The Effect of Using a Computer-based Multimedia Educational Program on Learning Some Basic Skills in Tennis

Nasser Abuozeid Ali Ibrahim
Muhammad Muhammad Abdullah

**Assistant Professor, Department of Elderly Sport,*
Faculty of Physical Education for Boys, Helwan University.
***Assistant professor, Faculty of Physical Education, Al-Azhar University.*

The present research aims at identifying the effect of a computer-based multimedia educational program on the level of skills performance of three basic tennis skills (grip, forehand shot, and backhand shot). The researchers used the experimental method in examining the effect of the proposed program. Participants were randomly selected from the students of the 3rd year at the Faculty of Physical Education, Al-Azhar University, and divided into two groups: an experimental group and a control group. The experimental group used the proposed computer-based program for learning the basic skills, while the control group used traditional methods of instruction in learning the same skills. The results show that both the control and experimental groups improved with respect to the examined skills. However, by comparing the post-test measurements of the two groups, it was evident that the experimental group outperformed the control group.

***Key words**:* Multimedia, Instructional Technology, basic tennis skills

Introduction

Education in this digital age relies heavily on modern educational technology in achieving the different educational goals. The use of modern technology in university education leads to the improvement of instruction and an increase in its efficiency. This calls for a need to convince university faculty members to utilize modern technology, form positive attitudes toward using technology in instruction, and develop the faculty members' knowledge and skills about the use of modern technology so that they can keep updated with the developments in their respective fields on the research, instructional, or technological levels.

Traci (2001) points out that an individual can recall 20 percent of what he/she hears, 40 percent of what he/she sees or hears, and this rate reaches 70 percent when the person hears, sees, and works. This rate also rises when the individual interacts with what he/she learns through these different methods.

Both researchers are specialized in racquet games and tennis, therefore they have attempted utilizing modern technology in their field. The researchers have tested how a computer-based educational program can help develop the skills performance of some

basic skills in tennis in an easy and innovative way.

The researchers noticed through their experience as tennis players, as well as their work as instructors of tennis sport courses at their faculties, that the students' skills achievement levels are low in these courses. The researchers note that this might be due to several reasons including the instructors reliance on traditional methods of instruction, lack of time allocated for teaching tennis skills which are difficult to learn and require sufficient time and effort on the part of instructor in order for the students to acquire them appropriately.

The researchers have decided to link traditional methods of instruction with modern technology in order to combine the benefits of both traditional education and e-learning, while avoiding the drawbacks of both approaches. This aims at improving the educational process, increasing the success rates, and enhancing the students' educational level. The researchers, therefore, consider it necessary to use the computer in teaching tennis skills, which will lead to enhancing the educational environment, help the students formulate their educational experiences through teaching them the "know-how" to use the different resources to get the information themselves. This method is considered one of the positive learning methods, which will have a positive impact on learning tennis skills.

The researchers believe that the present research is important as it: (a) calls for the need to use modern technology in learning to achieve the goals of the educational process; (b) attempts to introduce the computer as a modern method of instruction in university education in general and teaching tennis in particular; (c) shifts the traditional role of instructor from merely a transmitter of knowledge to a designer of effective educational settings and increase his/her role in guidance and direction; (d) develops the attitudes and tendencies of physical education students toward using modern educational tools in accordance with the requirements of the world today; and (e) provides physical education students with the practical experience for to using the computer in learning tennis skills.

The research aims at identifying the impact of a computer-based multimedia educational program in improving the level of skills performance of some basic tennis skills (grip, forehand shot, backhand shot) for an experimental group compared to a control group that are taught using traditional methods of instruction.

The researchers had three main hypotheses. The first hypothesis is the existence of statistically significant differences between the means of pre- and post-test measurements of the control group's level of skills performance for the basic skills in tennis in favor of the post-test measurement. The second hypothesis is the existence of statistically significant differences between the means of the pre- and post-test measurements for the experimental group of skills performance for the basic skills in tennis in favor of the post-test measurement. The third hypothesis is the existence of statistically significant differences between the means of differences between the experimental and control groups in the level of skills performance for some basic skills in tennis in favor of the experimental group.

Material and Methods

The researcher used the experimental method in the present study. The researchers identified the research population to be the students of the 3rd year at the Faculty of Physical Education, Al-Azhar University, as the tennis sport is one of the courses assigned to the 3rd year students. Moreover, the students of the research population had no previous experience in tennis, which will lead to more accurate results regarding the impact of the proposed program.

Participants

The researcher selected a random sample composed of 32 students from 3rd year students at the Faculty of Physical Education. The sample was divided into two groups: an experimental group and a control group. Each group consisted of 16 students. The experimental group was taught the tennis course using a computer-based program, while the control group was taught using traditional methods.

Before conducting their experiment, the researchers tested identification of the sample in variables that might affect the results of the research as indicated in tables 1 and 2. Table 1 shows that the calculated *t* value in the variables age, height, and weight for the control and experimental groups is less than tabular *t* value, which indicates identification of the sample. Table 2 shows that the coefficient of skewness is between +3 and -3 which indicates identification of the sample and that it represents a normal moderate population.

Table 1

Mean, Standard Deviation, Median, Skewness coefficient for research sample's age, height and weight variables

Sample identification in age, height, and weight variables

Variables	Group	No.	M	SD	Median	Mode	Max	Min	Range	*t*	Sig. value	Sig. level
Age	control	16	21.16	0.33	21.25	20.66	21.66	20.58	1.08	0.46	0.64	insignificant
yrs.	experimental	16	21.08	0.62	21.14	21.33	21.92	19.75	2.17			
Height	control	16	171.68	1.57	171.70	172.00	174.00	168.00	6	1.05	0.29	insignificant
cm.	experimental	16	172.12	0.50	172.12	172.00	174.00	172.00	2			
Weight	control	16	71.56	1.54	71.33	70.00	74.00	70.00	4	1.00	0.32	insignificant
Kg	experimental	16	72.00	0.81	71.92	72.00	74.00	71.00	3			

Table 2

Mean, Standard Deviation, Mode, and Skewness coefficient of the examined variables in the research sample

Variables	Measuring unit	M	SD	Mode	Skewness Coefficient
Wide jump from stability	cm.	2.22	2.21	2.25	-0.27
Jogging 30m	sec.	3.94	0.36	4.13	-0.53
Shuttle run 4 × 10	sec.	5	0.97	6	-1.03
Trunk flexion (forward and down)	cm.	13.8	0.87	14	-0.69
Pull-ups	times	4.9	0.91	5	0.33
Running and Walking 1000 m	sec.	3.34	0.42	3.3	0.14

Measures

The researchers used several measures and tests in the present research. Age was measured by birth date, height was measured by centimeters using a Restameter, and weight was measured by kilograms using a scale. The researchers reviewed the relevant literature in order to design the most appropriate tests to measure the examined skills, presented their tests to experts to decide on their appropriateness, and performed reliability and validity tests to ensure their reliability and validity in measuring the studied skills.

The researchers applied two tests to measure physical abilities and skills performance. Test A consisted of six parts: (1) jogging 30 meters where the participants ran for 30 meters together and the best time was recorded; (2) wide jump from stability to measure the leg muscle power; (3) pull-ups to measure the muscle endurance of the arms and shoulders, the participant's score was calculated based on the number of pull-ups performed in the correct manner (chin over the bar, straight knees); (4) shuttle run 4 times x 10 meters, to measure agility; (5) trunk flexion from a standing position the participant would lean forward and down to touch a ruler and stand this position for 2-4 seconds; and (6) running and walking for 1000 meters to measure the aerobic endurance. Test B was composed of three parts to measure the basic skills variables of the research: (1) accuracy of the forehand shot tested the participant's ability to score (out of 20 balls launched by a ball launcher) by forehand shots to a particular target area; (2) accuracy of the backhand shot tested the participant's ability to score (out of 20 balls launched by a ball launcher) by backhand shots to a particular target area; and (3) grip tested the participant's ability to score as many balls as possible into a particular target area by launching 10 balls.

The tests were validated (discriminant validity) by applying them to 20 students divided into two groups, a skillful group (10 students) from the 3rd and 4th years students at the Faculty of Physical Education who play tennis, and an unskillful group (10 students) who were the sample of the exploratory study. The results are shown in table 3. Table 3 indicates that there are statistically significant differences between the skillful and unskillful groups in favor of the skillful group, since all calculated *t* values are greater than the tabular *t* values at significance level of 0.05, which indicates the validity of these tests.

Table 3

Significance of differences among the means of the two groups (skillful and unskillful) in skills tests (N = 10)

Test	skillful group		unskillful group		Difference	t Value
	- M	± SD	- M	± SD		
Grip	102.30	31.88	32.80	4.83	69.50	6.82*
Forehand	46.90	1.60	18.90	5.53	28.00	15.39*
Backhand	13.30	0.95	2.40	1.35	10.90	20.89*

* Value of tabular *t* at significance level of 0.05 = 2.10

Table 4

Correlation coefficient between first and second applications for skills tests (N = 10)

Test	test		retest		Correlation coefficient *r*
	- M	± SD	- M	± SD	
Grip	32.80	4.83	34.80	2.86	0.83
Forehand	18.90	5.53	20.20	7.04	0.88
Backhand	2.40	1.35	2.60	0.97	0.82

Value of tabular *r* at significance level of 0.05 = 0.632

The reliability of the tests was calculated by test-retest method. The tests were applied to the 10-student sample of the exploratory study, and the retest was conducted after 7 days. The test and retest were conducted under the same conditions and at a similar time. Table 4 indicates that there is a statistically significant correlation between the test and retest results in the level of skills under examination, as all calculated *r* values were greater than the tabular *r* values at significance level of 0.05, which indicates that the tests are reliable.

Procedures

An exploratory experiment was conducted to ensure the efficiency of the used tools and equipments and train the assistants on conducting tests, measurement, and recording data in order to identify possible errors and avoid them in the main experiment. The exploratory experiment was conducted on 12 to 15 October 2012 on a sample of 15 students from the same research population, but outside the core sample. The exploratory experiment confirmed the efficiency of the tools and equipment used in the research, confirmed the assistants' realization of the measurement and test procedures and accurately recording the results in the appropriate forms, and ensured the appropriateness of the load (intensity, volume, and rest intervals) for each part of the educational module of the proposed computer-based program.

Additionally, an exploratory study was conducted on a sample of 10 students in order to get their feedback on the content and attitudes toward the proposed computer-based program, and to ensure that the program is appropriate for their needs.

The researchers conducted a pre-test measurement of the research sample (experimental and control groups) from 2 to 7 October 2012 in order to ensure the identification and equivalence of the sample, and determine the pre-test measurements of the examined skills variables (grip, forehand shot, backhand shot). Table 5 shows the pre-test measurements. It indicates that no statistically significant differences between the experimental and control groups exist in the pre-test measurement, which indicates the equivalence of the two groups.

Table (5)

Arithmetic mean, standard deviation, mediator and bending factor for research's sample of skillful variables

Variables	Group	No	M	SD	Median	Mode	Max	Min	Range	*t*	Sig. value	Sig. level
Grip	control	16	13.18	1.869	13.00	12.00	16.00	10.00	6	0.30	0.75	insignificant
	experimental	16	13.37	1.543	13.55	14.00	16.00	10.00	6			

The main experiment was conducted in the period from 19 October to 27 November 2012. Two education modules were taught to the control and experimental groups per week. The control group was taught by

traditional methods, while the experimental group used the computer-based multimedia program. The proposed program contained some basic skills of tennis (grip, forehand shot, backhand shot) that were derived from the curriculum of the 3rd year at the Faculty of Physical Education. The content of the program incorporated images, illustrations, movement sequences, audio effects, short videos, and interactive tools. The daily module of the proposed program was 90 minutes divided into warm-up (10 minutes), skill learning (60 minutes), physical preparation (15 minutes) and cool-down (5 minutes). The warm up aimed at preparing different parts of the body for the subsequent parts of the module. The skill learning part included a simple verbal explanation of the skill by the instructor, then the students watched the skill again on the computer through the program, thirdly, the students practiced the learnt skill, and finally the students watched the skill again on the computer, received feedback about their errors, and repeated the learnt skill. The physical preparation part contained special exercises related to the basic skills in tennis. The cool-down part aimed at restoring the normal state of the student's body after the previous loads.

After the experiment period lapsed, the researchers conducted post-test measurements of the basic kinetic skills of tennis (grip, forehand shot, backhand shot) for the experimental and control groups. The post-test measurements were taken on 28 and 29 November 2012.

Results

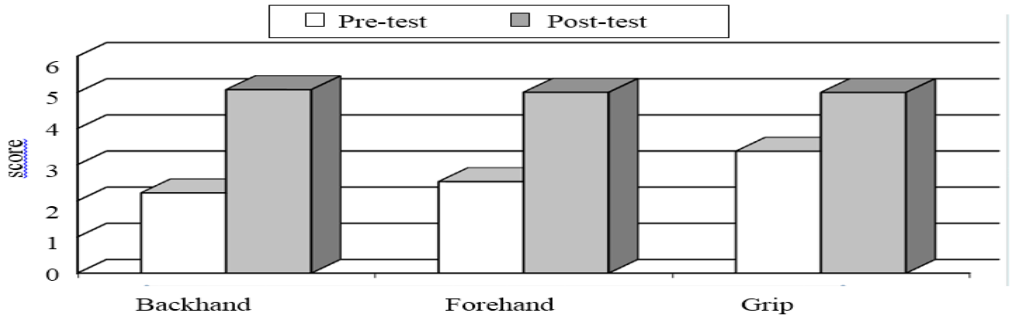
Table 6

Differences in skills performance tests (Grip – Forehand – backhand) between experimental and control groups in the post-test measurements

Variables	Group	No	M	SD	Median	Mode	Max	Min	Range	*t*	Sig. value	Sig. level
Grip	control	16	25.71	8.71	26.00	34.00	36.00	15.00	21	33.47	0.001	Sig.
	experimental	16	34.18	1.22	34.30	34.00	36.00	32.00	4			
Forehand	control	16	26.31	7.80	26.00	19.00	36.00	17.00	19	30.57	0.001	Sig.
	experimental	16	33.87	1.50	34.11	34.00	36.00	31.00	5			
Backhand	control	16	25.96	7.614	25.50	18.00	36.00	17.00	19	35.54	0.001	Sig.
	experimental	16	33.37	1.36	33.37	34.00	36.00	31.00	5			

Figure 1

Pre- and Post-test measurements of the control group's examined skills (Grip, Forehand, Backhand)



The results are shown in tables 6 and 7. Table 6 indicates statistically significant differences between the means of pre- and post-test

measurements of the skills tests (grip, forehand shot, backhand shot) for the experimental group which used the computer-based multimedia program in favor of the post-test measurement. There are also statistically significant differences between pre- and post-test measurements of the control group in favor of the post-test measurement. The calculated *t* value was greater than tabular *t* value at significance level of 0.05. Table 7 compares the post-test measurements of the control and experimental groups and shows a significant difference in favor of the experimental group.

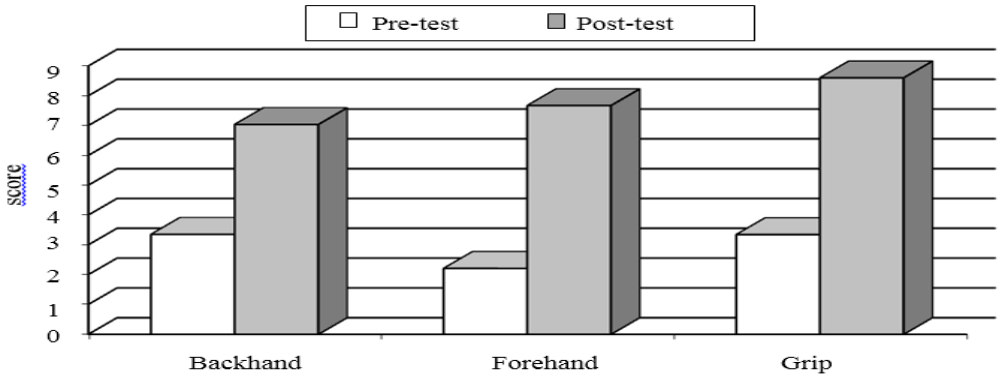
Table 7

Differences in pre- and post-test measurements scores for each student individually and the correlation coefficient

Variables	Exper. Group	No.	M	SD	Kurtosis	Skewness	Correlation coefficient	Max.	Min	Range	t	F. Value	F. Level
Grip	Pre-test	16	13.37	1.54	1.13	0.04	0.39	16.00	10.00	6	35.95	0.001	function
	Post-test	16	34.18	1.22	0.66	0.19		20.00	15.00	5			
Forehand	Pre-test	16	12.62	1.78	0.60	0.01	0.61	17.00	11.00	6	28.76	0.001	function
	Post-test	16	33.87	1.50	0.64	0.31		21.00	17.00	3			
Backhand	Pre-test	16	13.12	1.66	1.14	0.42	0.30	17.00	11.00	6	44.81	0.001	function
	Post-test	16	33.37	1.36	0.76	0.05		20.00	17.00	3			

Figure 2

Pre- and Post-test measurements of the experimental group's examined skills (Grip, Forehand, Backhand)



Discussion

The results show significant differences between the pre- and post-test measurements of the control group in the skills performance. The researchers attribute this improvement to the students' practice of tennis skills after the instructor verbally explains the skills. This helps the students acquire these skills. Thus, the first hypothesis is achieved.

The results also show significant differences between the pre- and post-test measurements of the experimental group. This indicates that the computer-based multimedia program used in teaching the experimental group the basic skills has a positive effect on the level of skills performance. This satisfies the second hypothesis.

The results also show significant differences between the post-test measurements of the experimental and

control groups in favor of the experimental group, which indicate that the computer-based program is more effective than traditional methods of instruction in improving the level of skills performance for the examined skills. The researchers also consider that this result is due to the positive effect of the program content which contributes effectively in achieving the skill-related goals of the course. Moreover, the program content is carefully organized, so that the beginner is able to improve the skills in question. Consequently, the researchers consider that the experimental variable, i.e. the program, resulted in the superior performance of the experimental group compared to the control group. Thus, the third hypothesis is satisfied.

From the previous discussion of the result the researchers conclude that the computer-based multimedia educational program positively contributes to promoting the level of learning tennis skills for the experimental group. The program has added interesting elements to the educational process of tennis skills. Furthermore, the program has had a positive effect on the experimental group's opinions and impression about the learning process, which has consequently had a positive impact on their acquisition of the skills.

The researchers, therefore, recommend that the computer-based program be applied in teaching tennis skills to the Faculty of Physical Education students. They also recommend that further programs be produced about other sports in general and tennis in particular. Additionally, they recommend that the Physical Education instructor be trained on the use and application of modern technology to solve the various educational obstacles. Finally, they recommend that

References

Abdullah O, Abdel Halim H. (2000) The Effect Of An Educational Program Using Animation On Learning Some Motor Skills In The Physical Education Class For Primary School Children. Magazine of Theories and Applications, 48.

Alfar I. (1998) Education of the Computer and Challenges of the 21st Century. Cairo: Dar Al-Fikr Al-Araby.

Al Furjan A. (1997) Technological Education and Educational Technology. Cairo: Dar Gharib.

Amin Z, Azmi N. (2002) Multimedia Design Systems. Minya: Dar Al-Huda for Publication and Distribution.

Baghdadi M. (2002) Educational Technology and Learning, 2nd ed. Cairo: Dar Al-Fikr Al-Araby;.

Bersval F, Ellington H. (1997) A Guide To Educational Technologies. Riyadh: King Saud University.

Davis S. (2001) What E-Learning Can Learn from History, USDLA Journal, 5.

El-Sherbini, F. (2002) The Effectiveness of a Treatment Program Using The Computer in The Students Achievement in Social Studies Subject. Journal of the Faculty of Education.

Ezz El-Din A. (2000) Modern Trends in the teaching Physical Education. Mansoura: Dar Al-Asdiqa' for Publishing and Distribution.

Sadek A. (1998) Developing Computer Software for Educational Purposes. Cairo: Dar Al-Kutub Al-ta'limiya.

Salamah A. (1993) Introduction to Educational Technology. Amman: Dar Al-Fikr for Publishing and Distribution.

Sharaf A. (2000) Education Technology in Physical Education, 1st ed. Cairo: Al-Kitabl Center for Publishing.

Salem M. (2002) Educational Technologies and Tools, 1st ed. Cairo: Dar Al-Fikr Al-Araby.

Salem W. (1998) Educational Technology and Learning in Physical Education, Part 1. Alexandria: Munsha'at Al-Ma'arif.