender.

	Gender	Arithmetical means	Standard deviations	Number
Experimental	**Male**	7.56	2.920	15
	Female	8.86	1.952	10
	Total	8.13	2.553	17
Control	**Male**	7.25	2.252	8
	Female	8.38	1.923	15
	Total	7.81	2.105	10
Total	**Male**	7.41	2.551	17
	Female	8.60	1.882	8
	Total	7.97	2.307	50

To indicate the statistical significance differences between these arithmetical means a two variance analysis had been done as shown in table (5)

Table (5)
Two- way ANCOVA had been done to show the impact of the variables group and gender and the interaction between them on the students' pre-test performance in the subtraction skill.

Source of variation	Sum of squares	Degrees of freedom	Average squares	P value	Statistical significance
Group	1.231	1	1.231	0.226	0.638
Gender	11.684	1	11.684	2.146	0.154
Gender x group	0.062	1	0.062	0.011	0.916
Error	152.454	28	5.445		
Total	165.969	31			

Table (5) shows the followings

-Absence of differences with statistical differences (α=0.05) attributable to the impact of group.

-Absence of differences with statistical differences (α=0.05) attributable to the impact of gender.

-Absence of differences with statistical differences (α=0.05) attributable to the impact of interaction between the group and gender, which proves the equality of groups in terms of group, gender and the interaction between them in the subtraction skill.

Equivalence of groups in their total sores in the pre-test

In order to check the equality of groups in the pre-test for the students' performance on the total score the arithmetical means and the standard deviations had been calculated according to the variables group and gender as shown in table (6).

Table (6)
The arithmetical means and the standard deviations in the pre-test for the students' performance on the total score according to the variables group and gender

Group	Gender	Arithmetical means	Standard deviations	Number
Experimental	**Male**	16.44	5.3888	15
	Female	17.43	2.637	10
	Total	16.87	4.303	17
Control	**Male**	14.88	4.357	8
	Female	16.75	3.105	15
	Total	15.81	3.781	10
Total	**Male**	15.71	4.845	17
	Female	17.07	2.815	8
	Total	16.34	4.021	50

To indicate the statistical significance between these arithmetical means the two variance analysis had been used as shown in table (7).

Table (7)
Two- way ANCOVA to show the impact of the variables group and gender and the interaction between them on the total score

Source of variation	Sum of squares	Degrees of freedom	Average squares	P. value	Statistical significance
Group	10.028	1	10.028	0.592	0.448
Gender	16.220	1	16.220	0.958	0.336
Gender x group	1.575	1	1.575	0.093	0.763
Error	474.312	28	16.940		
Total	502.135	31			

Table (7) shows the followings
-Absence of statistical significance (α=0.05) attributable to the impact of group.
-Absence of statistical significance (α=0.05) attributable to the impact of gender.
-Absence of statistical significance (α=0.05) attributable to the impact of interaction between the group and gender, which proves the equality in terms of group and gender and the interaction between them in total score.

11. Instruments of the study and its application

To achieve the questions of the study two instruments were used:

First: A test of addition and subtraction skills

To achieve the goals of the study, the researcher has developed a test to identify the strengths and weaknesses of the addition and subtraction skills within the numbers (9) and (99) among the members of the sample. The test included four questions that contained the skills of addition and subtraction. The researcher used this test in the pre and post tests to measure the current level of performance of the sample. The researcher also measured the impact of the method of the study on the students' achievement. The test in its final form contained 18 paragraphs for addition skills and 18 paragraphs for subtraction skills. The total score of the test was (36) that had been distributed to the paragraphs of the test.

12. Steps of test preparation

The researcher prepared the test based on the curriculum (Basic mathematical skills for children with mild mental disability) prepared by Dr. Yahyia (1999) by following these steps:
-Review the theoretical literature with respect to the preparation of the tests.
-Determine the content.
-Determine the behavioral goals that cover content.
-Writing paragraphs of the study that fit the two preceding paragraphs.

13. Validity of the test

The researcher checked the validity of the test by certified juries. The test was presented to a group of faculty members in Jordan University and specialists in special education. They were asked to view the test paragraphs and its goals to determine how appropriate the test is to the goals it was set for. They also were asked to add any comments they see appropriate.

The juries assure that the test is suitable for application and suits the goals which were set for. Besides they assure its suitability for the study sample with some modifications.

14. Reliability of the test

To ensure the reliability of the test, it had been verified in a test and re-test by applying it to a group from outside the study sample consisting of 16 students of Nazek Al Hariri center. After two weeks, the test was retest to the same group. Pearson correlation coefficient was calculated between the two tests and it was (0.87)

The reliability coefficient was calculated by using the internal consistency way and according to Koder Richardson equation KR-20-2 which was ranged (0.89). These values are considered appropriate for the purposes of this study. The discrimination and difficulty coefficient had been done for each paragraph in the test. Table (8) shows this.

Table (8)

Number	Difficulty coefficient	Discrimination coefficient	Number	Difficulty coefficient	Difficulty coefficient
1	0.25	0.81	19	0.25	0.55
2	0.25	0.81	20	0.31	0.61
3	0.25	0.44	21	0.44	0.36
4	0.44	0.54	22	0.44	0.33
5	0.69	0.63	23	0.63	0.43
6	0.75	0.45	24	0.63	0.51
7	0.50	0.54	25	0.50	0.72
8	0.50	0.69	26	0.63	0.30
9	0.44	0.37	27	0.56	0.37
10	0.69	0.39	28	0.69	0.39
11	0.31	0.65	29	0.38	0.34
12	0.31	0.34	30	0.31	0.61
13	0.25	0.35	31	0.25	0.48
14	0.50	0.37	32	0.56	0.39
15	0.44	0.33	33	0.63	0.36
16	0.50	0.50	34	0.56	0.62
17	0.50	0.39	35	0.69	0.37
18	0.50	0.73	36	0.69	0.32

Second: Computerized program for the development of addition and subtraction skills

The program of the study aimed at developing mathematical skills; addition and subtraction for the students of Down syndrome. For this purpose, the researcher prepared a computerized educational program on the CD-ROM format. The researcher focuses when preparing the program on addition and subtraction skills with the numbers (9) and (99), and it consisted of (29) sessions. The duration of each session was 20 minutes.

Program-building steps

1-Determine the overall objective of the program.
2-Determine the behavioral goals of the program.
3-Determine the content of the program.

The overall objective of the program

This program aims to develop the simple mathematical operations among the students of Down syndrome based on symbolic reinforcement.

The behavioral goals of the program

The students are expected after the completion of the application of the program to achieve group of addition and subtraction goals within the numbers (9) and (99) by using computerized and mental images.

The content of the program

This program consists of (14) skills in addition and subtraction and these skills are:
-Addition and subtraction within the number (9) by using computerized images.
-Addition and subtraction within the number (99) by using mental arithmetic and computerized images.
-Addition and subtraction one digit number with another one digit.
-Addition and subtraction one digit number with another with two digits.

Validity of the program

The researcher checked the validity of the study by certified juries. The study was presented to a group of faculty members in Jordan University specialists in special education. They were asked to view the study paragraphs and its goals to determine how appropriate the test is to the goals it was set for. They also were asked to add any comments they see appropriate.

Study design

The researcher used the quasi-experiments approach (design unequal groups with pre and post

E G	O1	x	O2
C G	O1	-	O2

EG: Experimental group
CG: Control group
01: Pre-test

02: Post-test
X: process (Computerized mathematical skills program)
-: Without process

Variables of the study

The study included the following variables:

First: Independent variable: It is a strategy of teaching and it has two levels:

Experimental group: the group exposed to the computerized educational program. •

Control group: the group learning the normal way. •

Second: The dependent variable

Develop the mathematical operations (addition and subtraction) and achievement mathematical skills.

Statistical processing

The researcher used the arithmetical means and the standard deviations for comparison of achievements between the two groups (experimental and control) in the pre and posttests. To investigate the differences between the arithmetic means substantial and statistically significant, an analysis of covariance (ANCOVA) has been done.

Results of the study and discussion

First question: Are there any statistical significance differences at the level (α=0.05) between the two groups (experimental and control) in developing simple mathematical skills (addition) due to gender, program, or the interaction between them?

To answer this question, the researcher had calculated arithmetical means and standard deviations plus adjusted means for addition skill according to the computerized program and gender.

Table (9)

Arithmetical means and standard deviations, adjusted means had been calculated for addition skill according to the variables of program and gender.

Program	Gender	Pre-test		Post- test		Adjusted means	Number
		Arithmetical means	Standard deviations	Arithmetical means	Standard deviations		
Experimental	Male	8.89	3.018	10.22	3.420	9.78	15
	Female	8.57	1.272	11.57	2.299	11.40	10
	Total	8.75	2.352	10.81	2.971	10.59	17
Control	Male	7.63	2.387	7.75	2.053	8.40	8
	Female	8.38	1.996	9.00	1.690	9.00	15
	Total	8.00	2.160	8.38	1.928	8.70	10
Total	Male	8.29	2.733	9.06	3.051	9.09	17
	Female	8.47	1.642	10.20	2.336	10.20	8
	Total	8.38	2.254	9.59	2.758	9.64	50

Table (9) shows the contrast in arithmetical means and standard deviations for the performance of the sample of the study on the skill of addition due to the difference in categories of variables program and gender. To show the statistical differences between the arithmetical means, the associated two covariance analysis had been used table (10).

Table (10)

Two -way ANCOVA had been used to show the impact of program and gender and the interaction between them on the addition skill.

Source	Sum of squares	Degrees of freedom	Average squares	P. value	Statistical significance
Pre(associated)	112.725	1	112.725	49.054	0.000
Method of teaching	27.564	1	27.564	11.995	0.002
Gender	9.796	1	9.796	4.263	0.049
Method of teaching x gender	2.048	1	2.048	0.891	0.354
Error	62.045	27	2.298		
Total	214.178	31			

Table (10) shows the following

-Presence of statistical significance differences (α=0.05) due to the impact of program in favor of the experimental method.

-Presence of statistical significance differences (α=0.05) due to the impact of gender in favor of females.

-Absence of statistical significance differences (α=0.05) due to the impact of interaction between program and gender.

The researcher believes that this can be due to the role of computer program which helped to attract the attention of students more than any other method. The method of teaching through computer proved to be more effective to confirm remembering and recalling information because it is based on two senses the sight and hearing. In addition to that, the computer has special significance in providing educational motivations and different types of motivations. In this study the role of the computer had been activated in the immediate motivations of the students when they answer correctly through applause. This means that getting the feedback directly modifies the behavior in the light of current experiences received from the computer. This would coincide with giving stars for students as a reward until they are replaced later with things the student loves. This procedure contributed in leaving a clear impact of the computerized program on the performance of the students. In addition, the number of various training sessions and the accompanying images and sounds had been used in the program contributed also in the superiority of the experimental group over the control group.

This result agreed with (Al Rassees 2003) study that showed superiority of the experimental group to the control group in solving basic additional facts with the help of computer.

Second question: Are there any statistical significance differences at the level (α=0.05) between the experimental group and control group in developing simple subtraction skill due to gender, program, or the interaction between them?

To answer this question the arithmetical means, standard deviations and adjusted means had been calculated according to program and gender.

Table (11)

The arithmetical means, standard deviations, and adjusted means had been calculated for subtraction skill according to the variables of program and gender.

Method	Gender	Pre -test		Post-test		Adjusted means	Number
		Arithmetical means	Standard deviations	Arithmetical means	Standard deviations		
Experimental group	Male	7.56	2.920	9.22	2.386	9.52	15
	Female	8.86	1.952	10.57	2.225	9.93	10
	Total	8.13	2.553	9.81	2.344	9.73	17
Control group	Male	7.25	2.252	7.25	2.315	7.77	8
	Female	8.38	1.923	8.38	2.066	8.08	15
	Total	7.81	2.105	7.81	2.198	7.93	10
Total	Male	7.41	2.551	8.29	2.494	8.64	17
	Female	8.60	1.882	9.40	2.354	9.01	8
	Total	7.97	2.307	8.81	2.455	8.83	50

Table (11) shows contrast in the arithmetical means and the standard deviations for the performance of the sample of the study in the subtraction skill due to the differences in categories of program and gender.

In order to show differences in statistical significance between the arithmetical means the two-way ANCOVA had been used in table (12).

Table (12)

Two-way ANCOVA had been used to show the impact of program, gender, and the interaction between them on the abstraction skill.

Source	Sum of squares	Degrees of freedom	Average squares	p. value	Statistical significance
Pre(associated)	79.131	1	79.131	33.638	0.000
Computerized program	25.526	1	25.526	10.851	0.003
Gender	0.971	1	0.971	0.413	0.526
Program x gender	0.019	1	0.019	0.008	
Error	63.514	27	2.352		
Total	169.161	31			

Table (12) shows the following:

-Presence of statistical significance differences (α=0.05) attributable to the impact of computerized program. The differences were in favor of the experimental group.

-Absence of statistical significance differences (α=0.05) attributable to the impact of gender.

-Absence of statistical significance differences (α=0.05) attributable to the impact of interaction between the program and gender.

This indicates that the students benefit from the computerized program and its activities, sessions, and the nature of images which accompanied the program and synchronized with the voices fit with images. The researcher attributed this to the number of sessions which contributed in clarifying computerized mathematical exercises and issues used in the program. It also contributed to the diversity of issues and multilateral exercises that had been used ranging from easy to difficult and from solving using the images to solving in the abstract way that depends on mental skills.

This study also agreed with Diana Dube and others (1995) which aimed to compare the explanation using the computer and the explanation of a teacher's way in developing the visual differentiation in math for individuals with mental disability. The results also explained that explanation using computer in solving math problems is more effective from explanation of a teacher's way, which reinforced the importance of the role of computer in the speed of learning among the students with special needs including Down syndrome students.

Third question: Are there any statistical significance differences at the level (α=0.05) between the experimental group and the control group in developing the simple mathematical skill (adding and subtracting) which is due to gender, program, and the interaction between them?

To answer this question the arithmetical means, standard deviations, and adjusted means were calculated for the skills addition and subtraction skills according to the variables of program and gender.

Table (13)

The arithmetical means, standard deviations, and adjusted means were calculated for the total score according to the variables of program and gender.

Program	Gender	Pre-test		Post-test		Adjusted means	Number
		Arithmetical means	Standard deviations	Arithmetical means	Standard deviations		
Experimental group	Male	16.44	5.388	19.44	5.659	19.35	15
	Female	17.43	2.637	22.14	4.100	21.07	10
	Total	16.87	4.303	20.63	5.071	20.21	17
Control group	Male	14.88	4.357	15.00	4.175	16.45	8
	Female	16.75	3.105	17.38	3.249	16.97	15
	Total	15.81	3.781	16.19	3.816	16.71	10
Total	Male	15.71	4.845	17.35	5.373	17.90	17
	Female	17.07	2.815	19.60	4.306	19.02	8
	Total	16.34	4.021	18.41	4.957	18.46	50

Table (13) shows apparent contrast in the arithmetical means and the standard deviations for the performance of the sample of the study on the total score due to differences in categories of the variables program and gender.

In order to show the statistical significance differences between the arithmetical means the two-ways ANCOVA had been used table (14).

Table (14)

The two-ways ANCOVA has been used to show the impact of the computerized program, gender and the interaction between them on the total scores.

Source	Sum of squares	Degrees of freedom	Average squares	P. value	Statistical significance
Pre-test(associated)	**460.872**	**1**	**460.872**	**135.136**	**0.000**
Method of teaching	**95.116**	**1**	**95.116**	**27.890**	**0.000**
Gender	**9.757**	**1**	**9.757**	**2.861**	**0.102**
Method of teaching x gender	**2.855**	**1**	**2.855**	**0.837**	**0.368**
Error	**92.082**	**27**	**3.410**		
Total	**660.682**	**31**			

Table (14) shows the following:

-Presence of statistical significance differences (α=0.05) attributable to the impact of computerized program in favor of the experimental group.

-Absence of statistical significance differences (α=0.05) attributable to the impact of gender.

-Absence of statistical significance differences (α=0.05) attributable to the impact of the interaction between the program and gender.

This may be attributed to the success of the computerized program in developing the skills of addition and subtraction on a sample study and implementing the activities and issues effectively which could in turn benefited the students. This appeared through the results of the students on the post-test and the impact of the computer on the performance of students through its effect on the experimental group.

The results of this study agreed with (Patra, Rath, 2000) which showed the importance of using computers on teaching simple mathematical skills and concept of number in favor of the experimental group.

Recommendations

In light of the results of the current study, we can propose a set of recommendations in the scientific and practical domains which are:

1-Provide schools and centers of children of Down syndrome with computers to be used in educating and training mentally disabled children.

2-Guiding and counseling families of the children with Down syndrome of the importance of computerized programs in educating and training their children different skills that contributes in discovering their abilities and self-achievement.

3-Work on adopting this computerized program which the researcher prepared in schools and children centers with special needs.

References

Arabic references

1-Dyab, Fateheiyah (2001) Teaching the skills of addition and subtraction for mentally disabled children through using computer. Unpublished master thesis. Jordan University.

2-Al-Rassees, Reem Fahed (2003) The effectiveness of an educational program to help in teaching the skill of addition for students with mild mental disabilities. Unpublished master thesis. Kingdom of Bahrain: Faculty of Education the Arabian Gulf University.

3-Rofael,Issam,Yousef, Mohammad (2001). Teaching and learning math in the 21st century. Cairo: Egyptian Al Angelo library.

4-Al Zoreiqat, Ibrahim (2012) Down syndrome: Qualifying characteristics and considerations. Amman: Dar Wael for publishing and distribution.

5-Saraya, Adel (2007) The technology of refrained education and the development of innovation. Applied vision.

6-Abboud , Hareth (2007). Computers in education. Amman: Dar Wael for publishing and distribution.

7-Ammari, Mounther (2004) Statistic record for Early Diagnosis of Disabilities Center. Amman – Jordan : Ministry of Health.

8-Al-Far Ibrahim (2002) Using computer in education. Amman: Dar Al Fiker for printing, publishing and distributing.

9-Al Kashef, Iman (2002) The effectiveness of computerized programs in improving some skill for mentally disabled children. The Egyptian Magazine for psychological studies. Issue no.(35) volume (12).

10-Al Mougheerah, Abdullah(1991). Role of computer in teaching math, Al Riyadh: printers of King Soud University.

Foreign references

- Abbeduto, L& Steven, F & Frances, A.(2007).Language Development in Down Syndrome: From The Prelinguistic Perid to The Acquisition of Literacy . mental Retardation And Developmental Disabilities Research Reviews 13:247-261.
- David, M. Nelly, T. and Agnes, L. (1992). Automatization of Mathematics ViaComputer assisted lnstruction Among Students With Mild Mental Handicaps, Education and Training of Mental Retardation, Vol 27 No 3, PP 200-207.
- Dube, R. Diana, H. joseh, F. (1995). Use Computer and Teacher DeliveredPrompts lndiscrimintion Training with lndividuals who have Mental Retardation.American Journal of Mental Retardation, Vol 100 (3), PP 253-261
- Deborah, J & Nadel, L. (2007) Education And Children With Down Syndrome: Neuroscience, Development, And Intervention Mental Retardation And Development, And Intrevention . mental Retardation And Developmental Disabilities Research Reviews13:262-271.
- Hawsawi, A. (2002). Teachers perceptions of computers technology competencies working with students with mild cognitive delay. Unpublished doctoral dissertation, University of Idaho, Moscow, ID. USA.
- Mastropieri, Margo A. Scruggs, Thomas E. And Shiah, Rwey –Lin (1997).Can Computer Teach Problem-Solving Strategies to Students with Mild Mental Retardation? The Psychology Journals, Vol 18No 3 may jun. PP. 157-165.45-
- Patra,J;Rath,p.k.(2000) .computer and pedagogy : Replacing Telling with computer assisted instruction for teaching arithmetic skills to mentally retarded children. Social Science International .Vol 16.(1-2),pp 70- 78.
- Ryba, Ken, Selby, Linda & Nolan, Pat (2002). Computers Empower Students With Special Needs. New Zealand: Educational Leadership international center.