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Research Article

The extent to which teachers of science subjects use virtual scientific laboratories during corona virus pandemic: the reality & hope

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Abstract

The study aimed to identify the reality of the use of virtual scientific laboratories when teaching science subjects at the basic stage in Amman's public schools which is the capital city of Jordan. The descriptive analytical approach was used.. The study population consisted of all teachers of sciences; mainly, the teachers who teaches the science subjects for the first grades in the public schools available in Amman. A questionnaire was prepared, and used to collect data and information consisting of (49) items (see the appendix) with two fields which are the reality of the use of virtual laboratories in teaching science subjects and obstacles and the teachers' viewpoints towards the use of the virtual laboratory and significance. The findings of the study showed the following: (1) there are many obstacles that prevent the use of virtual scientific laboratories technology in teaching science subjects at the basic stage including the lack of infrastructure and the lack of the financial capabilities necessary to secure the needs of the virtual laboratories, (2) teachers of science subjects are fear of taking responsibility while using the virtual laboratory when teaching science subjects, and (3) teachers of science subjects are not satisfied with using the virtual laboratory because it takes too much time while teaching sciences classes through educational platforms. Moreover, many students do not have enough internet. The study recommended the necessity to find an infrastructure for virtual laboratories and to train teachers to use them in order to reduce any educational loss in science subjects during crises particularly Corona Virus pandemic.

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Introduction

Knowledge and technological openness are the main features of the current time during Corona Virus pandemic which led to a change in lifestyles and the educational process. Since we live in the era of the Corona Virus pandemic, the traditional methods of dealing with knowledge are no longer sufficient to meet the students' technical and scientific needs. So it is necessary to overcome all obstacles that may reduce the benefits of e-learning in the light of the Corona Virus pandemic. As a result, the significance of technology in education has increased and the term "educational technology" that came up as a scientific formula for development. Therefore, most countries have adopted e-learning as a systematic way in designing, implementing and evaluating the entire educational process, using all available resources and capabilities to secure this sudden transformation imposed by the Corona Virus pandemic and developing teaching strategies that go with the nature of such a crisis. The recent trends in the field of scientific education and science teaching confirm the significance of the laboratory and the practical activities that are practiced there, assuming a prominent role because of their role in the success of the science programs and curricula. Technological techniques including E-learning, virtual labs, and dynamics-based virtual systems are all features of education in the future.

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The vocational education system in secondary schools including widely used information and communication technology (Peinazo, et al. 2019). The form of advanced technology applications has been integrated into various learning activities including virtual laboratories (Cambronero-López et al. 2017) that aim to develop learning performance and get students to learn independently (Ramírez-Romero et al. 2020).

Students' acquisition of laboratory work skills is an essential objective of teaching science subjects in all educational levels. So, laboratory activities are considered as a significant part of the curriculum itself. Wherever science is taught, the laboratory must be used (Zaytoun, 2005). Since the curricula is a tool to prepare students for scientific thinking and teaching methods are one of the components of the curricula, these methods are based on memorization; consequently, they must be reconsidered. That's because indoctrinate itself may lose students the ability to understand and to think very well (Crowell, 1989). Science subjects need to be taught and interpreted to use the laboratory that is considered as an integral part of practical education and science teaching. So recent trends in practical education takes a great care of the laboratories because they have to do with the scientific subjects and achieving the goals of teaching science in general (Zaytoun, 2004).

According to international experiences and models, virtualization in education and research is distinct particularly in the field of laboratories (Al-Hazmi, 2016). But what are the differences between real-life experiences and those formed in a computer screen?

Through virtual labs, students gain a tool by which they can experiment without any restrictions of space or time. Unlike school laboratories, they are all available all the year. They are also limited to a specific location and for a limited period of time. Using virtual environments makes students acquire better computer skills, which can be considered as skills for lifelong process learning. Using such technologies also make topics of science, technology, engineering and mathematics (STEM) to be combined together and provides great resources for more comprehensive workshops (Doukeli, 2012) and (Tselfes, 2002).

The subjects of science are one of the most ones related to technology. Such a relation is a cognitive one by integrating technology into the development of students' level. The education is supposed to be meaningful. In addition, many educators confirm the significance of integrating information and communication technology into science education.

Given the significance of scientific laboratories, new methods have emerged in conducting laboratory experiments using technology and providing the virtual world through the use of computers to facilitate students' understanding of scientific concepts and increase their motivation towards science. Martinez (2003) indicates that virtual laboratories have to do with computer applications in teaching science subjects to be used in addressing a huge number of problems facing sciences teaching in general. The use of the simulation system is essential in the possibility of simulating dangerous experiments that actually need complex devices.

The simulation system can overcome all these difficulties and can be even used in an ideal form that simulates reality without any troubles in the process of conducting it. The virtual laboratory system is one of the most important and valued systems since it is distinguished compared to other educational means by using simulation of global phenomena, as the student then can find the solutions to any problem he or she may find in any experiment. The experiments as well as the process of simulating them are one of the most important advantages of applying the computer system in science subjects. The virtual laboratory is determined in the absence of real laboratory, but it is sometimes possible to use a traditional laboratory with appropriate modifications in to enhance its effectiveness. Therefore, appropriate methods should be used to achieve the goals of science teaching and improve development outcomes. These methods include practical presentation, computer simulation method and the laboratory which is a successful method in achieving the goals of science subjects teaching. The use of virtual labs makes the cost of teaching reasonable. The use of virtual labs by students makes the content itself more effective through the usual methods in which the student feels free (Fenrich, 2003).

The use of virtual labs contributes to transform abstract concept into concrete ones and to provide multiple and varied experiences too. It also helps students in facilitating their understanding of scientific concepts since primary school students tend to have concrete skills in acquiring knowledge according to Piaget's classification. One of the features of the virtual lab that it allows weak students to do the experiment steps more than once. So the student can be able then to do experiments again outside the school. This allows teachers to get their students involved in scientific experiments in way that takes the individual differences among students into consideration. Thus, every student can be developed according to his or her individual abilities.

The virtual environment is an educational system established in a world created by the computer and combines the various tools and means of teaching and learning including the computer and the Internet, employing them in improving the inputs of the educational learning process, maximizing its outputs (or outputs) and helping to activate the interaction (at its various levels) among the parties to the process of scientific education. The quality of education has a great interest in most countries of the world to the extent that thinkers call this era by the era of quality as it is one of the main basics of the successful management model. Therefore, defining the basic and building quality occupy a great importance within the framework of its practical application in various institutions including schools and universities.

According to Zaytoun (2005), Nour (2011) and Martines et al. (2003), there are several features of virtual laboratories as follows: (a) compensating for the lack of real practical capabilities due to the lack of funding issues, (b) the possibility of conducting practical experiments that are difficult to be implemented in real laboratories as they are dangerous, (c) the possibility of visual presentation of phenomena that cannot be presented through real experiments because they contains tools that help support the experiment such as graphs, animations and analyses, (d) the synchronization between explanation of theoretical ideas and practical application, (e) the flexibility of use by students at any time, anywhere and at any speed, (f) the possibility of conducting the experiments several times according to the learner's ability so that he or she can comprehend without the presence of a human monitor and (g) virtual environments allow students to observe the process with more scientific details compared to the lecture method in a traditional classroom.

Moreover, the virtual laboratory environment enhances attention and motivation towards scientific topics by supporting cross-platform discussion among partners, peers, students and educators (Dobson, 2009).

Because of the laboratory work is important in linking the theoretical aspects with the practical process, and the teacher being the cornerstone of the educational process, he or she must be provided with laboratory skills that help him or her in translating theoretical content into practical activities that translate abstract concepts into concrete ones through the use of the virtual laboratory. This should be noted by taking into consideration the difficulties that prevent science subjects' teachers from using the virtual laboratory during the Corona Virus pandemic. Virtual learning environments enable learners to repeat events several times without hesitation, or zoom in and out, and monitor slowly the experimental processes achieves the desired teaching objectives (Tuyuz, 2010).

So, this study is to investigate the extent to which teachers of science subjects use virtual scientific laboratories during the Corona virus pandemic, the reality and the hope. It is a realistic study that contributes to highlight nature if virtual labs use and to develop the necessary solutions in order to achieve the desired goals of e-learning during dangerous crises such as the Corona Virus pandemic.

Statement of the Problem

Most public Jordanian schools suffer from low academic achievement by students in scientific subjects. This was confirmed by the study of students' achievement in science and mathematics in international tests (TIMSS). It is noted that Jordan's participation in this test from (1999) to (2015) that the results indicate that in (1999) it was (450), and in (2003) the score went up to (25) points to be (475). While in (2007) it reached (482), then it returned and went down in (2011) to reach (449) points. It also decreased very significantly in (2015) to reach (426) less than the result of (2011). The result returned and went up by an average of 26 points in science subjects in 2019 (National Center for Human Resources Development, 2019) . These fluctuations call for sounding the alarm and reconsidering all elements of the educational system. Despite the efforts by the Ministry of Education through the development of school laboratories, there are indications that teaching science subjects through laboratories did not receive an attention from those in charge of the educational process.

So the point of transition and transformation to using the electronic method of teaching is one of the goals of the teaching process and contemporary education programs. However, That requires a change in quality and development of the educational process in light of the requirements of the labor market. So the fundamental transformations must be done according the methods of teaching and learning in order to transform the educational model from closed learning environments represented by traditional methods. In the shadow of circumstances of Corona Virus pandemic in distance education, it is necessary to compensate for the educational loss in teaching science. This study is to identify reality of using virtual scientific laboratories in teaching science subjects during the Corona Virus pandemic.

The Research Significance

The current study is gaining importance through the importance of the topic addressed by a degree of science teachers to use virtual scientific laboratories during corona virus pandemic Researcher has sensed in the light of previous

experience in the Ministry of Education and qualitative variation in transmission impact of training programs to the classroom and through improving the professional competence of teachers and the development of strategies for their practices in a variety of teaching, especially in the science curriculum.

It is hoped that the results of this study will be useful to the following: (a) those in charge of the educational process in Jordan, as they will have an idea of the importance of activating the virtual laboratory and the follow-up of teachers to implement it and principles of public schools to provide it, (b) the universities and colleges that implement programs for preparing and training teachers of science subjects, and (c) the administrators in the Ministry of Education, as they will provide and activate virtual laboratories in the educational learning process. In addition, this study is very necessary as it may reveal the reality of employing virtual laboratories in teaching science subjects during Corona Virus pandemic and identify the most prominent problems facing the use of virtual laboratories in the education of science subjects.

Moreover, the current study is to reveal the teachers' opinions and the most prominent challenges they may face when employing the virtual laboratory. The study contributes to providing educators with the requirements of virtual laboratories necessary to teach science subjects as an interactive environment that may simulate real laboratories. It also contributes to informing officials of the Ministry of Education in Jordan about the features of the virtual laboratories and the significance of using such labs in teaching science subjects, to cover the shortage in research dealing with laboratory technology and to get the researchers of educational field pay attention to the importance of the virtual laboratory itself.

The Research Terms

The Virtual Lab: it is a place where simulated experiences, new ingredients are created and added. The student then is free to make decisions without any negative effects. Woodfield (2005) defined virtual laboratories as "an open environment in which the real science laboratory is simulated and the theoretical side is linked with the practical side and through which thinking skills are taught. The students then can have a complete freedom to make decisions without the negative consequences (p. 1728).

Corona Virus Pandemic: It is a global epidemic similar to severe influenza that is transmitted from one person to another by sneezing or coughing if the nose and mouth are not covered very well. Another way of transmission is touching something that the infected person has already touched. Some people do not realize they are infected with the virus until they find out symptoms of illness. That's why everyone must wear protective masks, use sterilization, wash always hands and keep social distancing (Meredith and Kalpart, 2021, p.1).

Science teachers: All teachers who teach science for the first grades of the Ministry of Education.

Literature Review

Electronic education is a type teaching that is based on electronic means during the educational process. Ismail (2003) defined the electronic education as a teaching system planned, prepared and implemented electronically via communication and information means available on the Internet. Most education was changed into electronic because of Corona Virus Pandemic. Alexiou et al. (2008) indicated that virtual labs are one of the new technologies and part of the electronic simulation. One can get good results from the real labs. Al Mouhameed (2003) in his research that aimed to identify the reality of virtual lab and its effect on teaching sciences for the eighth grade in Amman as well as the students' tendency towards, found out that the number of experiments that were conducted by males were less than those done by females. He also found that the number of labs in female schools is more than those labs available in male schools. The research sample consisted of (634) students, (40) principles and (15) labs.

Barakah (2014) found that the tendency of students towards using the virtual chemical lab when learning the practical part of Chemistry allowed them to identify the positives and negatives of the developed computerized software. Therefore, their tendency towards the virtual lab was positive. Al Baltan (2011) aimed to recognize the impact of using the virtual labs on teaching science subjects for secondary stage in Saudi Arabia. The researcher used the quantitative method. The research sample consisted of (325) teachers. The results showed that the virtual science laboratories are available in about (37%) of secondary schools in the Saudi Arabia. The reality of science subjects' teacher is very proficient in operating and dealing with computers. The level teachers' awareness of the nature of the virtual laboratory is fair. In the meanwhile, Al Haaj (2015) confirmed the effect of using virtual labs in the academic achievement in Chemistry for secondary stage students. Kamtoor and Ahmed (2015) aimed to identify the reality of using the scientific laboratory technology in teaching chemistry at the Sudanese secondary stage. The descriptive analytical approach was applied. A survey was used as a tool for collecting data and information. The study population consisted of all (80) secondary schools chemistry teachers in Bahri area. Secondary schools in Bahri area do not have

scientific laboratories. If any lab is available, it is incomplete in terms of tools and equipments. There is a complete agreement by teachers about the necessity of using scientific laboratories technology in teaching chemistry at the secondary stage. Anbesaw & Daba (2016) in their research paper aimed to clarify the factors that effect in the practical activities applied to teach science subjects in the public schools of Affar area that is located in southern Ethiopia. Both researchers followed the analytical method and the collected data and information via both a survey and interviews. The research sample consisted of (404) teachers. The results indicated that there is a lack of laboratory equipments and the lack of teachers who do not use practical activities in teaching science subjects. The local government and the school administration interest in the practical activity of students is weak because of those two previous obstacles. Kawu (2017) investigated the impact of the virtual labs on the levels of academic achievement and whether the students' gender who study chemistry has to do with their willingness in Nigeria. The research sample consisted of (60) students who was randomly selected from two secondary schools in Nigeria. The results showed that the grades of students who learn within homogeneous groups in virtual labs are better. Al Shehry (2016), Taha (2016) and Fernández-Avilés et al. (2016) all indicated that there is a positive impact of using virtual labs on the academic achievement of learners in science subjects.

The Research Objectives and Questions

This study aims to identify the reality of teaching sciences and using virtual labs by identifying the point of views given by the teachers of science subjects towards using the virtual labs. The research questions are as follows:

- What is the reality and obstacles of using the virtual labs in teaching science subjects?
- What is the reality of using the virtual labs in teaching science subjects in the basic grade according to the point of views given by the teachers of science subjects?

Method

Research Model

The methodology adopted in the current study is the descriptive approach, due to its suitability for the purposes of the study. The current research is to identify the reality of the use of virtual scientific laboratories in teaching science at the basic stage in Amman's public schools which is the capital city of Jordan.

Population & Sample of the Study

The sample of the study which consisted of (600) teachers (who teach science to the first three grades), in the directorate of education of Marka District in the first semester for the year 2020-2021, was selected randomly. The sample of the study represents 82% of the population of the study which is consisted of all the teachers of these grades in the District for the same year which are estimated by 731 teachers.

Data Collection Tools

Based on the literature review related to the variables of the current study, A questionnaire was developed by researcher , included two fields (1) the real situation of virtual labs use to teach sciences and the obstacles (2) Opinions of teachers towards virtual labs use and significance.

Table 1.
The Scale of Analyzing the Reality of the Use of Virtual Scientific Laboratories in Teaching Science Subjects at the Basic Stage in Amman's Public Schools

No	The Field	Item No
1	The reality and obstacles of using the virtual labs in teaching science subjects	1-35
2	The reality and obstacles of using the virtual labs in teaching science subjects	36-49
Total		49 Items

To achieve the goal of the study, and to answer the questions, the researcher built a questionnaire to measure the the reality of the use of virtual scientific laboratories when teaching science subjects at the basic stage in Amman's public schools. Where the process of building this resolution passed the following steps:

- A review of the literature relevant to teaching strategies virtual scientific laboratories.
- Drafting paragraphs of questionnaire according to the five-Likert scale, as has been the primary (55) paragraphs, was shortened to (49) paragraph after presentation to the arbitrators.
- In order to achieve internal honesty and inferential virtual paragraphs tool that has been built, presented the initial image on the arbitration committee to detect the degree of honesty to measure what they are intended

to measure, the number of arbitrators reached (14) of university professors and members of the curricula in disciplines (science teaching methods). In light of the views of the arbitrators was the opinion of the majority to amend some paragraphs, delete some paragraphs to become finalized (49) paragraph.

- To make sure of reliability of study tool (questionnaire), has been consistency coefficient was calculated in a manner the internal consistency of the sample individuals as Cronbach's alpha equation, by applying this tool once on the study sample, in order to discover the extent of their use of virtual scientific laboratories, where The total reliability coefficient of questionnaire is considered acceptable for the purposes of the study.

The Validity and Reliability of the Survey

For A questionnaire to be regarded as acceptable, it must possess two very basic characteristics, which are reliability and validity (Litwin & Arlene, 1995).

Reliability

To reduce the memory effects and make sure the respondents answer A questionnaire different from the way they answer in the first time, the researchers gave A questionnaire the same group of respondents at a later point in time and repeated the research. Then, the researcher compared the responses at the two times. The results showed the responses were different in both times.

Validity

To ensure the items of A questionnaire are clear and the correlate to the objectives of study and each item is correlated to the field, the survey itself was reviewed by (14) members including academic staff whose majors are in science and teaching methods as well as educational supervisors. They recommended to do some refinements including deleting (6) items and paraphrasing another ones. Moreover, the reliability coefficient of the test was calculated using the Cronbach – Alpha and Pearson correlation coefficients as follows table (2)

Table 2.

The Reliability of the Scale

N	The Field	Cronbach Alfa	Pearson Coefficients
1	The reality and obstacles of using the virtual labs in teaching science subjects	0.84	0.82
2	The reality and obstacles of using the virtual labs in teaching science subjects	0.79	0.82
Total		0.85	0.86

The scale was eventually transformed to an electronic form by Microsoft Forms to make sure it reaches easily to all teachers in accordance to the health conditions in the light of the continuing Corona Virus pandemic.

Results and Discussion

What is the reality and obstacles of using the virtual labs in teaching science subjects? To answer the first research questions, the total means of the both fields of the applied survey was calculated via SPSS as shown in the following table.

Table 3.

The Total Means, Standard Deviations and Degrees for the Fields of the Used Survey in the Current Study

Rank	No	Field	Mean	Sd	Degree
1	1	The reality and obstacles of using the virtual labs in teaching science subjects	3.66	0.43	Fair
2	2	Opinions of teachers towards virtual labs use and significance	3.58	0.51	Fair
Total			3.62	0.47	Fair

As mentioned above, it is clear that the reality and obstacles of using the virtual labs in teaching science subjects is fair as the total mean of the scale is about (3.66) just similar to Al Baltan (2011). According to such a result, it is noted from Table (4) that the reality of using the virtual laboratory in teaching science subjects and obstacles in general is fair with the mean (3.66) the standard deviation (0.43).

Table 4.

Means and Standard Deviations of the First Field (The Reality and Obstacles of Using the Virtual Labs in Teaching Science Subjects)

Rank	No	Item	Mean	Sd	Degree
1	3	Lack of the financial capabilities necessary to secure the needs of the virtual laboratory.	3.75	0.90	High
1	5	Fear of bearing responsibility for the failure of modern educational devices and materials during their high use in sciences teaching by teachers.	3.75	0.90	High
1	7	Disability to produce virtual lab software that helps me teaches sciences.	3.75	0.90	High
1	11	Weakness of students in using modern technologies (such as tablets, smart boards and virtual laboratories)	3.75	0.89	High
1	19	The school administration is interest in the knowledge and the achievement sides while ignores of the skill side.	3.75	0.89	High
1	23	The school prepares ways to support the teacher's application of the virtual laboratory in the sciences class	3.75	0.89	High
1	34	The virtual laboratory achieves objectives related to students' scientific thinking skills	3.75	0.89	High
8	1	The lack of internet within the laboratory hinders the use of the virtual laboratory in teaching sciences	3.74	0.89	High
8	9	Dissatisfaction with using the virtual laboratory during the Corona Virus pandemic limits my use of the virtual laboratory in teaching sciences	3.74	0.90	High
8	13	Using a virtual lab takes more time to teach sciences	3.74	0.90	High
8	17	Difficulty in carrying out experiments of the lessons	3.74	0.89	High
8	21	The school administration believes that the laboratory is just a waste of money	3.74	0.90	High
8	29	Virtual lab technology helps me simplify information for students.	3.74	0.89	High
14	15	The school management believes the laboratory as a waste of time	3.73	0.91	High
14	31	Computer simulation programs help the teacher to clarify some of the scientific concepts contained in sciences curricula more than traditional laboratories.	3.73	0.91	High
16	27	The teacher sets a clear study plan for applying the virtual laboratory in the sciences class.	3.72	0.92	High
17	8	Poor computer software skills.	3.65	1.05	High
18	2	The density of content in sciences curricula hinders the use of modern technologies.	3.64	1.05	High
18	4	Class time is not enough to use modern technologies in sciences teaching.	3.64	1.06	Fair
18	6	Unavailability of educational software that includes scientific experiments implemented in a virtual laboratory in Arabic on the Internet.	3.64	1.06	Fair
18	12	The school administration's lack of interest in addressing problems related to the use of modern technologies related to sciences teaching	3.64	1.06	Fair
18	30	The teacher uses the school's electronic library to enrich the sciences topics and curricula.	3.64	1.06	Fair
23	10	Low effectiveness of educational devices and technologies available in schools.	3.63	1.06	Fair
23	16	The way the book is organized and presented does not help in using the laboratory in teaching.	3.63	1.07	Fair
23	18	There is no practical activity guide accompanying the textbook	3.63	1.06	Fair
23	20	There are no lab classes according the school schedule	3.63	1.06	Fair
23	22	There is a necessity of having a specialist in virtual laboratories to help obtain the appropriate technology when needed	3.63	1.06	Fair

23	25	The teacher provides necessary support and guidance to students while using the laboratory in their sciences classes	3.63	1.01	Fair
23	32	Sciences educators understand the interrelationship between the application of virtual labs and the general education curriculum.	3.63	1.07	Fair
23	33	The application of virtual laboratories is based on integration with the study program that students are in.	3.63	1.06	Fair
31	14	The Ministry of Education has absolutely no interest in establishing virtual scientific laboratories.	3.62	1.07	Fair
31	24	Learning activities of applying the virtual laboratory in an active class are characterized by science	3.62	1.06	Fair
31	28	The teacher has mastered the design of teaching to integrate virtual laboratories into education	3.62	1.07	Fair
31	35	Teachers are interested in achieving goals specific to students' scientific thinking skills in the virtual lab classes.	3.62	1.06	Fair
35	26	Students interact positively while using the virtual lab in sciences lessons.	2.88	1.39	Fair
			3.66	**0.43**	Fair

The items ranged between fair and high as the means ranged between (3.75-2.88). The following items (3, 5, 7, 11, 19, 23, 34) came with a high degree. The items include lack of financial capabilities necessary to secure the needs of the virtual laboratory, fear of taking responsibility for the failure of modern educational devices and materials while they are used in teaching science subjects by teachers, weakness in producing virtual laboratory software that helps teachers teach science subjects, students' weakness in using modern technologies (such as devices, tablets, smart boards, and virtual laboratories), the school administration's interest in the knowledge and the achievement sides, and the neglect of the skills side, the school prepares ways to support the teacher's use of the virtual laboratory in the science class and the virtual laboratory achieves goals related to students' scientific thinking skills. Whereas the items (14,23,28,34,35) came with a fair degree. These items include the following: the Ministry of Education is not interested at all in establishing virtual scientific laboratories, the learning activities of using the virtual laboratory in a class are effective in science, the teacher is mastering the design of teaching to integrate virtual laboratories into education and the teachers are interested in achieving goals related to students' scientific thinking skills in the virtual laboratory classes. According to the given results, the reality of virtual lab use when teaching science subjects and obstacles is generally fair. The most basic obstacle is the lack of required physical capabilities to secure the needs of virtual lab. These results goes with the study of both Anbesaw & Daba (2016).

The major obstacles of virtual labs use include taking the responsibility of any damage in devices during teaching science subjects by teachers, who are not actually able to produce virtual labs software that may help them to teach sciences, weakness of using the modern technologies (Tabs, clever boards and virtual labs) by students, most administrations at schools are interested in cognitive and academic achievement rather than skills, some schools do not support the use of virtual lab during the science class. Moreover, most respondents do not agree that the virtual lab may achieve goals related to the skills of scientific thinking by students. This proves why there is a kind of fear of using the virtual lab when teaching sciences by teachers who suffer from lack of experience. Most teachers believe that using virtual labs is useless to teach science subjects during Corona Virus Pandemic. The results of the first question revealed that there is a gap between the reality and hope concerning with activating virtual labs. The items that go with such a result are fair including integrating the virtual labs during the science classes by teachers, achieving private goals related to scientific thinking skills by students during the virtual lab classes, teachers are not given a chance to use the modern technologies to stay up to date with the scientific developments and their need to train. All above mentioned can be happened with out a vital role led by the ministry of education to overcome the difficulties of using the virtual lab classes. One can conclude the obstacles whether they are technical or physical seem very usual. However, identifying such obstacles helps in overcoming them in the future. Corona Virus Pandemic highlighted the significance of technology in the educational process by finding a well-prepared infrastructure to help students to learn all subjects particularly the scientific subjects. This can be done by finding an alternative, which is the virtual lab instead of the traditional one that teachers can use during crises such as Corona Virus Pandemic.

What is the reality of using the virtual labs in teaching science subjects for the basic grades according to the views of teachers of science and significance?

To answer this question, means and standards deviation of the second field of survey have been calculated as shown in table (5).

Table 5.
Means and Standard Deviations of the Second Field (Opinions of Teachers towards Virtual Labs Use and Significance)

Rank	No	Item	Mean	Sd	Degree
1	39	Teachers show inquiry-based teaching strategies while implementing the virtual lab	3.74	0.90	High
1	45	I focus on the theoretical side because it achieves success for the student	3.74	0.90	High
3	41	Virtual lab software provides opportunities for students to practice higher mental skills.	3.73	0.90	High
3	47	Laboratory use is a waste of time	3.73	0.89	High
5	40	The learning environment during the implementation of the virtual laboratory provides opportunities for effective communication between students and students	3.64	0.89	High
6	36	The sciences teacher have got the necessary professional knowledge and skills to enable learners to employ virtual laboratories in sciences teaching	3.63	0.89	High
6	43	I have enough experience to conduct experiments	3.63	0.89	High
6	49	Experiments in the lab are just indispensable teaching aids.	3.63	0.89	High
9	38	Teachers link science skills and processes with students' practices in a virtual lab application	3.62	0.90	High
9	42	I am convinced of the usefulness of using laboratory technology in teaching sciences	3.62	0.90	High
9	44	I am afraid that the experiment will fail in front of the student	3.62	0.89	High
9	48	The use of the virtual laboratory is related to the efficiency of the teacher	3.62	0.90	High
13	46	The preparation of teachers in university colleges is weak in the field of laboratory experiments	3.61	0.89	High
14	37	Schools provide the appropriate digital equipment for the application of virtual laboratories in sciences teaching	2.57	0.91	High
Total			3.58	0.51	Fair

It is obvious from the results available in table (5) below that the teachers' view of the virtual laboratory and its significance in teaching sciences in general is fair with the mean (3.58) and a standard deviation (0.51). Some items came with a high rank while others came with a fair rank since the means ranged between (3.74 to 2.57). Item number (37) that states, "Schools provide the appropriate digital equipments for the application of virtual laboratories in science subjects teaching" came in the last rank with a mean (2.57) and a standard deviation (1.36). To put it simply, teacher's points of views towards the virtual lab use and significance is fair in general. Most teachers focus on the theoretical field since it helps student to succeed. That's because most teachers are convinced with the knowledge itself. They believe that the use of virtual labs during the Corona Virus Pandemic is just a waste of time. Moreover, they do not have the enough required skills to conduct experiments when using the virtual labs during the sciences classes.

Conclusion

The virtual laboratory is an educational software that achieves educational and scientific standards to get to the hoped goals of virtual learning during Corona Virus pandemic. The reasons for the lack of use of the virtual laboratory may be due to the failure to activate the laboratory in most public schools available in Amman. In addition, teachers do not have enough time to use the virtual laboratory due to the large number of topics in the sciences curricula. As it became clear from the results of the survey that the reality of not using virtual laboratories is fair due to several reasons, the most basic obstacle is the poor equipment and infrastructure of public schools. Moreover, most school administrations are convinced with the use of virtual laboratories in teaching science subjects. Teachers' lack of skills to use the laboratory while teaching science through platforms during Corona Virus pandemic is another basic obstacle. The responsible authorities should work to secure the needs of the virtual laboratory in terms of software, equipment, tools, computers and display screens to overcome the obstacles facing the use of virtual laboratories. Activating the virtual laboratory requires providing the appropriate educational environments for all various aspects.

Achieving positive results in activating virtual laboratories requires technical skills that can be acquired by supervisors and teachers during their last classes in the university.

Recommendations

- It is highly recommended to Ministry of Education to activate using of virtual laboratory technology that has proven its effectiveness in achieving the objectives of teaching science subjects in general.
- Provide tools and devices for virtual scientific laboratories in a way that helps activate the use of scientific laboratories during the Corona pandemic.
- Hold courses to train teachers on how to activate the use of virtual scientific laboratories technology, establish virtual laboratories affiliated to the Ministry of Education and circulate them to all schools in Jordan.
- Train the supervisors of the Ministry of Education on the virtual laboratory and science teachers; apply virtual lab technology in science teaching because of its positives
- Set virtual lab sites on the learning platforms of the Ministry of Education, allow teachers and students to benefit from this technology, work on overcoming the difficulties facing the activation of the virtual laboratory through, and allocate an enough budget to secure the schools' needs of virtual laboratories and the inclusion of training programs for teachers to use modern technologies.
- Applying virtual laboratory technology in teaching science experiments in the basic stage to face crises such as the Corona pandemic.
- Hold a workshop to school managers about the importance of using the virtual laboratory to encourage their teachers to use the virtual laboratories.
- Conducting other studies to identify the effect of using virtual lab technology on science teaching and student achievement.

Limitations of Study

Human borders: it is limited to science teachers of basic stage belonging to the Directorate of Education in Amman /Marka. Spatial boundaries: It was conducted in a school belonging to the Directorate of Education in Amman/ Marka. Time limits:. First academic semester 2020/2021. Items of the instrument used in the study

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Appendix 1.
The Questionnaire

Name: (optional) ……..
Gender: Male ( ) Female ( ) **The Subject:** Sciences ( ) Others ( )
Qualification: Bachelor ( ) Higher than bachelor ( )
Years of Experience: Less than 5 Years ( ) 5 to 10 Years More than 10 Years ( )

No	Item	Strongly Agree	Agree	Neutral	Disagree	Strictly Disagree
1	Lack of the financial capabilities necessary to secure the needs of the virtual laboratory.					
2	Fear of bearing responsibility for the failure of modern educational devices and materials during their high use in sciences teaching by teachers.					
3	Disability to produce virtual lab software that helps me teaches sciences.					
4	Weakness of students in using modern technologies (such as tablets, smart boards and virtual laboratories)					
5	The school administration is interest in the knowledge and the achievement sides while ignores of the skill side.					
6	The school prepares ways to support the teacher's application of the virtual laboratory in the sciences class					
7	The virtual laboratory achieves objectives related to students' scientific thinking skills					
8	The lack of internet within the laboratory hinders the use of the virtual laboratory in teaching sciences					
9	Dissatisfaction with using the virtual laboratory during the Corona Virus pandemic limits my use of the virtual laboratory in teaching sciences					
10	Using a virtual lab takes more time to teach sciences					
11	Difficulty in carrying out experiments of the lessons					
12	The school administration believes that the laboratory is just a waste of money					
13	Virtual lab technology helps me simplify information for students.					
14	The school management believes the laboratory as a waste of time					
15	Computer simulation programs help the teacher to clarify some of the scientific concepts contained in sciences curricula more than traditional laboratories.					
16	The teacher sets a clear study plan for applying the virtual laboratory in the sciences class.					
17	Poor computer software skills.					
18	The density of content in sciences curricula hinders the use of modern technologies.					
19	Class time is not enough to use modern technologies in sciences teaching.					
20	Unavailability of educational software that includes scientific experiments implemented in a virtual laboratory in Arabic on the Internet.					
21	The school administration's lack of interest in addressing problems related to the use of modern technologies related to sciences teaching					
22	The teacher uses the school's electronic library to enrich the sciences topics and curricula.					

23	Low effectiveness of educational devices and technologies available in schools.					
24	The way the book is organized and presented does not help in using the laboratory in teaching.					
25	There is no practical activity guide accompanying the textbook					
26	There are no lab classes according the school schedule					
27	There is a necessity of having a specialist in virtual laboratories to help obtain the appropriate technology when needed					
28	The teacher provides necessary support and guidance to students while using the laboratory in their sciences classes					
29	Sciences educators understand the interrelationship between the application of virtual labs and the general education curriculum.					
30	The application of virtual laboratories is based on integration with the study program that students are in.					
31	The Ministry of Education has absolutely no interest in establishing virtual scientific laboratories.					
32	Learning activities of applying the virtual laboratory in an active class are characterized by science					
33	The teacher has mastered the design of teaching to integrate virtual laboratories into education					
34	Teachers are interested in achieving goals specific to students' scientific thinking skills in the virtual lab classes.					
35	Students interact positively while using the virtual lab in sciences lessons.					
36	Teachers show inquiry-based teaching strategies while implementing the virtual lab					
37	I focus on the theoretical side because it achieves success for the student					
38	Virtual lab software provides opportunities for students to practice higher mental skills.					
39	Laboratory use is a waste of time					
40	The learning environment during the implementation of the virtual laboratory provides opportunities for effective communication between students and students					
41	The sciences teacher have got the necessary professional knowledge and skills to enable learners to employ virtual laboratories in sciences teaching					
42	I have enough experience to conduct experiments					
43	Experiments in the lab are just indispensable teaching aids.					
44	Teachers link science skills and processes with students' practices in a virtual lab application					
45	I am convinced of the usefulness of using laboratory technology in teaching sciences					
46	I am afraid that the experiment will fail in front of the student					
47	The use of the virtual laboratory is related to the efficiency of the teacher					
48	The preparation of teachers in university colleges is weak in the field of laboratory experiments					
49	Schools provide the appropriate digital equipment for the application of virtual laboratories in sciences teaching					