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**The Effectiveness of a Computer Prepared Educational
Programme in Statistics on Students' Achievement and Their
Attitudes Towards Use of Computer in Learning .**

A Research Presented in Fulfillment of Ph. D. in Education
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Summary of the research, recommendations and suggestions

Introduction :-

Scientific and technological discoveries, especially in the field of computer and electronics, urged a lot of countries of the advanced world to enlighten their people by the bases of computer, thus the use of computer and its applications has increased in surprising rates in so many different fields of life. To an extent that has made them impossible to be counted. The use of computer in education is considered one of the most up-to-date fields in which computer has been involved. The use of computer in education is divided into several fields such as :-

- Computer Literacy
- Computer as an Intellectual Tool.
- Computer Manages Instruction.
- Computer Assisted Instruction [CAI] and Administration.

The beginning of the use of computer in the educational field was by using it as a medium for instruction. Researches and studies, in this field, cared at the beginning for building educational programmes whose aim was supporting the teacher's role; and this is through presenting programmes for training and practice; or building educational programmes which take the role of the teacher.

And so, the role of the teacher becomes, in this case, guidance only, and studying the effect of this on the students' achievement forming a positive attitude towards it and towards using computer in education by using some of the bases of the programmed education organized in a way that could the lessons prepared.

As researches continued in this field, a new role for the computer has appeared. This role is represented in the continuance interaction between the computer and the student which helps in diagnosing the students' faults and remediating them. This is through immediate feedback given to the students' answers. This

feedback helps also in making the learner aware of his faults in the future. This is one side; the other side is that it excites the students and encourage them to go for many trails and to be more persistent in their manner.

Computer is distinguished from other educational media and this has given a strong push to the researches in this field.

Some researches dealt with the psychological and mental aspects of the educational process such as the mental abilities and intelligence levels or the personal qualities and interests .

Some researches, though very little, have been done to show the effect of the computer in the scholastic achievement. This could be done by making the computer an intelligent tool with the different educational situations in order to be able to deal with different levels of knowledge and different interests, abilities and levels of students.

Some other studies tackled one of the important traits of the individual which is cognitive styles, especially the two sorts of perception (independent/dependent). These studies joined together the use of the computer as a tutor and cognitive styles of the individual learners with building educational programmes in a way that takes into consideration the individual distinctions for the two sorts of perception (independent/dependent). This is through presenting immediate feedback, according to the answers of the students; and through studying the quantity of feedback which each cognitive style needs.

In the same way, another study has been accomplished which endeavors to recognize the ability of the process of feedback through computer, to make education unique. This is through building an educational programme on the computer in two forms :

one of them with (feedback) while the other (without feedback) . And also through studying the effectiveness of each of them through a comparison between the achievement of the students those who use the programme in its two forms, and also their attitude towards the computer as a tutor .

The problem of the research :-

This problem can be defined through the following basic question:-
"What is the effectiveness of an educational programme by computer with and without feedback in statistics on the achievement of the students who have the two sorts of perceptions (independent/dependent) and so on the attitude of those students towards learning by computer ?"

From the previous question, some questions appear :-

- 1- What is the effectiveness of an educational programme by computer in statistics (with feedback) on the achievement of the students ?
- 2- What is the effectiveness of the educational programme by computer in statistics (without feedback) on the achievement of the students ?
- 3- What is the effect of interaction between feedback and cognitive styles (independent) on the achievement of the students when they learn statistics by the use of the computer ?
- 4- What is the effect of interaction between feedback and cognitive style (dependent) on the achievement of the students when they learn statistics by the use of the computer ?
- 5- What is the effect of feedback on achievement of independent and dependent students in the same experimental group (the first) ?
- 6- What is the effect of the absence of feedback on the achievement of independent and dependent students in the same experimental group (the second) ?

- 7- What is the attitude towards the use of the computer as a tutor of the students who study by computer with feedback ?
- 8- What is the attitude towards the use of the computer as a tutor of students who study by computer without feedback ?

Hypotheses of the research :-

According to the studies and researches in the field of learning by computer in general, and the use of feedback through computer in particular; and also the ways of perception of the individuals who have the cognitive style (independent/dependent), the researcher sees that she should put the following research hypotheses :-

- 1- The suggested programme is effective if there is feedback.
- 2- The suggested programme isn't effective if there isn't feedback.
- 3- There is a statistically significant difference at (level 0.05) between the average of the students' marks whose cognitive style is (independent) and study the programme (with feedback); and the average of the students' marks whose cognitive style (independent) and study the programme (without feedback) in the after test in favour of the students who are given (feedback) .
- 4- There is a statistically significant difference at (level 0.05) between the average of the students' marks whose cognitive style is (dependent) and study the programme with feedback; and the average of the students' marks whose cognitive style is (dependent) and study the programme without feedback in the after test in favor of the students who study the programme with feedback .
- 5- There is no statistically significant difference at (level 0.05) between the average of the students' marks whose cognitive style is (independent) and the students whose cognitive style is (dependent) who study the programme with feedback in the achievement test .
- 6- There is a statistically significant difference at (level 0.05) between the average of the students' marks, whose cognitive

style is (independent) and the students whose cognitive style is (dependent) who study the programme without feedback in the acquisitive test.

- 7- The students who have been given feedback will have a positive attitudes towards the use of the computer as a tutor.
- 8- The students who haven't got feedback will have negative attitudes towards the use of the computer as a tutor.

Aims of the research :-

The aim of the present research is to build an educational programme via the computer and to study the effectiveness of the use of the computer as a tutor with feedback and without feedback. The research aims also at studying the effect of the interaction between feedback and the two types of the students, perception (independent/dependent) on the students' achievement and their attitudes towards the use of the computer as a tutor".

The importance of the research :-

The importance of the research appears in the following points:-

- 1- Presenting an educational programme in statistics as a school subject by the use of the computer as a tutor.
- 2- Presenting recommendations and suggestions for those concerned in building educational programmes via the computer, which may help in building their educational programmes via the computer in a scientific and educational way that takes into consideration the individual differences among the students as for the two sorts of perception (independent/dependent).
- 3- Presenting a tool for measuring the students' achievement level in statistics : an achievement test which can be used by researchers later on in other studies.
- 4- Presenting a tool for measuring attitudes towards the computer as a tutor, which can be used in other researches too.

Research limitations :-

The researcher was concerned in this study with the following two points :-

- 1- The research is based on the content of the subject matter of statistics for fourth secondary students in the advanced commercial secondary education (5 year system) ,and this is for the following reasons :-
 - A-This curriculum is considered to be relatively advanced as it is taught to the students of the near-final years of the advanced commercial secondary schools.
 - B-This curriculum is not administered to the general certificates as it is difficult to do experiments on such grades.
 - C-There are two laboratories, in this advanced school , which are fully and well prepared and this will make it easy to carry out the experiment.
- 2- The researcher was keen on choosing a relatively advanced age as a period of relative stability that allows individual differences between the two sorts of perception to appear.

Research tools :-

- 1- The educational programme which the researcher has prepared via the computer.
- 2- The achievement test (before-after), to measure the level of the achievement (before-after) the implementation of the experiment prepared by the researcher.
- 3- A measure for attitudes (Likart way) towards the use of the computer as a teacher which has been prepared by the researcher.
- 4- "Included forms" test (The counting picture) (El Sharkawi/ Soloman 1988) a test which is concerned with defining the cognitive styles of the students.

The general frame of the research :-

The research consists of three principal parts :-

The first part :-

It contains the theoretical background of the research, and it includes the first and the second chapter of the research :

The first chapter : contains the research plan and its terms.

The second chapter : is concerned with reviewing the previous studies and the theoretical background in a way to clarify the extent of benefit from them in this research.

The second part :-

It is concerned with the procedures of the research. It contains:-

The third chapter : which shows how the educational programme can be built and the foundations which have been put into considerations.

The fourth chapter : showed how to build the achievement test and to measure its validity and reliability, how to build a measure for attitudes towards the use of the computer as a tutor, and finally how to define and choose "the included forms" test .

The third part :-

The fifth chapter : It deals with how to implement the experiment of research, beginning with the choice of the sample of the research and putting the experiment plan for it; then controlling the variables of the study making sure that the experimental groups involved in the learning, administrating the achievement test and the measure of attitudes, and collecting the data of the study.

The sixth chapter : is devoted to the statistical analysis of the research and examining the hypotheses put for answering the research questions.

The results of the research :

In the sixth chapter of this research, the statistical treatment and the examining of the research hypotheses have been accomplished; the results can be shown as follows :-

- 1- The programme is effective if there is feedback.
- 2- The programme is less effective if there isn't feedback.
This means that it can be said that the educational programme by its two parts, either the one which deals with students with feedback or the other which deals with students without feedback; both of them are effective, yet it is less effective if there is no feedback (look at the results in the fifth chapter).
- 3- There is a statistically significant difference at level 0.05 between the average of the students' marks who have an (independent) cognitive who study the programme (with feedback) and the average of the students' marks who have an (independent) cognitive style who study the programme (without feedback) in the "after achievement test" in favor of (feedback). This means that we can say that the independent students, in perception who have got feedback, have achieved more success and more marks than their independent colleagues who haven't got feedback.
- 4- There is a statistically significant difference at level 0.05 between the average of the students' marks who have a (dependent) sort of cognitive style who study the programme (with feedback) and the average of students' marks whose cognitive style is dependent and who study the programme without (feedback) in the after achievement test in favor of feedback.

This means that we can say that the (dependent) students in cognition, who have got (feedback), have achieved more

success and more marks than their (dependent) colleagues who have not got feedback.

- 5- There is no statistically significant difference at level 0.05 between the average of the students' marks whose cognitive style is (independent) and the average of the students' marks whose cognitive style is (dependent) who study the programme with (feedback) in the after - acquisitive test.

This means that we can say that there is no abstract difference between the (independent) students' marks and the (dependent) students' marks in the first experimental group in which the students have got (feedback). This means that the (dependent) students in their cognition have achieved success and good marks the same as their independent colleagues. This is because they have got (feedback) through computer screens.

The importance of feedback appears more when we compare the averages of the (dependent) and (independent) student's marks in the second experimental group which hasn't got (feedback).

The Comparison showed that there is an abstract difference between the averages of the (independent) students' marks of the second experimental group and the (dependent) student's marks of this group.

Therefore, it is apparent that (feedback) had an effect on the (dependent) students' achievement in the first experimental group. (Feedback) has made no abstract difference between the (dependent) and (independent) students' marks.

These results can be explained in the light of Watken's idea and the ideas of his colleagues, and what many studies (the second

chapter) have assured concerning the importance of organizing and presenting the subject of learning. So there is no longer any need from the dependent students- to analyze and reorganize in order to be able to grasp what they had of knowledge and information. Moreover, the existence of a well developed feedback appropriate to the educational situation led to the diagnosis and remediation of the students' mistakes. Therefore, this helped in correcting the learning process in addition to perseverance in performance on the part of the students. So the dependent students became able to reach the same level of performance of their independent colleagues.

- 6- There is a positive attitude towards the use of the computer as a teacher among both students who have got (feedback) in the first experimental group and the students who (haven't got feedback) in the second experimental group.

And so, we can say that there is no significant difference between the average of the students' marks of the first and second experimental group in the measure of attitudes towards the computer as a teacher.

Suggestions and recommendations :-

As a result of the present research and after verifying the validation of the hypotheses, the following suggestions and recommendations can be presented :

Computer may contribute in solving the problems of private tutor and the reduction of achievement level, looking after the individual differences; and also in continual education. So, we should care for:-

- 1- Scientific theories which are concerned with techniques of designing educational programmes and teaching these theories to students of education and training courses for teachers or

- for the people concerned in order to define the level of these programmes.
- 2- The previous suggestion should necessarily be followed by another related to high-level laboratories in the faculties of education and the educational research institutes to cover this need for hardware such as (big memory disks of high ability to store- cards, headphones, microphones for recording and producing sound-cards, screens, and cameras (or machines for taking photos) able to deal with the natural picture or video ...) also the software for programmers for drawing programmes to changing into Arabic-programmes for dealing with the sound and the drawing in a subsequent way or a slow way.
 - 3- There should be much interest in preparing equipped laboratories in the schools. This enables us to deal with high-level educational programmes and be able indeed to interact with the students in the classroom.
 - 4- There should be much emphasis on training the teachers to build the educational programmes or at least to train them to deal with them. and prepare them for use and interaction with the student, or at least teachers should know how to deal with the educational programmes to serve the curriculum they use .
 - 5- We should try to prepare and to form a library for educational programmes attached to the computer laboratory, and contains programmes for training and practice . We should try also to prepare another library for learning resources which may help the student to deal with lessons and exercise in order to refine the educational process on the one hand, and to study what he has missed of lessons on the other.

- 6- There is a final recommendation . It may be a dream : It is trying to build or establish a bank for the educational lessons as network that serves each participant at home or in school to deal with this bank through this network and this is the same thing which can be found in banks of information and nets of distance communication.

Suggestions for other researches :-

- 1- Studying the effectiveness of feedback through computer screen and cognitive styles in different kinds and levels in other courses or subjects in addition to statistics.
- 2- Studying the quantity of feedback which each cognitive style (dependent/independent) requires to achieve their defined objectives.
- 3- There should be much care for experimenting computer and the techniques of designing educational programs for students with certain mental abilities.
- 4- Studying the effect of education and training through thinking of students.
- 5- An evaluative study of the computer in our schools .
- 6- Studies on the ability of the student who learns through computer screens to interact with other i.e. what is the difference between the way or the style of learning by computer and learning in classrooms with regard to the effectiveness of the student's interaction with his colleagues and with his teachers ?
- 7- Studying the effect of interaction between different abilities and learning through computer.