

# A Proposed Intelligent Simulation Program For Preventive Maintenance Skills in the Egyptian Universities Computer Labs

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**Abstract**— This research aimed at designing and developing an intelligent program to simulate and develop the computer maintenance for the Egyptian universities students to face and manage the computer labs crisis, that result from the student less experience with the basic maintenance skills especially in the computer labs in the Egyptian universities. This could lead to the possibility of infecting the computer devices with virus, defects, non protection for the documents. Many software programs are used to design this intelligent program to simulate the maintenance such as: Adobe Photo Shop, Flash, Screen Virtuoso Pro, Adobe Director and Sound Forge. Research sample was selected from the fourth year students in Educational Technology department, which amounted to (30) students from the Faculty of Specific Education, Ain Shams University. Some tools are prepared to assure the efficiency of the maintenance simulation S/W program as a model that can be applied in Egyptian universities such as: 1- A questionnaire: to identify the skills of preventive maintenance of computer to face crises in computer labs for Educational Technology students from the viewpoint of experts and specialists. 2- A training card: to determine the training needs of students to identify their training skills in Ain Shams University. 3- The proposed simulation S/W program: to increase students skills of preventive maintenance of computer in the Egyptian universities to cope with and manage crises in the computer labs. 4- A prepared test: to measure the extent of the achievements of Educational Technology students from the information contained in the simulation S/W program. 5- Performance observation cards: to determine the level of students performance in Educational Technology and the skills of preventive maintenance of computer to face crises in computer labs. The researcher used the experimental designing, (T.test) to treat the data that obtained from the pre and post application of the study tools on the group, Black's method was used to measure the efficiency of the test analysis and observation results. The results showed that the efficiency of the proposed intelligent program to simulate the computer maintenance skills on the higher education students. It recommends the necessity of using it inside the Egyptian University Labs to avoid the student troubles and the need of providing the computer labs with simulation programs which designed it professionally.

**Key words**—Simulation, Preventive maintenance, Crisis, Computer Lab

## I. INTRODUCTION

Several studies indicated to the importance of using simulation in the learning process, including the study of Fiedler (2005), which aimed to measure the effectiveness of a simulation training program to take the appropriate selection of effective teaching methods at the various teaching positions. It demonstrated the effectiveness of the S/W program student on educational experiences through Exercise-English simulation and prediction of teaching

performance in the future, and the possibility of its use as a preliminary survey (Fiedler,2005,p140).

The simulation method is an effective way in the learning process, especially in the field of computer maintenance, as they are learning by means of discovery learning, where students go from one point to the other through the observations and the examples they see, and then linking them until to reach to conclusion. The result is driven from student attemptseven it may be completely wrong. Students try to reach a result through the events and the assumptions, and then test the validity of the right assumptions to hit right solution (Ibrahim,2004,p.547). Simulation help to improve the students learning process of the scientific concepts, especially in the field of computer maintenance, and provide more positive attitudes closer to realism without any crisis. (Rasmi,2005 p.316).

### A. Research Problem:

Traditional ways of education often does not provide students with all the necessary skills to solve problems in the real world (Sawhney,2007,p1319), but we find that the simulation programs increase the development of a number of specific skills such as decision-making skills, scientific skills, imagination and innovative thinking (Olive,2007,p. 189). In this regard, the study of (Scott,2001, p12)aimed to identify the effectiveness of the simulation of Psychological Decision-Making for students through services which are provided special education students in the district as needed. The results proved the effectiveness of the simulation S/W program, and that the program is a high level of accuracy portrait. The simulation processing of students interact through it instead of being recipients of knowledge only, and to provide them with many good practices, and their cooperation with each other and give them the opportunity to think, help to improve the learning process (Michael,2007,p1847)

The problem with the current research associated with several aspects: **First**, that education in the Egyptian universities is facing a real crisis because of the pressure of expansion and development of both human resources and educational programs without studying the needs of the Egyptian labor market and the framework of global standards, while the **Second** side is associated with lacking of students skills of preventive maintenance of computer. A survey on students in Faculty of Specific Education, Ain Shams University, was conducted by the researcher showed that they do not have many of the preventive maintenance skills of computer, so this study is an attempt to identify the effectiveness of the simulation to develop the student skills of preventive maintenance of computer to avoid a crisis in

computer Labs, according to the following main question:

"What is the effectiveness of the proposed simulation S/W program to develop the student skills of preventive maintenance of computer in the Egyptian universities to prevent and cope with Computer Lab crises and to manage the computer labs?"

#### B. Objectives of the Research:

- 4) Current research aimed to build a simulation S/W program for the development of student skills for computer preventive maintenance in the Egyptian universities to cope with crises and manage the computer labs at educational technology departments.
- 5) Manage and prevent crises that could result from a lack of students knowledge of the basics of computer preventive maintenance.

#### C. The Research Limits:

Current research is limited to:

- 1) The proposed simulation S/W Program depended only on the main Skills of preventive maintenance of computer for students of the fourth year, at the Department of Educational Technology, Faculty of Specific Education, Ain Shams University. The identified skills are listed and reviewed from the viewpoint of experts and specialists at many technology and computer faculties.

#### D. Research Hypothesis:

Current research aimed to verify the authenticity of the following assumptions:

- 1) There are statistically differences at the level of statistical significance (0.01) between the average mark of the test grades for students aspects of technology knowledge associated with the computer preventive maintenance before and after applying the simulation S/W program test in favor of the post-test after using simulation program.
- 2) There is no statistically significant differences at the level of (0.01) between the average levels of students practical performance in educational technology departments with a performance observation card for the skills associated with the preventive maintenance before and after the simulation S/W program in favor of the second group (who use the proposed Simulation S/W).

#### E. Research Methodology:

The current research adopted a quasi-experimental approach, to determine the impact and the relationship of the independent variable, (a simulation S/W program on the related variables for each of knowledge skills of preventive maintenance and **Practice** skills of performance for preventive maintenance. Research sample was selected from the fourth year students in Educational Technology department, which amounted to (30) students from the Faculty of Specific Education, Ain Shams University. In the light of the research variables, the researcher adopted the experimental design known as the experimental measurement of the one-dimensional pre-test design. One group pre-post where the researcher used:

- The statistical **T-test** is used to deal with data obtained by the pre-post test to the experimental group.
- **Black Ratio Loss Rate** was used to calculate the loss of "effectiveness" for the students' scores and grades of test performance observation card.

#### The researcher prepared the following research tools to achieve the research objectives:

- 3) A questionnaire: to identify the required skills of preventive maintenance of computer to face crises in computer labs for Educational Technology students from the viewpoint of experts and specialists.
- 4) A training card: to determine the training needs of Educational Technology students according to their skills from the list of preventive maintenance of computer to face crises in computer labs in Ain Shams University.
- 5) The proposed simulation S/W program: to develop students skills of preventive maintenance of computer in the Egyptian universities to cope with and manage crises in the computer labs.
- 6) A prepared test: to measure the extent of the achievements of Educational Technology students from the information contained in the simulation S/W program.
- 7) Performance observation cards: to determine the level of students performance in Educational Technology and their skills of preventive maintenance of computer to face crises in computer labs.

## II. THEORETICAL FRAMEWORK

#### F. Simulation and Educational Crisis:

Crisis is a time characterized by great risk means a serious failure to work within the system. It affects institutions and especially within the computer labs in the Egyptian universities, so we need to predict the crisis to be ready to face them (Al-Saud, 2007).

There were several definitions of simulation Ibrahim (2000) defined it as a simplification of some situation from the real life, including the presentation of the simulation model of the system is given according to specific rules. Simulation training offers students with a real, safe, interesting, easy, economically, as the simulation closer to reality through the transfer to the classroom in the form of models (Ibrahim, 2000,p.160). Al Far (1998, 46) defined that the software simulation of a repetition of the behavior of the phenomenon in nature, making it difficult or impossible to implement in the classroom (Al Far,1998,p.46). In the view of Shimi and Ismail (2008), it was a real submission which simulates reality and be replayed on the screen of the computer simulation programs are used to increase the realism of the learners and the learning achievement of the discovery and development of concepts and mastery of skills and social interaction as well as problem-solving skills (Shimi & Ismail,2008,p.267). The Bailey & D'Angelo (2007) showed that is to build the simulation model mimics reality, and simulation programs are interactive computer-based model is a natural system in terms of installation and sources, which occurs activities and educational processes (Bailey &

D'Angelo,2007,p1).

In this regard, a study of "Ahmed Abdel-Aziz al-Rihab (2007), aimed to contribute to the development of science education, themes and activities in general and primary education in particular, and to prepare a computer program to simulate the activities of scientific activities be replicated in real magnet for the proposed unit. The results of the study pointed to the effectiveness of the use of simulation computer program where they rely on the linkage between the concepts and issues and activities. Computer simulations provide the educational characteristics of the mediator is a good education to help student in activities and educational functions of the teacher cannot be done or performed by the student himself in view of the seriousness or the length of time or cost or fear of the wrong use of the students, exposing them to damage or loss thereof, and thus push forward the educational process of teaching to learning where the student is the first actor through interaction the actual activity performed in the simulation, which develop skills and attitudes as well as many values, cooperation and competition. (Rihab Nasr, Ahmed Abdel-Aziz: 2007, p. 98)

#### G. Classifications of Educational Simulations:

The simulation programs are classified into: (Graybeal & Pooch,1980,pp89-100)

- 6) Dramatic Simulation: Based on dialogue and exchange of roles between the number of persons to represent the position of a particular educational.
- 7) Spreadsheet Simulation or Tabletop Simulation: Built through the use of certain number cards and tables to represent the position of a particular education depends largely on the data and information for a particular phenomenon or behavior.
- 8) Computer Simulation: Based on the use of computers in the design of a situation that resembles reality.

#### H. Simulation Characteristics:

There are many characteristics of the simulation as it follows, (Ahmed Shaaban Dossoki, et al,2006, p.441).

- 1) Training programs provide a good simulation of the clear events, which gives the learner the opportunity to participate actively in the events of the program.
- 2) Use clear and precise pictures and sound.
- 3) Learner-oriented direction depends on the learner-control in the learning environment.
- 4) Provide a wide range of information that can be used by learners to help in the understanding of the topic under study.
- 5) Simulation programs enable the learner to comprehend the facts, ideas and feelings which is the most effective way to achieve the educational objectives by affecting the computer.
- 6) There are some other characteristics of the simulation, which are: (Mohamed trick: 2002, pp 275 to 276)
- 7) Te-position the real and composition with emphasis on clarifying the processes taking place in this position.
- 8) Help to increase the confidence of the trainee himself, and assist in the acquisition of skills and the provision of security and safety of the trainees.
- 9) The deletion of parts of the practical situations, however,

important for realistic training.

- 10) The simulation programs are characterized by giving more opportunity for the learner to deduce the conclusion, leading himself to accommodate a greater volume of information.
- 11) The simulation programs are important, as the learner interacts with the environment of the reality simulators, and must be educated to carry out tasks and solve problems.

In addition to the previous characteristics of simulation: (Swaak, et all: 2002, p2) add the characteristics of **Learning Environments** which are :

- 1) Learner can gain a large amount of information.
- 2) Learner can access information in different ways.
- 3) Present information to the learner in several forms such as animation and image in the numerical and graphical form.

#### I. Disadvantages of Computer Simulation Programs:

Despite the advantages of Simulation Program mentioned above, but there are also disadvantages of the simulation in the field of education and training, including both point of view of the (Salah al-Din Muhammad Tawfiq: 2003, p. 281) and (Muhammad Ali: 2008, p. p. 122 to 123) as follows:

- 1) require a great deal of planning and programming to be effective and influential, comparable to natural conditions.
- 2) require the high preparation of many of the simulation training program by a group of programmers to be accurate(Bruks,2008,p24).
- 3) require high computer equipment specifications, for the representation of complex phenomena.
- 4) require a team of teachers and programmers, psychologists, curriculum experts and expert teaching methods and educational material, time, effort and cost of material.
- 5) simulation programs may be inflexible, since they do not permit seizure of the teacher to fit the educational philosophy of teaching (Widdison and et all,2008,p24).
- 6) update or change the part of the simulation programs need to the programmer himself; to help the teacher or the learner to modify any part of Simulation S/W Program. The simulation programs reduce social skills, learning to stay with the computer screen for long hours, which lost the ability to interact with the community.
- 7) simulation programs needs of many computers to allow student learning or teaching in small groups, which requires the costs.

### III. LITERATURE REVIEW

The simulation has an effective role in the process of training and education. There are a lot of studies focused on the topic of computer simulation and its importance in the educational process as the study of " James, 2006", which aimed to measure the effectiveness of the simulation to assist physicians doctors in the fields of emergency, and to put students in positions similar to the real positions (fig. 1) as well as increase the level of critical thinking and the creation of these students for employment after graduation. The outcome of this study is the effectiveness of this program to

achieve the goals that were designed for, but that study had recommended the need to make adjustments to curricula that support critical thinking (James, 2006, p128).



Fig. 1 The Simulation Model in The Medical Field (Vam Instructor Area: Available at <http://vam.anest.ufl.edu/furtherstudy.html>), [8/10/2008]

The study of Fischler (2006) aimed to prepare a simulation S/W program for the education of teachers in positions similar to situations in the classroom teaching and teaching patterns that can be followed in teaching the teacher called the simulator, in addition to receiving feedback following the completion of the program. This study demonstrated the effectiveness of the program, the study has recommended the use of simulation tool in education and for effective impact in education (Fischler B, 2006, p216).

The study Irwin (2005) aimed at efficient use of simulation as an engineering design model in three dimensional and training activities to resolve the problems as shown in Fig. (2). The results of the study demonstrated the effectiveness of the program, and the simulation is a valuable tool for use in teaching students computer-aided design and simulation using the provision of activities for students and help to predict the answers to solve the problems accurately (Irwin, 2005, p161).

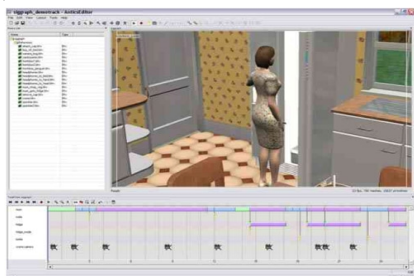


Fig.2 A simulation S/W Program For Building Designing Expressive 3D Components for Building Simulation : 2008



Fig. 3 The Internal Design of Buildings (Fire bridge, 2008)

The study of Rick (2003) aimed to identify the effectiveness of simulation training in the skills and use these

skills in new situations in exchange for training in the real environment. This study demonstrated that the use of training simulation S/W program is effective in training skills (Rick, 2003, p114).

The study of Crescencio (2003) has targeted to build a system of cooperative education via the Internet depending on the simulation systems that provide simulated environments in which learners interact, this study was the topic of "computer viruses" as a key to the environment of simulation. The results of this study depends on the effectiveness of the systems in the three-dimensional simulations give students the knowledge and skills used in the maintenance of the computer (Crescencio, 2003, p345).

The study of Keith (2003) aimed at to identify the effectiveness of the simulation to solve problems and gain experience in the laboratory of organic chemistry. The study confirmed the effectiveness of the program in solving the problems related to the article, and provide an opportunity for learners to solve the problems of the environment during the simulation and testing laboratory to gain experience and knowledge skills (Keith, 2003, p237). In this regard, the study of Roger (2008) aimed to identify the effectiveness of simulation training for the leadership and control of major accidents in exchange for traditional training. The results confirmed the effectiveness of training through the simulation program (Roger & et al, 2008, p11).

The study of Siddiqui (2008) aimed to know how to simulate the effectiveness of the program on the development of thinking skills and decision-making in important positions, and the impact of this program on the efficiency of educational output. This study demonstrated the effectiveness of the program and the simulation S/W program is a significant impact on the educational process, and contribute significantly to the training and skills development because it allows students to practice the skill without any risk. (Siddiqui, et al : 2008, p10).

In the view of Salas (2006) that the right steps for the simulation-based training and face the crisis is as follows: (Salas, 2006, p12).

- 1) Identify the skills that have been observed by the trainees, and the data were collected for their performance in previous exercises.
- 2) Focus on identifying the tasks and competencies that will be the focus of training.
- 3) Determine the training objectives.
- 4) Develop scenario is appropriate for the necessary training, and develop the necessary skills to carry out the program prepared in the simulation environment.
- 5) Determine standards and criteria which help identify the skills of trainee and their application properly.
- 6) Collect data and compare the real performance benchmarks and standards that have been developed.
- 7) Gather information on the performance of the trainees on the basis of a training program prior to the amendment and the development of simulation model.

These phases together to create the components of effective simulation-based training to cope with crises as seen in Fig. (4)

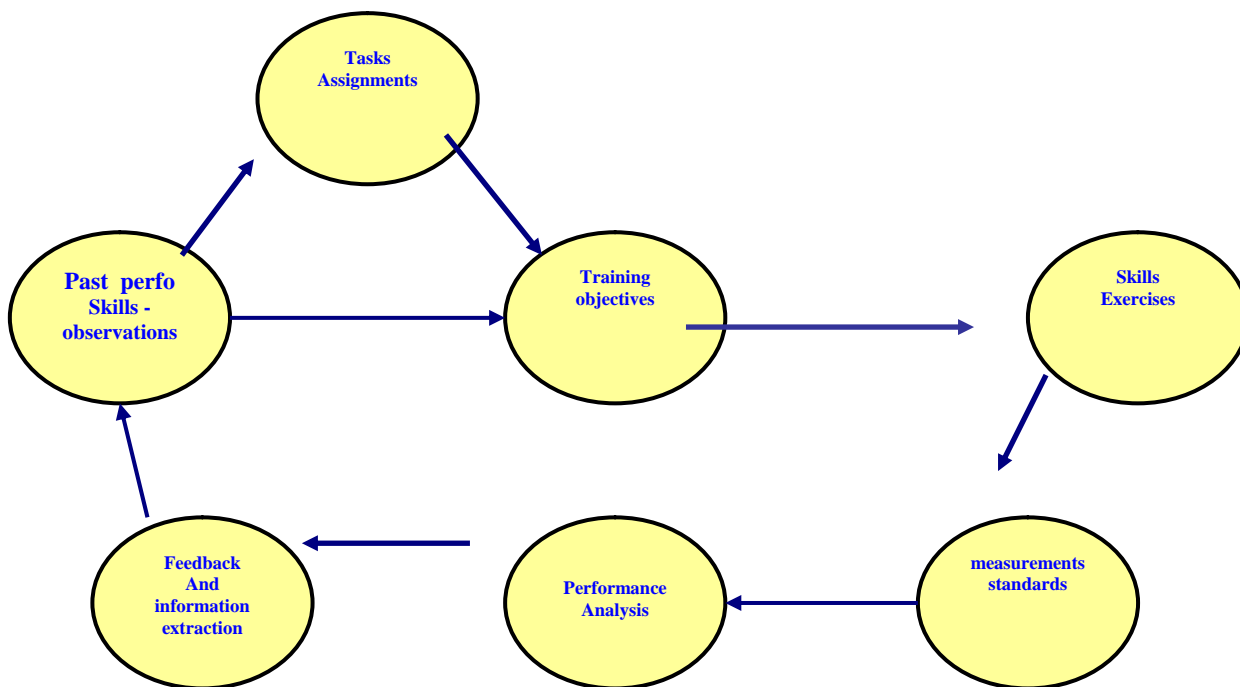


Fig. 4 The Component of Effective Simulation Based Training to Cope With Crises (Salas, 2006, p12)

**IV. THE PROPOSED MODEL FOR THE SIMULATION S/W PROGRAM FOR COMPUTER PREVENTIVE MAINTENANCE TO PREVENT CRISIS IN COMPUTER LABS AT EGYPTIAN UNIVERSITIES:**

Preventive maintenance is designed to frustrate the system failure of computer labs in the Egyptian universities (Hussain,2001,p.157)

*A. The Goal of the Simulation S/W Program For Preventive Maintenance to Prevent Computer Lab Crisis:*

The researcher proposed a simulation S/W program to develop the skills of preventive maintenance of computer in the Egyptian universities to cope with crises and manage the computer labs. The simulation S/W program included the skills of preventive maintenance of computers under four themes: 1- The Basics of Maintenance, 2- The Basics of the Internet, 3- Optimizing the Performance of the Operating System, and 4- the preventive maintenance. These themes are shown in the table (1).

*B. Design of The Proposed Simulation S/W Program to Develop Student Skills of Preventive Maintenance For Computer to Confront Crises:*

Table 1 represent proposed simulation S/W program to develop student skills of preventive maintenance For computer to confront crises:

Table (1) The Proposed Preventive Maintenance Skills Necessary to Prevent Crises in the Computer Labs

No.	Preventive Maintenance Skills Necessary to Prevent Crises in the Computer Labs	The importance of skills			The relative weigh	Percentage
		Very important	important	Not Important		
<b>1</b>	<b>First: The Basic Maintenance</b>					
<b>1-1</b>	<b>Methods of Security and Protection</b>					
<b>1-1-1</b>	Establish a password	30	-	-	1	100%
<b>1-1-2</b>	Administrate the screen to hide access to the windows	10	3	17	0.383	38.33 %
<b>1-1-3</b>	Specify Password for the Guest account	6	8	16	0.33	33.33
<b>1-1-4</b>	Delete the password for the Guest account	11	5	14	0.45	45%

1-1-5	Hide the user from the entry screen windows	11	2	18	0.366	36.6
1-1-6	Make the password more effective	10	5	15	0.416	41.6%
1-1-7	Determine the number of password characters	8	6	16	.0366	36.6%
1-1-8	Operate Viewer Program	5	8	17	0.3	30%
1-1-9	Delete the folder contents	6	8	16	0.333	33.3%
1-1-10	Prevent user tracking	9	3	18	0.35	35%
1-1-11	Delete the un-needed contents of the list of recent documents	29	1	-	0.983	98.3%
1-1-12	Prevent the addition of files to the folder	25	5	-	0.916	91.6%
1-1-13	Block access to discs	28	2	-	0.966	96.6%
1-1-14	Hide drivers	12	2	16	0.433	43.3%
1-1-15	Use Modern Diagnose	10	3	17	0.383	38.3%
1-1-16	Hide elements of desktop	7	4	19	0.3	30%
1-1-17	Hide file extension	13	1	16	0.45	45%
1-1-18	Remove Programs from the Start list	11	2	17	0.4	40%
1-1-19	Encrypt files	30	-	-	1	100%
1-1-20	Hide files	30	-	-	1	100%
1-1-21	Backup data	6	4	20	0.266	26.6%
1-1-22	Deny access to Control Panel	30	-	-	1	100%
1-1-23	Create the file propellant	10	2	18	0.366	36.6%
1-1-24	Operate file with the start of the operation of propellant Windows	10	3	16	0.383	38.3%
1-2	<b>Temporary Files and Check Disks</b>					
1-2-1	Delete the temporary files manually	30	-	-	1	100%
1-2-2	Delete temporary files automatically	30	-	-	1	100%
1-2-3	Examination of the hard disk using the screening program	30	-	-	1	100%
1-2-4	Automatic cleaning disk	9	3	18	0.35	35%
1-2-5	Defragmenter Disk	30	-	-	1	100%
1-3	<b>Improve The Performance of Computer and Increase Its Efficiency</b>					
1-3-1	Locate and remove spy ware programs using spybot search & destroy	8	6	16	0.366	36%
1-3-2	Locate and remove spyware using Ad-awara S/W	27	3	-	0.95	95%
1-3-3	Resist viruses	30	-	-	1	100%
1-3-4	Improve the performance of windows	30	-	-	1	100%
1-3-5	Activate the development of direct access memory	28	2	-	0.966	96.6%
1-3-6	Disable active desktop feature	25	5	-	0.916	91.6%
2	<b>Second: The Basics of the Internet</b>					
2-1	<b>Cookies files and temporary Internet files</b>					
2-1-1	Modifying Settings for a faster modem connection	7	7	16	0.35	35%
2-1-2	Prevention and access files Cookies.	30	-	-	1	100%
2-1-3	Delete Cookies Files	30	-	-	1	100%
2-1-4	Control the temporary Internet files	30	-	-	1	100%
2-15	Prevent the advertising windows	9	4	17	0.366	36.6%
2-2	<b>Internet and Networks Risks</b>					
2-2-1	Control of the security zones settings	9	3	18	0.35	35%
2-2-2	Liquidate of advertising messages to email	11	3	16	0.416	41.6%
2-2-3	Restore the browser start page	30	-	-	1	100%
2-2-4	Do hostile locations	30	-	-	1	100%
2-2-5	Protect the volumes involved	28	2	-	0.966	96.6%
2-2-6	Hide the volumes involved	29	1	-	0.983	98.3%
2-2-7	Control firewall	29	1	-	0.983	98.3%
2-3	<b>Firewalls</b>					
2-3-1	Use of protection from the windows	30	-	-	1	100%

2-3-2	Disable Plug and Play international feature	27	3	-	0.95	95%
2-3-3	Clear to participate in the service file and print	6	6	18	0.3	30%
2-3-4	Remove unimportant services	29	1	-	0.983	98.3
3	<b>III: Performance Optimization of the Operating System</b>					
3-1	<b>Optimal Performance of Windows OS</b>					
3-1-1	Remove unnecessary programs from the Startup folder	30	-	-	1	100%
3-1-2	Disable unnecessary services	11	2	17	0.4	40%
3-1-3	Stop information services on the errors and restart automatically	26	3	1	0.916	91.6%
3-1-4	Stop the mistakes and re-use operating system files NTFS	30	-	-	0.866	86.6%
3-2	<b>The Safe Use of Computers</b>					
3-2-1	Use Energy settings for computers	30	-	-	1	100%
3-2-2	use a Screensaver	25	5	-	0.916	91.6%
4	<b>IV: Preventive Maintenance</b>					
4-1	<b>Preventive Maintenance of Hardware</b>					
4-1-1	Clean the computer hardware	10	3	17	0.383	38.3%
4-1-2	Avoid body vibration and shock	9	4	17	0.366	36.6%
4-1-3	Avoid touching the electronic parts.	25	5	-	0.916	91.6%
4-1-4	Segments of the cable and install a good (without vibration).	27	3	-	0.95	95%
4-1-5	Avoid the removal, or installation of a connector during the operation of the computer.	25	5	-	0.916	91.6%
4-2	<b>Preventive Maintenance of Software Programs</b>					
4-2-1	Set the CD in the place allocated to it.	28	2	-	0.966	96.6%
4-2-2	Avoid touching in the wrong way.	29	1	-	0.983	98.3%
4-2-3	Update S/W programs to detect and delete viruses.	27	3	-	0.95	95%

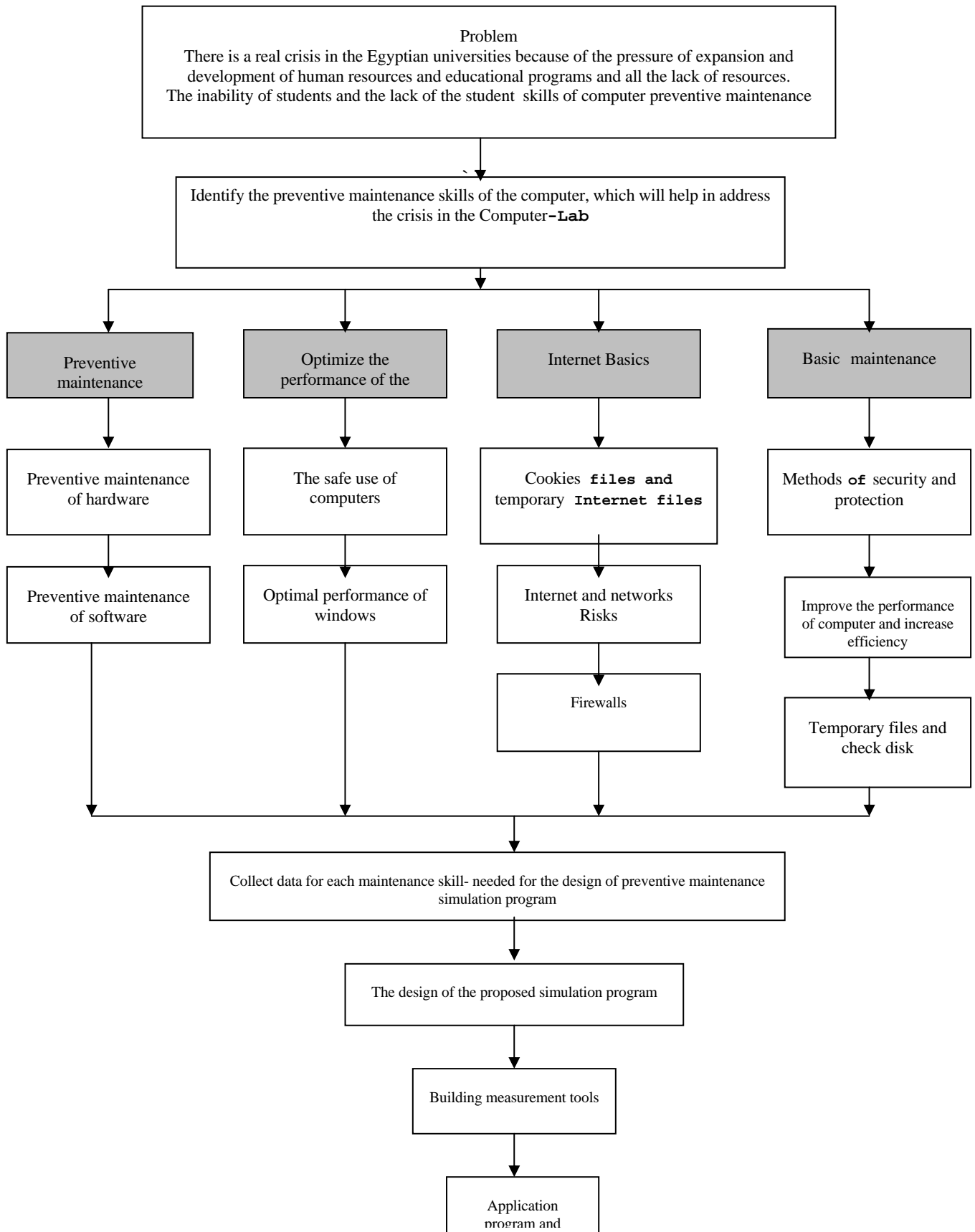


Fig.(5) : The Proposed Model For Simulation S/W program For Preventive Maintenance Skills



#### A. software Programs Used in Implementing the Proposed Simulation S/W Program For Preventive Maintenance Development:

There are some software programs are used in implementing the simulation programs as follows:

- 1) The use of Adobe Photo Shop Drawing for the preparing the fixed images used in the simulation program where the photographs fixed through the photo library in the program of the same composition, as well as to modify colored according to the fragmentation of the education program and the use in writing texts.
- 2) The use of Flash for the preparation of some animation.
- 3) The use of the Screen virtuoso PRO for the preparation of the video where several videos show some actions of the performance of the practical skills of preventive maintenance for computer.
- 4) The use of Adobe director 11 for the preparation of displays and interactive training simulators to prepare an environment for realistic computer screens, to allow the student to implement steps to perform the skill without harming the PC.
- 5) The use of Sound Forge for the preparation of sound and musical backgrounds, to explain the voice recording demo and video explaining the steps to the maintenance skill.

#### B. Research Tools For Measuring the Effectiveness of the Simulation Maintenance S/W Program:

##### 1) Preparing a Valid Test:

Maintenance skills are listed in the light of the proposed simulation S/W program, according to educational goals, educational content, based on identifying the elements that will measure the behavioral components of the test. To measure the sincerity of the test content, the questionnaire was reviewed by a group of arbitrators and expertise in the educational technology and computer science, to reach to the final form of the test, which included (44) multiple choice question, (46) a right and wrong statement, and thus a test become genuine and valid application for the calculation of persistence.

##### A- Calculation of Test Stability Factor (Spearman&Brown):

The stability test means that the student receives the same test grades or nearest grade around it (in the same test) when applied more than once in the same circumstances (Abu Allam, 2004, p. 429). The aim of measuring the stability of the test is to know the extent of free test errors that may alter the student performance from time to time on the same test. The calculation of the stability test is obtained by retesting the same sample(15) students from the fourth year students of the Faculty of Specific Education, Ain Shams University - after applying the simulation program, and then calculate grades of stability factor for the prediction equation using the Spearman & Brown, which is:

$$ra = 2r / (1 + r)$$

**where: ra = consistency coefficient & r = correlation coefficient.** The percentage of the coefficient of the test (r = 0.86) and the stability factor of the test was (ra = 0.92), and this means that the test can be given the same results if the same test was applied to the sample itself in the same conditions.

The researcher considered that the term of the ease factor means more than (0.80) is very easy, and the the coefficient (0.20) is very difficult. After the calculation of the ease and the difficulty factor of the items of the test, it was found that a factor of the ease of the items of the first part of the test grades (multiple choice items) are between (0.40 - 0.80), and as for the second part (right and false questions), as the ease of questions ranged between (0.60 - 0.80). Accordingly, so, all test questions were within the range specified, and it is not very easy or so, difficult. The result conducted from the equation:

$$\text{Easy Factor} = x / (x+h)$$

Whereas, x = Right answers h = Wrong answers

$$\text{Difficult Factor} = 1 - \text{Easy Factor}$$

##### B- Discrimination Factor for Each Test Question

Based on the discrimination factor of student's excellent and weak students which was calculated for each question according to:

$$\text{Discrimination factor} = \text{easy factor} \times \text{difficult factor}$$

After calculating of discrimination of the test items which were found between (0.16 - 0.24), So, the test grades are suitable because there is no questions has got the least discrimination factor (0.16) which is weak.

##### 2) Performance Observation Card:

There are several steps in the preparation of the performance observation card as follows:

##### A- Determination of the Content of The Performance Observation Card:

The researcher designs the performance observation card of practical skills for preventive maintenance of computers, and included the (497) sub-skills under the following main skills:

- The basic skills of maintenance of basic skill, includes 264 sub-skills.
- The basics of the Internet, which includes 171 sub-skills.
- optimize the performance of the skill of the operating system, which includes 54 sub-skills.
- The preventive maintenance skill, which includes the 8 sub-skills.

Adopted in building the method of a performance observation, where all aspects of the student behavior, and then analyze all the appearance of a set of performances. The distribution of scores according to levels of performance as follows:

- two marks if the student move successfully.
- one mark if the student has the skill frequency after several attempts.
- getting no mark if the student has not performed the skill.

##### B- The Stability of The Performance Observation Card of Maintenance Skills:

The researcher, with two administrator from the Department of Educational Technology, Faculty of Specific Education, Ain Shams University, who have the skills, and knowledge of the topic, for the observation (30) students of the fourth year, the Educational Technology has been in use as follows:

- to allocate the performance observation cards for each student (one card for each observed).
- to start and end of the registration of student performance at the same time.

- to complete each card is independent of the other with the stability of the method of discharge.  
 The stability of the performance observation cards were

calculated per the agreement of the skill using the following formula (Ibrahim, 2005, p. 344)

$$\text{The Number of Approvals for Each Observed} \times 100$$

$$\frac{\text{The number of approvals for each observed} + \text{number of approvals for each observed}}{\text{number of approvals for each observed}}$$

Based on the above formula, the performance card in its final form consisted of (41) skills on (497) steps, and the majority of the class card (994) marks, and thus become a valid card to verify the assumptions the current study.

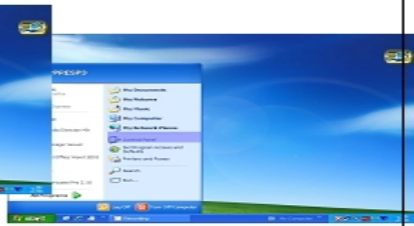
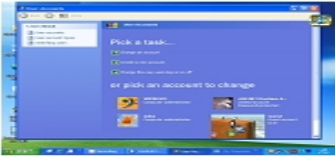
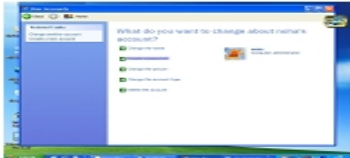
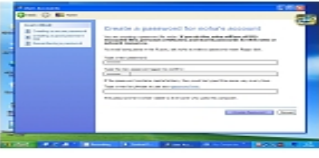
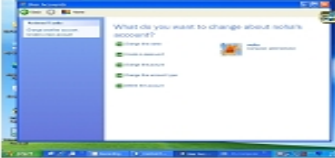


**V. SNAPSHOT OF THE PROPOSED SIMULATION STEPS TO ESTABLISH A PASSWORD AS A PREVENTIVE MAINTENANCE SKILL IN COMPUTER LAB**

The following snapshots of the simulation S/W program screens and steps to use:

- Student can choose the main topic of basic maintenance and from the theme of security and protection, he selects the creation of a password.
- Screen shows the objective of the lesson, and after completion of reading to appear next to the screen to know the lesson in general, and then pressing a button on the video the student

Thus follow the same steps for the implementation of other preventive maintenance skills to prevent crises in the computer labs, as shown in table (2).

Table (2) An Example of The simulation steps to Establish A Password as a Preventive Maintenance Skill

No	Screen Snapshot	Help and Explanation of How to Gain the maintenance Skill
		
Press a button to see the video to start simulation training for students in the simulated environment without compromising the reality of a computer.	Click Start button and select a Control Panel.	Press on the User Accounts.
		
Press on the name to be used to establish a password.	Press on the create a password.	Write the password, and then re-writing the password, then press the button create password.
		
Close the window.	Re-Start of a computer	Write the password, which could enable it to log on to computer

**VI. INTERPRETATION AND ANALYSIS OF THE RESULTS:**

The researcher prepared a brief preliminary explanation reflects the idea and purpose of the simulation program. After

the completion of the presentation of the program (experimental materials processing) has been applied of the test grades in favor of post-test group of experimental basis. Performance observation card was the application of the practical functioning pre-test in order to identify their skills.

After the completion of the application of research tools, the researcher assistant monitor the levels of students in each of the test grades (pre-post test), and a card of performance observation of the practical performance, with a view to addressing the statistical hypothesis necessary for testing research.

#### A. First: Hypothesis I Test:

There are differences at the level of statistical significance (0.01) between the average mark of the test grades for

students aspects of technology knowledge associated with the operation of the computer preventive maintenance before and after the simulation test for the post-test.

Table (3) The Arithmetic Mean, Standard Deviation and the Value of "T." to the Average Marks in the Experimental Groups of the Pre-Post Test Grades

Sample	Pre-test		Post-test		Calculated "T."	The level of significance
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
30 students	38.33	10.72	83.23	9.42	21,172	Significant

In analyzing the results in table (3), it illustrated the high level students understanding and training in the experimental group after using the proposed simulation program, when compared to the pre-test simulation, with an average mark of the students in the experimental measurement of pre-using simulation program (38.33), while the average mark of (83.23). The value of calculated "T" is (21,172), and the value of the tabular "t" in the statistical table is equal to (2.75) and thus a calculated "T." is larger than tabular "t." in statistical table at the level of significance (0.01) and 29 marks of freedom, that is a significant statistical, the difference was being in favor of the experimental group who

used simulation program. So, The first hypothesis is accepted.

#### A. Second: Hypothesis II Test:

There is no statistically significant differences at the level of (0.01) between the average levels of students performance in Egyptian universities such as educational technology departments with a performance observation card for the skills associated with the preventive maintenance before and after the simulation S/W program in favor of the second group (who use the proposed Simulation S/W).

Table (4) The Arithmetic Mean, Standard Deviation and The Value of "T", Average Marks of Performance Observation Card

Sample	Pre-test		Post-test		Calculated "T."	The level of significance
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
30 students	327.57	135.53	919.80	163.34	20.121	Significant

Table (4) illustrated the high level test marks of the students in the experimental group after using the simulation program, when compared to the pre-test, with an average mark of the students in the experimental measurement of pre-test (327.57), while the average mark of (919.80) for the post-test. The value of calculated "T" is (20,121), and to disclose the value of "t" in statistical table, we find it equal to (2.75) and thus a calculated "T." is larger than the tabular "t." in statistical table at the level of significance (0.01) and the marks of freedom was 29, that is, a statistical significant, the difference was being in favor of post using Simulation S/W program. So, the second hypothesis is accepted.

#### A. Measuring the Effectiveness of The Simulation S/W Program with the Loss Rate Ratio of Black

Measure the effectiveness of the program means to measure the effectiveness of the simulation to the level of at least 1.2 as measured by the equation of Black rate of gain in

terms of cognitive performance and aspects contained in the program. To ensure the validity of this has been the calculation of the average mark of Educational Technology students before and after using simulation S/W program in test grades of the performance observation card; and then calculate the proportion of the loss rate for Black in the equation:

$$\text{Loss rate ratio} = \frac{y - x}{d - x} + \frac{y - x}{d}$$

Where as:

- y: the average marks of post-test in the performance observation card
- x: The average marks of the pre-test card, in the pre-performance observation card
- d: Maximum marks of test or maximum mark of performance observation card

#### A - The Loss Rate Ratio of Test Scores For Black.

It is clear from the table (5) that the Loss Rate Ratio of 1.36, is greater than the ratio set by the "Black", which

indicates the high level of understanding of Educational Technology students after using the simulation software program in terms of knowledge content and that the program is highly effective.

Table (5): The Average Marks of Students Testing Scores Before and After Using The Simulation Program and The Loss Rate Ratio For Black.

Average pre-test scores	The average post-scores	Final Mark of the Test	Loss Rate Ratio For Black	Significant
38.33	83.23	90	1.36	Significant

### B. The Loss Rate Ratio of The Performance Observation Card:

It is clear from table (6) that the Loss Rate Ratio of performance observation card is equal to (1.48) which is

greater than the percentage identified in the "Black", which indicates the high level of performance of students using simulation program and this shows that the simulation S/W program more effective in reduction of the crises that can occur in the computer labs.

Table (6): The Average Students Testing Scores (Marks) Before and After Using Simulation Program According The Black Rate in The Performance Observation Card.

Pretest Average scores	Post-test average scores	Post average -scores For Observation Card	The average scores For Black Rate	Significant
327.57	919.8	994	1.48	Significant

### VII. RECOMMENDATIONS:

- It is recommended to use Simulation computer programs in the Egyptian computer labs to serve the diverse curriculum approaches to what was done by researcher from the implementation of a simulation S/W program for preventive maintenance of the computer.
- Care for the simulation programs, and disseminated of the various disciplines, because that will reduce the expenses of the preparation of laboratories specialized training which will cost money and reduce many of the crises that may affect the computer as a result of training.
- The need for a modern and global trends in the design and production of computer simulation programs.
- Design and production of other programs to be linked to simulation and virtual reality modeling and testing of students in the Egyptian environment.
- The need for the processing of existing computer labs, allowing the various colleges and operation simulation, and production programs as well as the best processing and computer labs in schools.
- Need to pay attention to the rules which the simulation programs through the preparation of the simulation approach for teaching college students through specialized assessments of the project were to be trained to produce simulation software because of its advantages in avoiding crises and risks.
- Consider further student training courses on simulation and software production and attention to the areas of virtual reality and other modern applications.

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