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"The Attitudes of University Students Towards Their Use of Virtual Labs and The Obstacles to The Use of Virtual Labs in The Educational Process" Field Study on the Students in the Computer Engineering Department at the University College of Applied Sciences (UCAS) – Gaza, Palestine

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Abstract:
The study aims to measure the attitudes of students in the Computer Engineering Department at the University College of Applied Sciences – Gaza, Palestine towards their use of virtual labs, in addition to studying the obstacles to the use of virtual labs in the educational process. The results show that the degree of student attitudes towards the use of virtual labs is average. In general, the researcher explained these findings that the University College Applied Sciences needs additional measures to promote the culture of using virtual labs by holding training courses for teachers and students. The results also showed that there are limitations when using virtual labs such as the lack of special computers with special specifications for the use of virtual labs and the absence of virtual labs for some courses, in addition to the continuous power outages in the Gaza Strip for a long time. One of the most important recommendations of the researcher is the need to strengthen the culture of using virtual labs in the educational process and to provide such labs for all courses of practical and technical disciplines, and to develop policies and strategies on the use of virtual labs within the E-Learning system. The study followed the descriptive analytical approach. The study tool is a questionnaire targeted (220) students from the Computer Engineering Department at the University College of Applied Sciences – Gaza, Palestine for the (2021-2022) academic year, and the sample consisted of (53) students of Computer Engineering Department, randomly selected from the study community.
Keywords: E-learning, educational technology, students' attitudes, virtual labs.

اتجاهات طلبة الجامعة نحو استخدامهم المختبرات ومعوقات استخدامها في العملية التعليمية" دراسة ميدانية على طلبة قسم هندسة الحاسوب في الكلية الجامعية للعلوم التطبيقية ـ غزة، فلسطين

الملخص:
تهدف الدراسة إلى قياس اتجاهات طلبة قسم هندسة الحاسوب في الكلية الجامعية للعلوم التطبيقية نحو استخدامهم المختبرات الافتراضية بالإضافة إلى دراسة معوقات استخدام المختبرات الافتراضية في العملية التعليمية. يتضح من النتائج أن درجة اتجاهات الطلبة نحو استخدام المختبرات الافتراضية هي متوسطة. و بشكل عام فسر الباحث هذه النتائج علي ان الكلية الجامعية بحاجة الي إجراءات إضافية لتعزيز ثقافة استخدام المختبرات الافتراضية وذلك بعقد دورات تدريبية للمدرسين والطلاب. وايضا بينت النتائج أنه يوجد معوقات عند استخدام المختبرات الافتراضية مثل عدم امتلاك الطلاب أجهزة حاسوب خاصة ذات المواصفات اللازمة لاستخدام المختبرات الافتراضية و عدم وجود مختبرات افتراضية لبعض المساقات، بالإضافة إلى انقطاع التيار الكهربائي في قطاع غزة بشكل مستمر و لفترة طويلة. من أهم توصيات الباحث ضرورة تعزيز ثقافة استخدام المختبرات الافتراضية في العملية التعليمية و توفير مثل هذه المختبرات لجميع مساقات التخصصات العملية و التقنية, و وضع سياسيات و إستراتيجيات حول استخدام المختبرات الافتراضية ضمن منظومة التعليم الالكتروني.
كلمات مفتاحية: التعليم الالكتروني, تكنولوجيا التعليم, اتجاهات الطلبة, المختبرات الافتراضية

1- Introduction

In light of the technological development at the global, regional and local levels, it was necessary to keep pace with this development due to the widespread use of different areas of technology in the field of education, which led to the emergence of modern and important technologies, including "virtual labs". This study came out to measure the attitudes of students of the University College of Applied Sciences towards their use of virtual labs to obtain certified results for the development of both traditional and virtual labs, in order to raise the academic level of students. Technological development has contributed to the emergence of modern technologies, an important, and useful educational change, which is virtual labs, and many international models and experiments have proven the importance and feasibility of this technique and its adoption in education and research like Virtual lab at the University of Hanover, in natural sciences and engineering, Germany and many others mentioned later in this study. Virtual labs are one of the technology innovations in education and an extension of electronic simulation systems, where the virtual labs largely simulate the real labs in its functions and events, and through which results similar to those of the real labs are obtained. This study will address the virtual labs in terms of their concept and components, highlighting the benefits and advantages and referring to some of the world's experiences in this field.

1.1- Study Problem

The researcher, as a lecturer in the Computer Engineering Department, believes that the reality of teaching specialized practical courses suffers from the lack of equipment to conduct some practical experiments, and this is due to the lack of material means to provide with all equipment, especially in light of the acceleration of development. The current technological and economic crisis in Gaza Strip, as well as the increase in the number of students, caused the apparent failure to conduct practical experiments as required, which led to a limitation in conducting advanced experiments which need advanced equipment.

Also, it is worth to mention the Covid-19 pandemic and its impact on the education process. As result, most of the higher education institutions shutdown their campuses and shift to online. This forces the practical courses to stop because there is no other way than face to face education foe the practical courses. Hence, the importance of the virtual labs became reality. . Due to the importance of technical education and equipping students with the technical skills necessary for the labor market, we had to study this subject and raise the issue of virtual labs and their use. Hence the idea of the study to research.

1.2- Study Problem Questions

1. What are students' attitudes towards using virtual labs?
2. What are the obstacles to using virtual labs?
3. Is there a statistically significant correlation between students' attitudes towards the use of virtual labs in the educational process?. The variables are level of study, age, and specialization. Following are the study hypotheses to be tested:
    - There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the change in the level of study.
    - There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the age change.

- There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the change of specialization.

1.3- Study objectives

The study aims to:

1- To identify the attitudes of University College of Applied Sciences students towards the use of virtual labs in the educational process.
2- Highlighting the obstacles that students face when using virtual labs.
3- To find out if there is a statistically significant correlation between students' attitudes towards the use of virtual labs in the educational process.

1.4- The Importance of The Study

The importance of the study comes in the following points:

1. Keeping up with modern methods of teaching using computers and information technology in order to develop the educational environment.
2. Give teachers an idea of virtual labs as an interactive environment that mimics traditional labs.
3. Guide teachers to choose the right models from virtual labs.
4. Emphasizing to the University College of Applied Sciences administration, with the advantages of virtual labs and their importance in the educational environment.
5. Complete the shortage in traditional labs.

2- Study Terms

Virtual Labs Concept

Virtual labs is one of the applications of the so-called virtual reality and is one of the innovations of education technology, which is an artificial or imaginary learning environment alternative to real reality and simulates it, and the learner here lives in an imaginary environment interacts and shares with it through his senses and with the help of the computer and some other devices depending on the type of virtual labs and its specialty.

Virtual labs are known as an open environment through which traditional labs are simulated and the practical aspect is linked to the theoretical aspect, through which thinking skills are taught, and students have the freedom to make decisions themselves without having negative effects on what is known as a virtual learning and learning environment aimed at developing the practical skills of students and there are many of these labs free of charge on the Internet. (Saleh, 2013).

The research identifies the virtual labs as an online educational environment that offers the required tools to conduct the practical courses experiments anytime from anywhere.

2.1- Key Components of Virtual Labs

Virtual labs consist of the following key components (Hassan, 2016):

1. Computers with high technical specifications connected through the local network or through the Internet, so that the student can conduct the experiment remotely.
2. Its communication network and devices include all communication media between the components of the labs and its tools. Lines of communication must be safe and of reliable quality.
3. The virtual labs software are simulation programs designed by a team of specialists. These programs are exciting, attractive and rely on multimedia technology.
4. Sharing and management software is labs management programs for students in terms of tasks and follow-up activities and permissions.

2.2- Virtual Labs Features

Some of the most important features of virtual labs in higher education institutions include (Praxilabs, 2021):

1. To complete the shortage in traditional labs due to lack of adequate financial support.
2. The ease of carrying out practical experiments that are difficult to work in traditional labs because they are dangerous to the student.
3. Obtain results and visual data and present some experiments that cannot be displayed during experiments in traditional labs.
4. The possibility of implementing all the experiences and ideas of the course, which are difficult to implement in traditional labs due to the limited possibilities and time available.
5. Enable the student to conduct practical experiments at any time and from anywhere.
6. Allowing the student to conduct the experiments several times, which leads to greater absorption
7. Allowing students to collaborate and cooperate with each other more.
8. Enable the student to document the results electronically for analysis, processing or sharing with others easily.
9. Enable the teacher to evaluate students better and faster when conducting experiments.
10. Save money, especially in some labs that need high-cost components such as chemicals.
11. Protecting the student and not being exposed to the risks of some serious experiences, especially junior students.
12. Add the excitement to the educational material and attract the attention of the students and encourage them to integrate into the learning process.
13. The possibility of cooperating with other educational institutions with the aim of exchanging experiences through virtual labs on the Internet.
14. Cooperation in the implementation of scientific research among higher education institutions in different parts of the world, which provides an opportunity to develop the performance of researchers.

2.3- Virtual Labs Use's Obstacles (Al-Radhi, 2010)

1. The use of virtual labs requires hardware and Software with high specifications in order to carry out different practical experiments in all disciplines.
2. Lack of virtual labs in Arabic language environment.
3. The design and production of virtual labs needs an integrated team of programmers, teachers and educators.
4. Not fully interacting with virtual labs by teachers and students.

2.4- Virtual labs relationship with E-Learning

E-Learning is the umbrella of educational Virtual Reality applications, such as Smart Classes, Virtual Classes, Computer Simulation, Virtual Labs, and these applications intersect and are very similar in their services and in their hardware and software components. The virtual labs are one of the pillars of E-Learning in the applied and practical field and one of the results of the integration of technology in the field of science, where it resulted from the consequences of the expansion of the use of information and communication technology, that is available individually or through a website. (Dais, 2013)

2.5- International Models and Experiences in the Field of Virtual Labs (Dais, 2013)

- The Project (Semm labs) of the University of Lille , French.
- The virtual labs produced by Crocodile Clips, a leading global educational software company, has produced virtual labs for chemistry, physics, mathematics and technology.
- Virtual Chemistry Lab at the University of Bestberg, USA.
- Virtual Chemistry Lab at Carnegie Mellon University, USA.
- Virtual Microbiology Lab at the University of Texas, USA.
- Virtual Chemistry Lab at Charles Stewart University, Australia.

- Virtual lab at the University of Hanover, in natural sciences and engineering, Germany.
- Virtual lab at Johns Hopkins University, USA.
- PHET virtual lab at the University of Colorado, USA.
- Virtual Physics Lab of the Arab Electronic School, Jordan.
- PraxiLabs helps to conduct science experiments Anywhere Via 3D Interactive Virtual Labs, Egypt.

3- Research Methodology

In this part of the study, the researcher deals with the study's methodology, and sample, in addition to the study tool, the steps of its preparation and the statistical methods used in the study. Following is a description of the previous elements:

The study followed the descriptive analytical approach, meaning the descriptive analytical approach: "It is the method that studies a phenomenon or an event, or an issue that currently exists from which information can be obtained that answers the study questions without the intervention of the researchers" (Alga and Professor, 2000:83). The study targeted (220) students from the Computer Engineering Department at the University College of Applied Sciences – Gaza, Palestine for the (2021-2022) academic year, and the sample consisted of (53) students of Computer Engineering Department, randomly selected from the study community.

3.1- Study Tool

The study used the questionnaire as a tool to survey the targeted student's sample.

The Psychometric Characteristics of the Questionnaire

Scale (Questionnaire) Validity

(Obeidat, 1999:15) describes the validity of the tool as "its ability to measure what was developed to measure it". The researcher used the following methods to ascertain the authenticity of the tool.

Trustees Validity

The researcher presented the tool to a group of trustees, in its initial form, from specialists, and the researcher asked them to express their opinions, observations and suggestions about the tool and its suitability to measure the objectives of the study. Then the researcher obtained some opinions and suggestions from them. In the light of this, the researcher modified the wording of some paragraphs, deleting, adding and merging others, so that the number of paragraphs of the survey now is (33) out of (40).

Scale (Questionnaire) Reliability

The instrument's stability factor was calculated using the Cronbach Alpha method. And Table (1) shows that the stability factor of a questionnaire is fairly high, confirming the stability and suitability of the questionnaire.

Table1: Stability Factor

#	Number of Paragraphs	Number of Sample Members	Stability Factor
1.	33	53	0.781

3.2- Analysis

To determine the instrument on which to interpret the results of the study, the cell length in the Triple Likert scale was determined by calculating the range between the scale grades (3-1=2), and then dividing it by the largest value in the scale to obtain the length of the cell i.e. (2/3 =0.67), after so, this value was added to the lowest value in the scale (the beginning of the scale which is a valid one) in order to determine the upper limit of this cell, and to interpret the results of the study and

judge the response level, the researcher relied on the order of mathematical averages at the field level of the tool as a whole, and the level of paragraphs in each area, guided by the Triple Likert scale (A.A.,2016). The following Table (2) shows scale scores.

Table 2: Triple Likert Scale

#	Cell Length	The Corresponding Relative Weight	The Degree of Approval	The Level of Response
1.	1.66-1	%33.33-%1	I don't agree	A few
2.	2.33-1.67	%66.66-%33.34	Neutral	Medium
3.	3-2.34	%100-%66.67	Agree	Big

4- Results and Discussion

This section presents the most important findings based on statistical processes collected and analyzed through the study tool.

4.1- The First Question of The Study Analysis

What are students' attitudes towards using virtual labs?

To answer the first question, the researcher calculated the averages, standard deviation and relative weights of each of the study first domain paragraphs: students' attitudes towards their use of virtual labs from the questionnaire. Table (3) showing these results.

Table 3: Students' Attitudes

#	Paragraph No.	Paragraph	Average	Standard Deviation	Relative Weight %	Agreed Degree	Response Degree
1-	20	Use virtual labs because they're better than real-life labs.	1.96	0.706	65	Neutral	Medium
2-	8	I prefer to use virtual labs during teamwork.	2.11	0.824	70	Agree	Big
3-	9	Virtual labs help me get better familiar with practical experiences than real-world labs.	2.17	0.802	72	Agree	Big
4-	5	The best virtual labs in practice on real-life labs.	2.17	0.893	72	Agree	Big
5-	21	Use virtual labs to avoid disabling electronic devices and pieces.	2.26	0.812	75	Agree	Big
6-	16	Use virtual labs because they develop creative thinking.	2.30	0.749	77	Agree	Big
7-	10	I see virtual labs are better for individual work.	2.32	0.803	77	Agree	Big
8-	3	Virtual labs give me specialized skills and high-quality performance.	2.38	0.686	79	Agree	Big
9-	2	The best virtual labs on real labs for what distinguishes them in terms of accuracy, speed and time freedom.	2.40	0.716	80	Agree	Big
10-	13	My use of virtual labs is very important in solving my homework.	2.43	0.636	81	Agree	Big
11-	18	Virtual labs make up for lack of realistic labs.	2.45	0.748	82	Agree	Big
12-	24	My use of virtual labs is a useful tool when implementing extracurricular activities for specialization.	2.47	0.668	82	Agree	Big
13-	11	Virtual labs help me innovate	2.51	0.576	84	Agree	Big

		and innovate in my field.					
14-	12	My use of virtual labs helps me think clearly when studying.	2.51	0.669	84	Agree	Big
15-	1	Virtual labs are one of the most important good alternatives to technical education.	2.51	0.608	84	Agree	Big
16-	14	Virtual labs are more important for practical courses.	2.53	0.608	84	Agree	Big
17-	4	Virtual labs are one of the most important practical educational tools in the specialty	2.53	0.639	84	Agree	Big
18-	15	Using virtual labs help me increase practical attainment.	2.53	0.575	84	Agree	Big
19-	6	Virtual labs achieve educational goals.	2.55	0.574	85	Agree	Big
20-	7	Get things done faster using virtual labs.	2.55	0.607	85	Agree	Big
21-	25	My use of virtual labs helps me keep up with the technological development of our current specialty era.	2.55	0.637	85	Agree	Big
22-	17	Virtual labs enable me to think about training solutions in multiple ways.	2.57	0.572	86	Agree	Big
23-	19	Enjoy using virtual labs.	2.58	0.535	86	Agree	Big
24-	22	Virtual labs are a help for real-life labs.	2.66	0.553	89	Agree	Big
25-	23	Using virtual labs saves money.	2.83	0.470	94	Agree	Big

It is clear from the previous Table (3) that (22) of the questionnaire paragraphs within the first domain have received a large response score, which means that the degree of student attitudes towards the use of virtual labs is large as (22) paragraphs of the questionnaire have received agreed score, as the paragraph with the rank of (23), which is " Using virtual labs saves money " has a relative weight of (94%) with a high response degree, which confirms that the use of virtual labs saves money. Also, the paragraph with rank (22), which is "Virtual labs are a help for real-life labs" have gained a relative weight of (89%) with a high response, which indicates that the importance of using virtual labs is from the point of view of students. Paragraph (20), "Use virtual labs because it's better than real-life labs", has a relative weight of (65%) with a moderate response grade, which indicates that some students prefer to use virtual labs. In general, the researcher explains these findings that the University College of Applied Sciences needs additional measures to promote the culture of using virtual labs such as training courses for teachers and students. As the Project (Semm labs) of the French University of Lille held a training workshop, on the conversion of scientific experiments in labs into virtual experiments using this technique.

4.2- The Second Question of The Study Analysis

Highlighting the obstacles that students face towards using virtual labs?

To answer the second question, the researcher calculated the averages, standard deviation, and relative weights of each of the second domain paragraphs: what are the obstacles facing students towards their use of virtual labs. The following Table (4) shows this.

Table 4: Virtual Labs Use Obstacles

#	Paragraph No.	Paragraph	Average	Standard Deviation	Relative Weight %	The Degree of Approval	The Level of Response

1-	28	The best virtual labs through web pages	2.04	0.854	68	Neutral	Medium
2-	33	Virtual labs must be provided through smart devices	2.51	0.724	84	Agree	Big
3-	29	The Moodle program should be supported for our virtual labs	2.58	0.602	86	Agree	Big
4-	31	Virtual labs must be provided for all practical specialty courses	2.58	0.745	86	Agree	Big
5-	32	Teachers encourage us to use virtual labs	2.62	0.527	87	Agree	Medium
6-	30	The need for proper training on how to use virtual labs	2.66	0.618	89	Agree	Big
7-	27	I prefer to have a computer with specifications that fit the virtual labs	2.77	0.466	92	Agree	Big
8-	26	Power outages in the Gaza Strip continuously and for a long time	2.79	0.532	93	Agree	Big

The previous Table (4) shows that the questionnaire paragraphs for the second field have received a response score between medium and large, as paragraph (26), which is "continuous and prolonged power outages in the Gaza Strip", has received a significant response score of (93%) and this confirms that the continuous power outage in the Gaza Strip is one of the most important obstacles to the use of virtual labs. Also, paragraph (27), which is "Better possession of a computer with specifications that fit the virtual labs", has obtained a relative weight of (92%), which indicates that students prefer to own their computer, which indicates that the lack of computer sought by students to fit the use of virtual labs is one of the most important obstacles.
These results show the fact that there are obstacles when using virtual labs, such as the continuous power outages in the Gaza Strip. Also, students have not owned their special computers with the necessary specifications for using virtual labs, and the need for virtual labs for some courses. As well as the need for appropriate training to use virtual labs.

4.3- The Third Question of The Study Analysis

To find out if there are statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the responses of the sample of the study attribution to the following variables: (academic level, age, specialization).

To answer this question, the researcher tested the following zero hypotheses:

1. There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the change in the level of study.
2. There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the age change.
3. There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the change of specialization.

The following are the results of the test for the validity of previous hypotheses:

4.4- The First Hypothesis

The first hypothesis states: There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the change in the level of study.

To test the validity of this hypothesis, the researcher used the (One-Way ANOVA) single contrast analysis test for the study level variable.

Table 5: Relative Differences for The Level of Study Variable

#	Field: Students' Attitudes Towards Using Virtual Labs		Total Squares	Degrees of Freedom	Average Squares	"F" Value	Level of Significance
1.	Questionnaire paragraphs	Between groups	11.086	2	5.543	0.158	0.854
		Within groups	1756.386	50	35.128		
		Total	1767.472	52			
2.	Field: What are the obstacles students face towards using virtual labs						
3.	Questionnaire paragraphs	Between groups	1.525	2	0.763	0.166	0.847
		Within groups	229.493	50	4.590		
		Total	231.019	52			

It is clear from Table (5) that there are no statistically significant differences at the level of significance ($0.05 \geq \alpha$) in the responses of the study sample on: (students' attitudes towards their use of virtual labs, what are the obstacles facing students towards their use of virtual labs), this confirms the agreement of the study sample members on the use of virtual labs, regardless of their level of study and explains that the students agree on their attitudes about the use of virtual labs and also limitations of using virtual labs.

4.5- The Second Hypothesis:

The second hypothesis states: There are no statistically significant differences at the level of indication ($0.05 \geq \alpha$) in the degree of students' attitudes towards their use of virtual labs due to the age change. To test the validity of this hypothesis, the researcher used the (One-Way ANOVA) single contrast analysis test for age change.

Table 6: Relative Differences for The Age Variable

#	Field: Students' Attitudes Towards Using Virtual Labs		Total Squares	Degrees of Freedom	Average Squares	"F" Value	Level of Significance
1.	Questionnaire paragraphs	Between groups	150.986	2	75.493	2.335	0.107
		Within groups	1616.486	50	32.330		
		Total	1767.472	52			
2.	Field: What are the obstacles students face towards using virtual labs						
3.	Questionnaire	Between	15.867	2	7.933	1.844	0.169

	paragraphs	groups					
		Within groups	215.152	50	4.303		
		Total	231.019	52			

It is clear from Table (6) that:

1- There are statistically significant differences at the level of significance (0.05≥α) in the study sample responses to: (student attitudes towards their use of virtual labs) and this confirms the disparity of the study sample members agreeing on the use of virtual labs, considering the varying capacity by age.

2- There are no statistically significant differences at the level of significance (0.05≥α) in the responses of the study sample about (what are the obstacles facing students towards their use of virtual labs) and this confirms that students agree on the constraints of using virtual labs.

4.6- The Third Hypothesis

The third hypothesis states: There are no statistically significant differences at the level of indication (0.05≥α) in the degree of students' attitudes towards their use of virtual labs due to the change of specialization.

To test the validity of this hypothesis, the researcher used the (One-Way ANOVA) single contrast analysis test for the specialization variable.

Table 7: Relative Differences for The Specialization Variable

#	Field: Students' Attitudes Towards Using Virtual Labs		Total Squares	Degrees of Freedom	Average Squares	"F" Value	Level of Significance
1.	Questionnaire paragraphs	Between groups	72.585	3	24.195	0.699	0.557
		Within groups	1694.886	49	34.590		
		Total	1767.472	52			
2.	Field: What are the obstacles students face towards using virtual labs						
3.	Questionnaire paragraphs	Between groups	14.841	3	4.947	1.121	0.350
		Within groups	216.178	49	4.412		
		Total	231.019	52			

It is clear from Table (7) that there are no statistically significant differences at the level of significance (0.05≥α) in the responses of the study sample on: (students' attitudes towards their use of virtual labs, field: what are the obstacles that students face towards using virtual labs), this confirms the agreement of the study sample members on the use of virtual labs, regardless of their specialties and explains that students agree in their attitudes about the use of virtual labs and also about the obstacles to using virtual labs.

5- Conclusion

The results show that the degree of student attitudes towards the use of virtual labs is average. In general, the researcher explained these findings that the University College of Applied Sciences needs additional measures to promote the culture of using virtual labs by holding training courses for teachers and students. The results also showed that there are limitations when using virtual labs such as the lack of computers with special specifications for the use of virtual labs and the absence

of virtual labs for some courses, in addition to the continuous power outages in the Gaza Strip For a long time. Also, the study confirms the agreement of the study sample members on the use of virtual labs, regardless of their level of study and explains that the students agree on their attitudes about the use of virtual labs limitations . In addition, it confirms the disparity of the study sample members agreeing on the use of virtual labs, considering the varying capacity by age. The study confirms the agreement of the study sample members on the use of virtual labs, regardless of their specialties and explains that students agree in their attitudes about the use of virtual labs and also about the obstacles to using virtual labs.

6- Recommendation

The most important recommendation of the researcher is the need to strengthen the culture of using virtual labs in the educational process, and to provide such labs for all courses of practical and technical disciplines, and to develop policies and strategies on the use of virtual labs within the E-Learning system.

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8- Links for the internet

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2- https://blog.praxilabs.com/2018/02/08/virtual-labs-features-benefits/#9_Benefits_of_Virtual_Labs