أثر المحاكاة (ثنائية / ثلاثية) الأبعاد في تنمية مهارات الطلاب في صيانة الحاسب الآلي في جامعة الباحة

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ملخص الدراسة:

تركز الدراسة على أثر المحاكاة ثنائية وثلاثية الأبعاد في تنمية بعض مهارات صيانة الحاسب لطلاب كلية التربية، جامعة الباحة. وقد تم استخدام التصميم شبه التجريبي لغرض هذه الدراسة. ولتحقيق هدف الدراسة، تم تنفيذ اختبار تحصيلي وبطاقة ملاحظة مع ٦٠ طالباً. استخدم الباحث اختبار ت لقياس الفرق بين المجموعة التجريبية الأولى (تدرس بالمحاكاة ثنائية الأبعاد) والمجموعة التجريبية الثانية (تدرس بإستخدام المحاكاة ثلاثية الأبعاد)، وتشير النتائج إلى وجود فرقاً جوهرياً بين متوسط درجات الطلاب للمجموعة التجريبية الأولى والثانية في الاختبار التحصيلي البعدي لصالح المجموعة الثانية في مهارات صيانة الكمبيوتر، بالإضافة إلى ذلك، كان هناك اختلافاً جوهرياً في بطاقة الملاحظة في الاختبار البعدي لصالح المجموعة التجريبية الثانية في مهارات صيانة الحاسب الآلي. حددت نتائج هذه الدراسة كفاءة المحاكاة ثلاثية الأبعاد في تنمية بعض مهارات صيانة الكمبيوتر لدى الطلاب.

الكلمات المفتاحية: الصورة المتحركة الثنائية والثلاثية؛ قدرة إصلاح الكمبيوتر.

The Impact of (2D/ 3D) Simulations in Developing Students' Skills of Computer Maintenance at Albaha University

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Abstract

The study focuses on the impact of (2D/ 3D) dimensions simulations in developing some computer maintenance skills for students at College of Education, AlBaha University. A quasi-experimental method used for purpose of this study. To achieve the aim of the study, it was implemented achievement test and observation checklist with 60 learners. The researcher used a t-test to measure the difference between the first experimental (taught by 2D simulation) and second experimental (taught using 3D simulation) groups. Results indicates a significant difference between the mean students' scores of the first and second experimental groups in post achievement-test in favor of second group in computer maintenance skills. In addition, there was a significant difference found in observation checklist in post-test in favor of second group in computer maintenance skills. Consequences of this study specified efficiency of 3D simulation in developing some computer maintenance skills for students.

Keywords: Two and three moving-picture; computer repair ability.

للاستشهاد من البحث

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INTRODUCTION:

There is a need for tools that help students to understanding the real life scenarios during their training and learning, which is certainly the case for those studying computer maintenance skills. Hence, there is a need for simulations, as they help transfer a realistic experience to computer screens, and thus achieve educational goals. The process of acquiring skills is one of the important outcomes of the educational process for students at undergraduate level, and simulation develops skills to learn.

The using of e-learning and its applications, in addition to employing Internet innovations, to develop students' skills to provide effective learning, as well as save time and effort during their education) Amasha & Al-Shaya, 2009). E-learning helps enrich the learning process and develop skills, and it also allows learners to access curricula and educational materials on an ongoing basis (Al-Sharqawi & Al-Saeed, 2009). According to Al-Hawwiji and Muhammad (2012) that performance skill is the mental ability to perform a specific process for the purpose of collecting, preserving and storing information through analysis, evaluation and reaching conclusions.

According to the researcher's experience, in recent decades, the recognition of the importance of maintaining computer skills in most fields of knowledge to effectively learning has spread. Students' performance can be observed and measured until reaching a high level of competence. The term 'skill' refers to the systematic practice of computer maintenance skills to thus be able to perform a task efficiently and with the utmost accuracy. Computer maintenance is the practice of maintaining a computer free of any malfunction or defect.

There are several types of maintenance: preventive maintenance involves procedures to protect the computer from minor problems; corrective maintenance, which refers to repairing a computer that is not working; and periodic maintenance, which takes place during operating hours. (Al-Sharbni, 2002). The field of educational technology is interested in employing tools in the educational process, such as developing educational software industry. It is expanding the scope of its use and working to facilitate access to information through electronic tools, which have become increasingly widespread (Michael, 2001). Multimedia can be considered as a set of animation, graphs, texts, audio and video in digital order, and when the user has some control over what is offered, it is known as interactive multimedia. However, multimedia is rarely cooperative, for example, when a student presses enter to move to the next screen in a linear manner. Although task becomes collaborative when the student influences what he sees, for example, if his answer to the question determines which screen appears afterwards (Vaughan, 2011)..

In addition, the emergence of computer simulation has formed of improving skills. Computer simulation develops computer maintenance skills using 2D or 3D simulations. As a consequence, educational institutions have begun to use them as a teaching tool. Indeed, the use of computers helps solve many educational problems, as well as improve the quality of education. For example, computer-assisted learning has been used in the form of practice and drills, instructional games, tutorials, and simulation.

Computer simulation is considered one of the best types of computer-assisted learning, as it helps to overcome a number difficulties encountered during the educational process, such as damage to equipment in the classroom or limited time for learning. It is also considered an effective method in the discovery-learning environment, as it creates an environment that is closer to reality,

which cannot be provided by theoretical lectures or simply from reading texts. Therefore, it motivates students in learning, critical, and discovery (Ramadan, 2007).

The results of studies by Abdulaziz (2007); Atwan (2009) and Al-Mazidi and Al-Shuaili (2017) have indicated the impact of the using computer simulation programs for the development of educational goals, problem-solving skills, knowledge and practical skills.

According to the researcher's experience, in spite of the many advantages of computer simulation, it is true that learning how to do it in reality is extremely valuable. Students learn best by applying their knowledge in practical situations. This is achieved when students are in A real-life learning environment to diagnose and repair computers. The use of computer simulation for the development of computer maintenance skills in the educational environment has been increasing in popularity across the globe in recent years. The application of computer simulation, such as 2D and 3D simulations, has allowed educational institutions to develop revolutionary learning strategies, which are interactive, cooperative, and competitive.

Indeed, computer simulation, such as 2D and 3D simulations, can support and enhance computer maintenance skills. The core feature is the content created by the instructor, the creation of which allows the sharing of knowledge that reflects the collective intelligence of the users involved and supports a constructive learning environment. Therefore, the reasons for using simulation is to make the learning process based on students' abilities, achieve the goals of developing student's skills and facilitate computer maintenance, which is expensive or impossible to implement in the study room. As well as to reduce the time spent teaching it, the need for repetition, and ensure accurate results by stimulation practice.

Simulation software is beneficial as it motivates students, makes learning easier, and interesting the learner's skills (Malik, Sun & Nisar, 2012). Simulation is considered a type of education that stimulates the learner's desire, further learning, and gives the learner the opportunity to acquire knowledge and experience in a visually stimulation way, during which the learner is freed from mental inertia. In turn, this leads to freedom of thought and helps to develop innovative capabilities (Saraya, 2015).

Computers have been increasingly used to provide scientific material to learners through software that learners can interact with to achieve specific educational goals, including tutorial instruction software, drill and practice software, as well as simulation software (Abu Hikma, 2016). The characteristics of 2D and 3D simulation programs are as follows)Shelly, Gunter, & Gunter, 2012): Raising students' interest, encouraging research and role-play among students, providing the elements of excitement that work to attract and maintain attention, allowing the continuation of education or training in separate sessions, helping to achieve the goals in a reasonable time, simulating reality.

A study by Huang, Liaw and Rauch (2010) showed that structural theory supports the concept of active learning experiences, which directly links the learner to knowledge, in order to create new knowledge, and thus improves their thinking and problem-solving abilities .

Computer simulation can assist to improve students' skills in university. Indeed, the primary tasks of the instructor is to help learners to access free and beneficial forms of technology. Computer simulation typically include images and photos, which are an efficient way for students to process information, as they enhance students' progress. Computer simulation has simplified

information by presenting it visually. E-learning techniques are to improve learners' understanding of computer maintenance skills. However, it is a fact that both 2D and 3D simulation are a crucial method of instruction in the educational environment. Therefore, the current study seeks to explore the interaction between preparation and treatment, to reach the appropriate educational design through two methods of implementing simulations. In addition, the current study explores the impact of two types of dimensional simulation programs on the subject of computer maintenance has on learners' skills .

The reviewed of literature such as study by (Abu Mansi, 2016); (Adegoke, 2013); (Allam, 2011) and (Alexe, 2013) in computer simulation programs on students' skills in terms of computer maintenance. Computer simulation programs affect students' skills in term of the development of computer maintenance skills they acquire, because visual information is effective at conveying information and teaching skills. The researcher seeks to improve students' skills by using computer simulation in the classroom when teaching students some computer maintenance skills. The important thing to bear in mind when using the software is to present image and word together including suitable colors and forms. In that way, learners can deal with visual data successfully. Motivation theory supports software use during the educational process, because students are motivated to learn and pay attention. The current study seeks to explore the interaction between preparation and treatment to reach the appropriate educational design through 2D and 3D. Furthermore, the current study explores the impact of 2D and 3D strategy on students' skills among students at the College of education at Al-Baha University.

PROBLEMS RELATED TO THE STUDY:

According to Khamis (2015) educational technology is concerned with designing appropriate education for learners in learning styles through the educational design models, based on constructive theory that focuses on learners' activity in building learning. This is because it takes into account the characteristics and needs of learners, and the diversity of content, educational activities and materials, as well as educational media (text, images, drawings, videos, and animations) to accommodate educational preferences. The need to develop school curricula and the skills of instructional design among students of the College of Education, in general, and students of educational technology, in particular, was also recommended at the fourteenth conference of the Egyptian Society for Educational Technology in 2014, and at the fourth international conference of e-learning and distance learning in 2015. Studies by Hassan (2014) and Muhammad (2015) indicated the ineffectiveness of traditional methods used to develop skills, and thus recommended the use of technological innovations to develop students' skills.

Although various studies have discussed the impact of computer simulation (both 2D and 3D), few have been conducted in Saudi Arabia. Investigating ways to improve students' skills at the College of Education at Al-Baha University could therefore fill a gap in the literature. The researcher first conducted a pilot study with a group of 20 learners outside the sample of the main study to determine any problems with the study. The study began with an achievement pretest to measure and obtain a starting point for the sample. The researcher detected a low level of achievement (35-50%) among students in terms of the development of their preventive computer maintenance skills, because of the ineffectiveness of the traditional teaching methods. As a result, this prompted the researcher to use computer simulation, such as 2D or 3D simulations with the aim of increasing their computer maintenance skills. Traditional multimedia programs have some

shortcomings in handling content for preventive maintenance and are far from adequate at presenting content in a form that helps students to operate and train. This course indicates the diversity of skills and knowledge that students must know in the field of computer maintenance, such as preventing access to disks, stopping hidden posts, and power settings for computers. These skills are difficult to acquire via traditional methods, which prompted the researcher to think about building a simulation program to provide students with a number of preventive maintenance skills, as these programs have many advantages, which previous studies have indicated. This study comes as an attempt to identify: The effectiveness of a simulation program to develop preventive maintenance skills related to computer operation and use during training, and accordingly, the research problem is focused to identify the effectiveness of two- and three-dimensional simulation programs on computer maintenance skills.

The researcher identified a low achievement level for students regarding their development of computer maintenance skills in education, indicating that traditional methods of teaching are not very effective. Therefore, the researcher felt changing the teaching approach to a more modern one, could help students achieve more. In this case, the researcher sought to establish the impact of 2D or 3D simulations on the skills of students studying the computer maintenance unit of the selected subject. It was expected the use of computer simulation would increase students' skills of computer maintenance. Therefore, the problem of the study centered on the lack of students' understanding of computer maintenance when taught by traditional methods. Thus, it is proposed that weblogs are needed to implement the course material.

Based on researcher's experience, it has become clear that students lack the maintenance skills required. This is because of the obstacles facing students when learning how to maintain computer. Students also fail to meet their needs and provide practical training, not understand the concepts related to computer maintenance, not residing a computer system in terms of the password, difficulty in formatting hard drive, not having the divided hard drive skills, difficulty installing the windows version on a computer, and not finish the practical exercises that are required from students. Consequently, students frequently complain about the textbook chapters, which provide no opportunities for practical application and thus result in a low achievement level for students. Therefore, a more recent and impacted approach should be used to improve students' skills in a way that is engaging and responsive their needs. Finder's solution is through frequent use of 2D or 3D simulations.

The present study is the first study aimed at exploring the impact of computer simulation on students' skills. The researcher noticed the focus on the use of computer simulation as part of the educational processes at the present time, since they provide an effective way of solving current educational problems, by providing students with the time needed to develop their thinking, and thus increase academic skills. Hence, the research problem was found in the following statement: students lack computer maintenance skills and do not engage to a great extent in the subject, because of the ineffectiveness of traditional teaching methods. So, the computer simulation usage to report this lack is essential. Based on previous educational literature on the subject of computer simulation (Mustafa, 2005; Atwan, 2009; Alexe, 2013; Abu Hikma, 2016; Alsaba, 2017) computer simulation has been proven to be effective in overcoming difficulties related to problem-solving skills.

RESEARCH QUESTION:

1. What are the basic skills required for computer maintenance skills?
2. What are the impact of (2D/ 3D) dimensions simulations in developing students' skills of computer maintenance skills at AlBaha University?
3. Is there a significant relationship at the level of $\alpha \leq 0.05$ between students 'computer maintenance skills?

THE ASSUMPTIONS OF THE STUDY:

1. There are no statically significant difference in the level of $\alpha \leq 0.05$ between the mean scores of first experimental (those using 2D- dimensional simulation) and the other experimental (those using 3D- dimensional simulation) groups during the achievement pre-test, as a result of applying the software.
2. There are no statically significant differences at the level $\alpha \leq 0.05$ between the mean scores of the first experimental group (those using 2D-dimensional simulation) and the other experimental group (those using 3D- dimensional simulation programs) groups during the achievement post-test, as a result of applying the software.
3. There are no statically significant differences at the level of $\alpha \leq 0.05$ between the mean scores of the first experimental (those using 2D- dimensional simulation) and the other experimental (those using 3D- dimensional simulation) groups during the observation checklist pre-test, as a result of applying the software.
4. There are no statically significant differences at the level $\alpha \leq 0.05$ between the mean scores of the first experimental (those using 2D-dimensional simulation) and the other experimental (those using 3D-dimensional simulation) groups during the observation checklist post-test, as a result of applying the software.

THE STUDY OBJECTIVES:

1. To measure the effectiveness of 2D and 3D-dimensional simulation programs on students' achievements and skills.
2. To develop the computer maintenance skills of the students.
3. To design a computer program based on computer simulations to overcome the low performance of the students in some areas of computer maintenance skills.
4. To identify the effectiveness of (computer simulation) in developing some computer maintenance skills.

THE IMPORTANCE OF THE STUDY

1. This study is concerned with highlighting the difference between ٢D and 3D in raising students' computer maintenance skills.
2. The university administration's contribution to the use of 2D and 3D in university teaching by providing technical and administrative support because of its impact in facilitating the transfer of content to students and overcoming the limits of time and place.
3. Help to achieve Saudi Arabia's Vision for 2030, which aims to transform classrooms into electronic learning environments through the computerization of the curriculum, dispensing with paper books.

4. Shed light on new teaching methods that may contribute to solving the problem of training student to improve their computer maintenance skills related to diagnosing and repairing computers.

LIMITATIONS:

The study population: the study was conducted among 60 students who registered for the course at the College of Education at Al-Baha University in Saudi Arabia during the second semester of 2020-2021. The subject: titled "Use of Computers in Special Education". The researcher selected the "computer maintenance skills" unit to track learners' achievements and skills. The study focused on students completing simulation in two ways. The first method involved two-dimensional simulation programs, with tasks being completed by students, whereas the second method focused on three-dimensional simulation programs, with tasks being completed by students. Place of study: At the college of education at Al-Baha University.

THE DEFINITION OF TERMS:

1. Effectiveness is defined as the impact of the investigation as an independent element on the dependent factors, or an individual's need to obtain goals, feedback, and experience achievements (Jain and Singh, 2017). Operationally, in this study, effectiveness refers to the statistical effect on the dependent variable, that is to say, the students' progress learning the information featured in the unit titled Computer Concepts after using the independent variable (blogs) as a teaching method.
2. Maqat (2016) defines computer simulation as a process in which computer programs are employed to place the student in an educational situation that resembles the real situation, in order to bring him closer to the real world, as carrying out the activity in the real world is difficult to do, due to the material cost, human resources required, or the danger to the student.
3. The term computer simulation relates to the representation of two-dimensional and three-dimensional. Or Computer simulations can also be computer-generated versions of objects from the real world that are presented in 2 or 3-dimensional multimedia formats.
4. Practical skills: the intended practice of organizing, and maintaining something accurately and with minimal effort or time.
5. Computer maintenance skills refer to the practice of producing maintenance experiences, which make the acquisition of knowledge and skill more efficient, effective, and appealing.
6. Computer maintenance refers to the practical procedures for repairing a computer experiencing a malfunction or defect.
7. According to Mazen, (2007) the term skill refers to the ability to perform a specific process with a degree of speed and perfection in an efficient manner.
8. The researcher defines skill procedurally understanding computer maintenance clearly and swiftly using computer simulation (2D or 3D), while also saving time, effort and money based on the grades obtained by the student.

LITERATURE REVIEW

Due to our brain's ability to recognize associations and patterns, studies reveal that visual views and illustrations increase user awareness (Hullman, 2011). Most educational software platforms drop into the interactive graphical application type. These apps are multimedia tools

which are capable of handling any form of media design, as well as providing an interactive individual experience. It also provides a very high level of language, illustrative scripting situation control navigation and allows individual input. Although most apps give these abilities, some are better suited to complex and interactive media than others.

Early history of computer educational software

The usage of computer software in education and exercise environments dates back to the initial 1940s, while American scholars established flight emulators that used computers to create simulated data onboard. Flight simulation is used for several reasons, including flight drill for pilots, the design and improvement of the aircraft itself, research into aircraft characteristics and handling control characteristics.

Educational software was mostly implemented to support students and teachers during self-work and study at the time. Over the years, educational software was developed and began to replace teaching and textbooks. Nowadays, teachers can apply instructional support (educational software) to facilitate teaching for themselves and the learning process for students. The usage of software and computers in education and training goes back to the initial 1940s, when US researchers established flight simulators that use analog computers to create simulation data for on-board devices.

Lei and Zhao (2007) defined technology, and discovered how students used it in 2003-2004, containing of number of hours' students spent on technology. Technology is a piece, a product, and a tool; it has the ability to resolve educational problems if they are associated with specific problems. For example, the computer program Microsoft Word allows for literary composition. Most students (81.4%) in the study said they use computers to do their homework, using a combination of four types of technology designed for learning, followed by searching for information for school work (71.4%), emailing (65.8%) to browse online for entertainment (58%), chatting online (51.1%) and working with specific programs (50.2%). Around half (41.1%) of students in study stated they use computers to play games and only 11.3% to invent websites. Overall, technology was found to be largely used for investigation and communication, not for expression and construction. In addition, students revealed that they spend between 3-4 hours on the computer every day.

According to Sahin and Turan (2009), whose study aimed to discuss the effect of technology use on teaching and learning in a classroom environment, the outcomes revealed only educationally sound teaching and appropriate technologies leading to improved learning. From the students' perspective, incorporating technology into learning requires advanced skills.

Al Mashrafe (2010) conducted a study aimed at exploring the effect of using a general program to increase computer skills among students. The findings showed that the educational program was effective in developing computer skills. The study summarized that educational programs have a good impact in developing students' knowledge in teaching biology more than the traditional method.

A study by Al-abrat (2011) aimed to design software and then evaluate its impact on students' achievement in the classroom. It was concluded that the software used in class to involve students in problem solving by educational software and thus increased their academic achievement.

According to Serin (2011), the use of educational programs and the provision of educational materials through computer technology was found to enable learners to build knowledge. In addition, it was found to play an active role in helping them to process and improve knowledge, discover other resolutions, and develop their problem-solving skills.

Another significant study was that conducted by Mansi (2011), whose study intended to identify the effect of using electronic imitation in increasing programmatic logic control skills among students at Palestine Technical College. The study sample was 60 male and female students from Palestine; half of the control group were taught in the usual way, and the 30 in the experimental group were taught with electronic simulation. An experimental design was used in this study. Study tool was an observation checklist to measure participants' programmatic logic control skills. The results illustrated that there was a statistically significant difference in electronic simulation between two groups in favor of the experimental one.

The study of Secomb, Mckenna, and Smith's (2012) intended to explore the use of simulation design activities they created in terms of its impact in learners' skills at Australia University. It was concluded that emerging computer simulation used in classroom did not lead to a significant difference in student performance between the control and experimental groups.

Efe and Efe (2012) endeavored to discuss the impact of using computer imitations on students' knowledge when learning about cells. The study sample amounted to 91 learners at Fatih High School in Diyarbakir, Turkey who were randomly assigned into control and experimental groups. The experimental group was taught using computer simulation, while the control group was taught by regular method. The study tools consisted of preliminary and post-tests. The findings showed experimental group achieved significantly higher quantity and quality of knowledge, understanding, application, analysis, synthesis and evaluation than the individuals from the control group. It was concluded that computer simulations have a more positive effect in increasing students' achievement in teaching than a traditional method.

Alexe (2013) focused on the effect of computer simulation on foreign language skills among students at the Technical University of Civil Engineering in Bucharest. The study design was a quasi-experimental method. The study sample was made up 30 learners that were separated into two groups: an experimental group, which was taught using a computer-based simulation, and the control group, which was taught by traditional method. The benchmark was an achievement test and observation checklist. The results showed that computer simulation has a positive effect on academic achievement and students' language skills. The findings indicated that teaching using computer simulation improves individuals' skills in a foreign language, because images make it easier for learners to understand the data. Indeed, the results of experimental group revealed they learned faster and easier and that the computer simulation improved their skills.

Kocaman and Cumaoğlu (2014) aimed to determin the effect of using educational programs, in form of individual games and tutorials, used in teaching vocabulary on students' success and the strategies used by students. A quasi-experimental method was used in the purpose of this study, which consisted of repeated measurements of one group. The findings showed the effect of educational programs and games on the students' use of vocabulary learning strategies. Two patterns of educational programs were used in the study, one of these programs (the Dynamic English Vocabulary Instruction Program) was a type of educational software used individually and the other consisted of four different computer games. It was concluded that both types of software

used to learn vocabulary had an effect in developing students' achievement. When the use of the strategy was analyzed by gender, it was found that male students used compensation strategies more than female students.

In a study by Guy and Jackson (2015), they aimed to compare student performance in traditional learning environment versus distance learning environments while using computer simulations. A quasi-experimental method was used in this study, which included repeated measurements of 281 undergraduate students at Tennessee State University. The mixed experimental group used SIMNET, a computer-based instructional simulation, while the full online experimental group used only SIMNET and PowerPoint slides, while the control group was taught using Microsoft Word, Excel, PowerPoint, and Access traditional methods. The study tools consisted of preliminary and post-tests. The hybrid experimental group was better than the control group in favor of using the Microsoft Excel application. The hybrid experimental and control group performed better than the experimental-fully online group due to the fact they benefited from lectures and demos face-to-face with the professor. The results of experimental and control group showed the effect of a computer simulation strategy in higher education when used as an addition to face-to-face lectures and in mixed environments.

While a study by Al-Muhammadi (2016) aimed to design an adaptive electronic learning environment according to the learning methods and their impact on developing programming skills and applicability among middle school students in the computer course. The study design was a quasi-experimental method. The study was applied to six groups of third year middle school students, consisting of 177 learners, who were chosen randomly according to auditory, visual, and kinesthetic learning methods, psychological analytical and holistic methods, and were subjected a preliminary and post-test. The results of the research found that there were no statistically significant differences between the mean scores of the research groups according to the auditory, visual and kinesthetic learning methods in the post-test of the cognitive achievement test, the observation checklist and the usability scale of the middle school students.

Lysenko, Rosenfield and Dedic's (2016) sought to explore the effect of interactive program use to teach basic mathematical skills in the classroom. The study sample included 234 students from 12 first grades at school in Canada. A quasi-experimental method was used in this study and the study tool was a bilingual interactive multimedia learning tool. The post-test of experimental group indicated that the participants of that group scored significantly higher on the standard math compared to control group students. Therefore, it can be concluded that interactive programs in mathematics have a more positive impact in developing students' knowledge in mathematics than using a traditional method.

The study of Jurado, Petterson and Gomez's (2016) focused on increasing the educational usage programs in higher education based on the authors' experiences and the study. The data was conducted in four Latin American countries. The measuring tool was a survey and group discussion and the study sample was made up of 15 teachers who took a course about learning management system. The results showed that educational software has a positive effect on the social constructivist methods and is learner centered. In short, the findings suggest that teachers need to experience and embrace cooperative learning by using ICTs in education.

In another study, conducted by Abu Hikma (2016), the aim was to determine the impact of using computer simulation programs on cognitive achievement and skill performance in the

physics curriculum among third-grade secondary students. The sample of the study consisted of 48 learners in Abha, Saudi Arabia. The learners were divided into two experimental groups, each group consisting of 24 students who used of the simulation program. A quasi-experimental design was used in this study. The results of the study demonstrated that there was a significant difference between the two groups in terms of achievement and skills performance in favor of the individual education style group, as evidenced by calculating the size of the effect of the independent variable by the eta square coefficient. The results recommended further studies to examine the effect of simulation programs on achievement and skills performance.

Lu (2017) set out to build a web, path and platform based hybrid learning model to improve students' ability to comprehend a language. The study tool included 1,000 English words for the college students to memories. Most students gained a sense of achievement and became more interested and passionate in about learning while using software. Therefore, the study concluded that web-based program is very effective in helping college students' memories English vocabulary.

Odadzic, Miljanović, Mandić, Pribićević and Županec (2017) explored effect of using educational software and traditional teaching methods on high school students during biology lessons. The study sample included 173 learners in grade12 of a high school in Zrenjanin, Serbia, who were randomly assigned into control and experimental groups. The experimental group studied biology, specifically mechanisms of heredity, using educational program, while the control group was taught by traditional methods. The study tools consisted of preliminary and post-tests and retests. The results of the experimental group, which were revealed through the post-test achieved significantly higher quantity and quality of knowledge in all three cognitive domains (knowledge, understanding and reasoning) compared to the control group. It can be concluded that educational program has a more positive impact in increasing students' achievement in biology than a traditional method.

Abdullah (2017) looked at improving the interactive software employed in the teaching of science among elementary students. The ADDIE instructional design model was used as a guideline to create the interactive software. The study tool involved interviewing 10 experts about the software abilities used in science processing skills. The results revealed that the interactive software used was able to effectively teach science processing skills to the elementary school learners. In future, it is hoped that a great deal more interactive software can be developed to help teach science to learners in schools. As interactive software has been shown to make learning science more interesting. In addition, it can be used both in and outside the classroom as teaching and learning aids.

A study by Sharifi, Arefi, Vajargah and Kakojoibari (2017) involved the design and subsequent analysis of educational software as an approach to develop individual's writing skills. The educational software used was an open-ended platform that motivated students to learn. The study sample included 31 teachers working in a school for the hearing-impaired located in Iran. A mixed method design was conducted to obtain both quantitative and qualitative data. The results indicated that over 50% of students felt the software improved their skills in all curricular areas. In conclusion, the design of the educational software was able to enhance the writing skills of the students. Furthermore, the study recommended conducting further research into how educational software affects students' performance.

The study of Natsheh and Zahda's (2019) aimed to explore and evaluate the use of educational computer software implemented on an economics course at Palestine Polytechnic University. The study sample included 67 students. A quasi-experimental method was used in this study with a control that taught fractions using a traditional teaching method and an experimental group who was taught using educational software. The post-test results of the experimental group showed that the educational software improved their learning process.

The researcher believes that studying the effect of two-and three-dimensional simulation programs at developing the knowledge and computer maintenance skills of students at the College of Education. 2D and 3D are the factors affecting the development of computer maintenance skills among students and has a relationship to the application while students are low in computer maintenance skills. This is confirmed by the study of Abdullah (2017) and the study of Abu Hikma (2016), and the study of Alexe (2013). So, the new presented by this research is to determine the effect of 2D and 3D, which differs from previous research and studies.

MATERIALS AND METHODS

RESEARCH DESIGN

The study belongs to the category of experimental design, as it was quasi-experimental. It was performed on two experimental groups to explore the effect of the independent variable on the dependent variable improving achievement and skills of students studying computer maintenance skills and was measured by an achievement test and observation checklist. In total, 50 individuals from the College of Education were included in the study, following the equivalence test, during first semester of 2020. The main study lasted 4 weeks in duration. The two and three-dimensional simulation programs used, containing achievement test and observation checklist, were performed by the researcher in this study through understanding, training and feedback.

The study aimed to prove the theory that students' skills can be improved through the use of 2D and 3D simulation in the classroom. A sample of learners from the college of education at Al-Baha University participated in classes taught using both computer simulations. The quantitative data collection process was chosen to provide a general picture of the research problem, in terms of analyzing the computer maintenance skills that students should possess, as well as reviewing the results of previous studies and the literature related to developing computer maintenance skills. The t-test method was used in this study to analyze the data. The objective of descriptive design was focused on two aspects: the use of computer simulation programs and skills. The current study used quasi-experimental design approach, including the pre and post-tests. The two experimental groups consisted of students who had not dealt with computer simulation before and who were taught by the researcher before the experiment and were conducted during the academic year 2020-2021. Table 1 illustrates the experimental design.

Table (1):The experimental design of the study

Group	Pretest	Treatment	Posttest
Experimental(1) (30 learners)	Achievement pretest and observation checklist (O1)	Teaching using 2D (X1)	Achievement posttest and observation checklist (O2)
Experimental(2) (30 learners)		Teaching using 3D(X2)	

THE STUDY POPULATION

The target population of the study consists of some students in the College of Education at Albaha University, whose number is 800 male and female learners, according to Al-Baha University statistics.

PARTICIPANTS

The sample of the study consisted of (60) students, and the sample was chosen randomly with the availability of a computer, the Internet, possession of computer skills, dealing via the web, participation and interaction with the division of the sample into two experimental groups. The first (30) students that were taught using 2D computer simulation and the second experimental (30) students who were taught using 3D computer simulation.

STUDY INSTRUMENTS

Two main instruments were developed for answering the questions of the present study, namely an academic achievement test and observation checklist.

ACHIEVEMENT TEST

Cognitive achievement test: The objective of the test was to measure the cognitive achievement of student sample after studying using computer simulation according to Bloom's cognitive levels.

The objective of the test: To determine the cognitive achievement for the study sample after studying of the use computers in special education course using computer simulation according to Bloom's cognitive levels.

Test description: The test consisted of subjective questions (multiple choice) and each item had four choices, one of which represented the correct answer in light of the content of the computer maintenance skills, with the total score of the test being 30 mark.

Table of specifications: The specification table was built based on Bloom's cognitive levels, which are (remember, understand, application). The vocabulary that relates to each level of Bloom's cognitive goals to be achieved for each item has been determined, as the number of the test vocabulary in its final form was (30) with ten questions for every goal.

Validity of the test: The test was reviewed by a seven referees specializing in curricula, teaching methods and educational techniques to know their opinions on the components of the test in terms of the scientific validity of its vocabulary; its suitability for students; the relevance and comprehensiveness of the vocabulary to the subject of course, and the accuracy of its linguistic formulation; and the appropriateness of the score for each test question. Consequently, adjustments were made to some vocabulary according to their views by reformulating some questions to become clear, and writing the question head in bold and thus the test became in its final form of application.

Reliability of the test: The test was applied on an exploratory sample consisting of (20) students at the College of Education, Al-Baha University, excluding sample of main study. The reliability was calculated using the Spearman & Brown correlation equation to find the correlation

coefficient between the two parts, and then find the reliability coefficient (Al-sayed, 1979). The test reliability coefficient was (0.77) which is an acceptable value that confirms the reliability of the test.

Calculation of coefficients of difficulty and ease of the test vocabulary: The ease factor was calculated for each of the test items, and the ease factors ranged between) 0.80 -0.54(

Internal consistency validity

The Spearman correlation coefficient was calculated based on the scores of the exploratory sample between the total score and the total score of the achievement and observation checklist tests. Table 2 shows the results of the correlation coefficients.

Table (2): Correlation coefficients between the degree of each level and the total score of the achievement **test.**

N	Level	Correlation coefficients
1	Comprehension	0.674
2	Recall	0.530
3	Application	0.743

Table 2 indicates that the correlation coefficients between the score of each level and the overall test score ranged between 0.530 and 0.743, which are statistically significant at a significance level less than 0.01. This finding indicates that the items of each test level are valid.

OBSERVATION CHECKLIST:

The aim was to evaluate the computer maintenance skills of students on the computer use course based on their performance. The observation checklist was prepared according to the educational objectives of the program by reviewing the course and meeting a group of specialists in computer maintenance, as it consisted of 40 skills describing the skill performance of the student in relation to computer maintenance that they learned in the classroom. The quantifying of the grades for the observation checklist was calculated by direct observation of each student separately, where the grades were distributed according to two levels: performed (1) and not performed (0).

Validity of the observation checklist:

The test was reviewed by a group specializing in curricula, teaching methods and educational techniques to ensure the integrity and clarity of the procedural wording of the observation checklist for application. They made any modifications they thought appropriate, including the recommendation to delete three phrases, bringing the total number of elements of the card to 40. The reliability of the observation checklist was calculated by observing five student's performance. In order to ascertain any difficulties, they experienced when using it, the observer agreement factor was calculated for each of the five students using the Cooper equation to calculate the agreement percentage. The percentage of agreement = number of agreement / (number of agreement + number of disagreement) * 100. The average percentage of agreement of the five students was 91%, which indicates the reliability of the observation checklist application.

THE PROCEDURE OF THE STUDY

A pilot study was conducted prior to the main study to ensure the reliability of the study tools. 2D and 3D computer simulation, and the achievement and observation checklist tests were used in the pilot study among a group of 20 students outside the main study, in order to verify the suitability of this educational program and test the time (25minutes) allocated to the study sample, as well as to identify any obstacles that may later interfere with software application process. The pilot experiment showed that there were no major hindrances and that the time required to implement the program per lecture would be one hour. After that, sixty learners from the College of Education were selected to participate in the main study. They were included in the study after equivalence test. The main study consisted of the first experimental group, which consisted of 30 learners, who were taught using a 2D computer simulation, while the second group, consisting of 30 learners, was taught using a 3D computer simulation. Because a random distribution of research group participants was prohibited according to university administration policies, the study was conducted on students. However, the pre-experimental measures of study achievement and computer maintenance skills were combined to ensure parity of research groups for the study. The assignments for students in group 1 and 2 included reading, discussing and application of computer maintenance skills in a shared a computer simulation of 3-4 students. At the end of the sessions, participants in both experimental were tested as a post-test.

1. Defining preventive maintenance skills that students should be able to do through: Previous studies and research that dealt with preventive maintenance skills, and books specializing in preventive maintenance and information technology.
2. Presenting the 40 skills to reviewers in the field of educational technology, curricula and teaching methods for reviewing. These included in the study lesson such as preventing the computer from overheating; cleaning the computer of dust and dirt before and after use; no verb here the computer's power supply; keeping the computer away from noise; keeping the computer away from any magnetic release; ensuring the computer was not exposed to water; ensuring that there is no vibration; keeping all computer cables in safe locations far from those walking past.
3. Designing preventive maintenance skills and presenting to the students to determine their training needs for those skills.
4. Designing a simulation program to develop preventive maintenance skills.
5. Showing the program to specialists in educational technology and amending it in light of their directives.
6. Designing the achievement and observation checklist measurement tools.
7. Presenting the measurement tools, teaching methods and educational technology to reviewers in the field of curricula to ensure their validity.
8. The random sample was determined, consisting of 50 students from among the fourth-year students.
9. Conducting a pilot study for 20 students, to measure the validity of the program for application, make the necessary adjustments to the program and identify the difficulties and obstacles that the researcher may encounter during the pilot study.
10. Conducting a pre-test on students to determine their level of knowledge and skill in the content of the program before studying it.
11. Applying the simulation program to main research group.

12. Applying the post-test to know the impact of the program on the achievement and performance level of the program content.
13. Monitoring the results, then processing them statistically, then analyzing and interpreting them.
14. Writing recommendations and proposals.
15. In order to design the experimental manipulating materials, the researcher selected ADDIE model. The first stage of the instructional is design (ADDIE model) of the study.

DESIGNING OF 2D AND 3D STRATEGY

The researcher chose the ADDIE general design model to design the experimental material due to its use in the 2D and 3D strategy in university education and demonstrated the quality of performance and the validity of the results, and allows the learner to progress towards achieving the goals according to his learning rate in terms of time availability and appropriate educational options for the learner and in the end the feedback to know level of cognitive performance and it consists of five stages: analysis, design, development, implementation, evaluation in order to design 2D and 3D strategy.

The first stage is Analysis

The literature was reviewed on the topic of previous studies related to the use of computer simulation programs and their impact to prepare theoretical framework of the study. Undergraduate students have been chosen as the target audience for study and they watched and listened to programs. The study was conducted in the computer lab, where the students had access to computers. The effectiveness of teaching the computer maintenance studies unit was chosen as the focus of the study, because it contains of computer maintenance skills that can be taught effectively using computer simulation. The first experimental group studied the unit with the help of 2D simulation and the second experimental group with the help of 3D simulation. The goals are outputs the educational system, that is to say, what students can do at the end of the educational process. Therefore, setting the goals is one of the most important procedural steps by designing and preparing educational programs in terms of the appropriate content elements, as well as choosing the appropriate media and methods to achieve the objectives of the program. A number of factors were taken into consideration, including: academic factors, including factors affecting the ability of learner to learn skill; the physical environment of the class in terms of sound, light and temperature; the social environment such as the learner's preference to work alone or with a group; the emotional environment such as the learner's motivation, perseverance to work and possibly responsibility; the learning unit of the program, which in this case was devoted to learning computer maintenance skills through computer-based activities using a simulation program to provide activities.

The second stage is design

The researcher’s computer simulations are based on four digital images (created with Adobe Illustrator) to draw learners' attention to the program and aim to teach 40 computer maintenance skills. Data was presented clearly with symbols codes, color and consistency. The simulations scenario such as logical sequence of subject and its interconnection, sequence of skills, rrelationship of subject to the students' needs, the students' mentality, description of footage,

viewing and sequence are drawn besides appropriate text. The images were entered by a scanner and processed using Adobe Photoshop 7. All of the texts that appeared on the program screen were entered using a word processing program. Static effects were used when program frames appeared and disappeared, in order not to distract the learner. Music and sound effects were used when learning ccomputer maintenance skill. The computer program was created using Php, C +, C, and Java Script to review the simulation program. The program was introduced to a group of experts and specialists in educational technology and computer science to ensure the availability of the design and production standards for the program elements, and the appropriateness of evaluating of the computer maintenance course for fourth year students at the College of Education. A pilot study was conducted to ensure the clarity of the subject, program time for two groups, explain of the experiment, division of groups. The achievement test and observation checklist were based on recall, cognitive and application goals, and were comprised of 30 multiple choice questions to measure students' memory, comprehension and application. Then, a specification table was drawn up that including a number of questions to measure the effect of computer simulation on the students' skills. These included in the lesson: preventing the computer from overheating; cleaning the computer of dust and dirt before and after using the power-cord; keep the computer out of noise; keep the computer away from any magnetic release, which will prevent computer from being exposed to water; ensure that there are no vibrations; keep all computer cables in safe locations separate from those in the past; dividing and formatting the hard drive; OS installation, disk scan, and anti-virus backup.

The third stage is development

The researcher designed computer simulation, which was entitled "Computer maintenance", to teach 40 skills. The researcher began producing and testing of the methodology used in the project, and then presented it to a number of reviewers in the technology department to check the clarity on screen, its availability, and the process of building the computer program. The researcher conducted a pilot study among 20 learners who were not included in the main study sample, to verify the availability, to identify any obstacles that prevent their completion. The time required to conduct the main study with the equation (time spent answering the first student + time spent answering the last student/2). The results of pilot study indicated there was no obstacle to the application of the program and that the time required for each lecture was one hour. Then, the measurement tool was applied in the form of a post test, which recorded the data. The researcher then processed the data statistically, analyzed it and discussed the results, before making recommendations and suggestions in light of the results. The pilot study consisted of 20 learners. The first 10 students finished the test within 25 minutes, while the other 10 finished the test within 30 minutes, so the average was 30 minutes. Cronbach's alpha value was 0.74 indicating that the test had high validity. To determine the difficulties that the researcher faces when applying the study. It is clear from the ease coefficients that ranged from 0.50 to 0.73 and that the difficulty coefficients for the paragraphs ranged from 0.26 to 0.45. That is, the coefficient of ease or difficulty was55%.

The fourth stage is implementation

The researcher examined computer simulation then reviews it in terms of program availability and repetition of mistakes before applying it to the students. The researcher provided contact information in case the students have any inquiries regarding how to use the program. The age of

the learners was between 20 and 24 years old. Sixty learners participated in the study who were able to manipulate visual and auditory data. The subject being studied by them was the use of computers in special education, and the specific focus of the lesson was the "the computer maintenance". The first experimental group students used (2D simulation), and the second group (3D simulation) with taking into account the speed and the time duration. This was compatible with learning conditions and characteristics.

The fifth stage is evaluation

To determine if the goals had been achieved, pre and post-test were taken to measure the learners' skills, taking into account the feedback received from the learners. After that, the data was recorded and monitored, and then the data was processed statistically, analyzed and the results were discussed. The researcher presented recommendations and suggestions in light of the results. The achievement test and observation checklist were conducted to measure the study achievement and skills for both groups.

STUDY VARIABLES

First: the independent variables: the simulation programs (2D and 3D).
Second: The dependent variable: computer maintenance knowledge and skills.

RESULTS AND DISCUSSION

After completing the implementation of the simulation and observing the students' performance. The t-test for the two independent samples was conducted to measure the computer maintenance knowledge of the two groups in terms of the computer maintenance unit during the pre-test.

To answer this question, the null hypothesis was formulated, which states:

1. **There are no statically significant difference in the level of $\alpha \leq 0.05$ between the mean scores of first experimental (those using 2D- dimensional simulation) and the other experimental (those using 3D- dimensional simulation) groups during the achievement pre-test, as a result of applying the software**.

The t-test for the two independent samples was conducted to assure the equalization of the two groups in the achievement pre-test by ensuring they had the same experience in terms of the computer maintenance unit. The results are shown below in Table 3:

Table(3):The equalization between the two groups (pre-test)

Group	N	Mean	Std.Deviation	T value	Df	Sig.(2-tailed)
Experimental(1)	30	14.27	1.445	1.712	58	.067
Experimental(2)	30	15.14	1.689			

Table 3 shows there are no statically significant differences between the mean scores of the first group (those using two-dimensional simulation programs) and the second group (those using three-dimensional simulation programs) on the pre-test of achievement. As $p \leq 0.05$, the null hypothesis is accepted. The findings are consistent with those of previous studies (Noureldin, Stoica, Kaneva & Andonian, 2016; Alkofahi, Bin Jamaludin, Ng, 2015) that there was no statistically significant difference between the mean scores of the two experimental groups in the pre-achievement test related to computer maintenance skills.

2. **There are no statically significant differences at the level $\alpha \leq 0.05$ between the mean scores of the first experimental group (those using 2D-dimensional simulation) and the other experimental group (those using 3D- dimensional simulation programs) groups during the achievement post-test, as a result of applying the software.**

After completing the implementation of the program and observing the students' performance. The t-test for the two independent samples was conducted to measure the computer maintenance knowledge of the two groups in the post-test in terms of the computer maintenance unit during the post-test. The results are shown in Table 4 below:

Table(4):The post-test from the two groups

Group	N	Mean	Std.Deviation	T value	Df	Sig.(2-tailed)
Experimental(1)	30	19.21	1.705			
Experimental(2)	30	29.25	.866	19.875	58	.000

The results of the study analysis in table 4 shows the results (N= 30, $p < 0.05$) for the first experimental group of 30 students and the second experimental group of 30 students. In terms of the students' achievements, the first experimental group (taught using 2D simulation) reported a means score of $\bar{x}$ =19.21 posttest, with a standard deviation of σ = 1.705. While the second experimental group (taught using 3D simulation) reported a mean score of $\bar{x}$ = 29.25 in the posttest, with a standard deviation of σ = .866. After running a t-test on the second experimental group, it showed that the difference between the pretest was =15.14 and posttest was = 29.25, highlighting that there was an improvement in students' achievement and skills based on their results. The results indicated that there were statistically significant differences in the achievement mean groups, as shown in Table 5. The researcher attributed this to the impact of computer simulation, as the learners increased their achievement, thus indicating that 3D simulation is a more effective method than 2D simulation. Moreover, it was more effective at presenting the skills and information required, as well as the maps attractively. The findings revealed that the second experimental group did significantly better than the first group in terms of their achievement and skills. The results indicate that the use of 3D simulation can influence students' achievements in the subject of computer maintenance skills.

The findings are consistent with the previous studies (De boer, Wesselink & Vervoom, 2015; Ashraf, Collins, Whelan, Sullivan & Balfe, 2015;Park, Kim & Sohn, 2011; Hassan, 2014) on the effectiveness of 3D simulation programs at developing computer maintenance knowledge due to it being faster, presenting visual knowledge more clearly, and having fewer mistakes and taking less time than 2D simulation. The results of this study are not consistent with previous studies about the effectiveness of 3D. According to research by Dlamini (2015). Indeed, there was no significant difference in the scores based on the type of simulation (2D or 3D) that was used.

3. **There are no statically significant differences at the level of $\alpha \leq 0.05$ between the mean scores of the first experimental (those using 2D- dimensional simulation) and the**

other experimental (those using 3D- dimensional simulation) groups during the observation checklist pre-test, as a result of applying the software.

The t-test for the two independent samples was conducted to assure the equalization of the two groups in the pre-test (observation checklist) regarding skills. Table 5 shows the results of pre-test:

Table 5):The equalization between the two groups (pre-measurement in observation checklist test).

Group	N	Mean	Std.Deviation	T value	Df	Sig.(2-tailed)
Experimental(1)	30	٢٢,٣٠	٣.706	٢,٠٠	58	.452
Experimental(2)	30	٢٠,٤١	٤.016			

Table 5 shows there are no statistically significant differences between the mean scores or grades of the experimental group (those using software) and the control group (those using a traditional method) on the pre-measurement in the observation checklist. As $p \leq 0.05$, the null hypothesis is accepted. The findings are consistent with the previous studies such as those conducted by Noureldin, Stoica, Kaneva and Andonian (2016) and Alkofahi, Bin Jamaludin and Ng (2015), which indicated that there was no statistically significant difference between the mean scores of the two experimental groups in the pre-observation checklist test related to the computer maintenance skills.

4. **There are no statically significant differences at the level $\alpha \leq 0.05$ between the mean scores of the first experimental (those using 2D-dimensional simulation) and the other experimental (those using 3D-dimensional simulation) groups during the observation checklist post-test, as a result of applying the software.**

After completing the implementation of the program and observing the students' performance, the t-test for the two independent samples was conducted to measure the computer maintenance skills of the two groups in the post-test, in terms of the computer maintenance unit during the post-test. Table 6 shows the results of post-measurement test:

Table (6): The post-measurement of the observation checklist

Group	N	Mean	Std.Deviation	T value	Df	Sig.(2-tailed)
Experimental(1)	30	٣٠,١	٣,١٣	٩,٦٥	58	.000
Experimental(2)	30	٣٩,٢١	٢,١١			

Table 6 shows the results (N= 60, $p < 0.05$) in terms of the students' observation checklist measurement. In terms of the students' skills, the first experimental group (taught using 2D simulation) reported a means score of $\bar{x}$ =10.86 posttest, with a standard deviation of $\sigma = 2.514$. While the second experimental group (taught using 3D simulation) reported a mean score of $\bar{x}$ = 17.23 in the posttest, with a standard deviation of $\sigma = 5.454$. After running a t-test on the second experimental group, it showed that the difference between the pretest was =9.77 and posttest was = 17.23, highlighting that there was an improvement in students' skills based on their results. The results indicated that there were statistically significant differences in the observation checklist mean groups, as shown in Table 6. In addition, the findings also showed that the second experimental group were significantly better than the first group in terms of their observation checklist grades. The results indicated that the use of 3D simulation can influence students' computer maintenance skills. The researcher attributed this to the influence of 3D simulation on

leading classroom discussion, as learners increase their skills. In short, 3D simulation provides an opportunity for learners to share their experiences, work actively, search for information across different resources, and interact with classmates by computer.

3D simulation presents the content as it occurs in reality life. Computer maintenance skills displayed through 2D simulation lack depth. 3D simulation helps students' reading of knowledge and skills, thus reducing misconceptions and perceptions, as well as 3D are more consistent with educational principles. 3D is interesting by linking computer maintenance skills and perceive by the senses with reality life, as tangible representation. The information represented by 3D simulation which is better 2D simulation. 3D simulation has the depth in presenting content, colors and movement that lead to better encoding of information to storing information, which led to a better long-term memory. Students learned by (3D simulation) that was student-centered. The 3D simulation improved the use of class time.

PROGRAM EFFICIENCY:

The researcher calculated the measures of association of this study. Table 7 shows the values of these transactions.

Table (7) :Measure of association

Test	Eta	Eta Square
Post-test group	.970	.93

Table 7 shows the eta squared for the grade total of the posttest for the subject, which was the use of computers, for the study sample (.934), which refers to grade changes in 93.4% of participants during the posttests for both study groups in favor of the second group that was taught using 3D simulation.

The value of the eta squared (0.7338) indicates that 3D simulation has a very large impact on developing the computer maintenance skills of the student in the second experimental group when compared to the student in the first vgroup. The value of the eta squared also indicates that 3D simulation explains a rate of 93.4% for the scores variance of the computer maintenance skills of the students in the second experimental group, which is a very large variance explained by the fact they used 3D simulation. From the previous results, it is clear it rejects the null hypothesis, as the results of this hypothesis did not indicate a statistically significant difference at a level of significance (0.05) between the mean scores of the first and second experimental groups in the observation checklist test in the post-test, in favor of the average scores of the second experimental group in the two cases. In addition, the 2D simulation design had a very large impact on the development of the computer maintenance skills of the students in the second experimental group, compared to those in first group. The researchers attribute this to the use of 3D simulation for teaching the course computer maintenance improved the skills of lessons, as it provided a flexible learning environment, enabling them to learn effectively, building students 'knowledge, and provided learning resources, strategies, activities and various learning tasks appropriate to students' needs and previous experiences. In light of the constructivist theory that simulation leads the learner to knowledge in order to create new knowledge and thus improve thinking and the ability to solve problems through representation and alignment due to external stimuli reach the learner's desires and goals. The results of the study also agree with the theory of cognitive load by presenting the content through computer simulation, which provides the student with knowledge

and the speed of preserving and remembering information, which leads to the development of the students' computer maintenance skills.

CONCLUSION:

The purpose of the study was to examine the effectiveness of designing 2D- and 3D-dimensional simulation programs to develop a number of computer maintenance skills among students at the College of Education, Al Baha University. The results revealed that there were statistically significant differences at a level of $\alpha \leq 0.05$ between the mean scores of students from the first and second experimental groups in the post achievement test and observation checklist, with the results in favor of the second experimental group that used 3D simulation. This indicated that 3D simulation is a more effective tool in the learning and teaching of computer maintenance skills than 2D simulation.

RECOMMENDATIONS FOR STUDY:

1. It is important to customize the design of the computer simulation to the teaching according to the subject.
2. 2.As the sample of the current study was only comprised of learners at Al-Baha educational college at Al-Baha University in Saudi Arabia, future studies are needed to include learners from other colleges, to increase the sample size and thus make more accurate generalizations about the data.
3. Encourage the administration and professors in every department of Al-Baha University to use computer simulation in their teaching.
4. Use 2D and 3D simulation when teaching computer maintenance skills to undergraduate students because of the proven increase in acquiring computer maintenance skills, with an emphasis on three-dimensional simulation, as it showed greater effectiveness on students' academic achievement and skills.

SUGGESTIONS FOR FUTURE STUDY

1. A comparison of all types of web applications, specifically interactive media, is also needed to better understand the impact on computer maintenance skills, achievement, and communication.
2. A study of the effectiveness of software based on electronic games in the development of design skills among students.
3. A study of the computer simulation program used online to develop computer maintenance skills.

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