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Virtual Laboratories in Learning Modern Languages: Usage Degrees and Obstacles

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Abstract

Objectives: This study examines the extent of virtual lab usage in modern language learning among university students in Jordan and the challenges they face.

Methods: A descriptive survey approach is used, focusing on studying the phenomenon as it is, providing both qualitative and quantitative insights.

Results: The results indicate a high level of virtual lab usage in modern language learning among Jordanian university students, alongside significant challenges hindering their use.

Conclusions: The study recommends securing funding for virtual labs in language departments, fostering collaboration between public and private universities to optimize available resources, and integrating virtual labs with students' devices to enable self-paced language learning beyond time and location constraints.

Keywords: degree of use, modern languages, obstacles, virtual laboratories.

المختبرات الافتراضيَّة في تعلُّم اللغات الحديثة: درجات الاستخدام والمعوقات

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ملخّص

الأهداف: يستكشف هذا االبحث درجة استخدام المختبرات الافتراضية في تعلُّم اللغات الحديثة بين طلبة الجامعات الأردنيَّة ومعوِّقات الاستخدام.

المنهجيَّة: تتضمَّن منهجيَّة البحث استخدام المنهج الوصفي المسحي؛ حيث يُعرَّف هذا المنهج بأنه دراسة الظاهرة كما هي، والاهتمام بها كوصف دقيق يعبِّر عنها نوعيًّا وكميًّا.

النتائج: تشير النتائج إلى أن درجة استخدام المختبرات الافتراضية في تعلُّم اللغات الحديثة لدى طلبة الجامعات الأردنيَّة مرتفعة، كما تشير إلى أن المعوِّقات التي تواجه استخدام المختبرات الافتراضية في تعلُّم اللغات الحديثة لدى طلبة الجامعات الأردنيَّة مرتفعة أيضًا.

الخاتمة: خلص البحث إلى توصيات رئيسة ومهمة وذات إضافة علمية، هي: توفير التمويل والدعم اللازمين لإنشاء مختبرات افتراضية في أقسام اللغات الأجنبية في الجامعات الحكومية والخاصة، والتشبيك بين الجامعات الأردنية الحكومية والخاصة للاستفادة من الإمكانات المتوفرة في الجامعات في ما يتعلق بالمختبرات الافتراضية لتعزيز تعلُّم الطلبة للغات الأجنبية، وربط المختبرات الافتراضية في الجامعة بأجهزة الطلبة ليتمكن الطلبة من تعلُّم اللغات الأجنبية ذاتيًّا بغض النظر عن عوامل المكان والزمان.

الكلمات الدالة: درجة الاستخدام، اللغات الحديثة، المعوِّقات، المختبرات الافتراضيَّة

Introduction

Since the last decade, the rapid technological progress witnessed by the world has played a major role in the production of modern scientific techniques called information technology (IT), along with the huge amount of information and knowledge that has become available at our fingertips with ease and smoothness compared to what we were before. What has been achieved today is called "globalization", which is that modern technology has turned the large world into a very small village (Al-Ghammaz et al., 2024). With that, you can communicate and move around wherever you want through what is called technology, retrieve information and knowledge, move through knowledge houses, libraries, and museums, and visit landmarks with ease and flexibility (Al-Ghammaz et al., 2025; Al-Shahwan, 2024). Technology has created a new technological generation different from previous generations and has changed the human lifestyle to become easier and more flexible (Abduljawad et al., 2020; Jarrar & Al-Zoubi, 2024).

Educational technology is a broad and complex term that includes all the methods, tools, devices, materials, and systems used by the teacher and learner in the teaching-learning process to achieve purely education-based goals (Alassaf, 2025; Al-Sayed-Ali, 2005; Alassaf & Bani Ahmad, 2020; Alshahrani, 2021). Educational technology does not only involve the use of modern devices and machines, but also means that the teacher and learner use a curriculum and teaching method within properly studied and organized steps to support the teaching process in various ways, sources, and educational means that lead to an effective educational environment that rises to accessing information at the highest desired levels (Altawalbeh & Alassaf, 2018; Qassed, Abduljawad, & Jaber).

Educational technology is also an integration of information and communications technology with the educational-learning process, where theories, discoveries, and their technological applications continue to amass in a way that humanity has never witnessed before (Alassaf, Daradkah, & Bani Ahmad, 2018). The virtual laboratory also provides an element of suspense, excitement, and attraction for the learner by using multiple communication tools such as sound, graphics, and various images. This type is also considered one of the broadest and most comprehensive types of using computers to conduct experiments and laboratory activities (Abushihab, 2020; Al-Far, 2002).

Importantly, through the researcher's experience as a faculty member at the Al-Zaytoonah University of Jordan, he has realized the importance of teaching languages and selecting the appropriate teaching method, including virtual laboratories. Many studies, therefore, have also emphasized the need to conduct future studies about virtual laboratories and their impact on learning modern languages (Al-Qurashi, 2013; Mohammad, 2016). Accordingly, the research problem is mirrored in answering these questions:

"What is the degree of use of virtual laboratories in learning modern languages among university students?"

"What are the obstacles facing the degree of use of virtual laboratories in learning modern languages among university students?"

2. Literature Review

Research work is done on the degree of use of virtual laboratories in learning modern languages among university students and the usage obstacles. Chen (2006) examines the efficacy of a learning environment based on virtual reality and students' visual-spatial abilities. The findings indicate that employing virtual reality technology in the teaching process has a high ability to help the student comprehend more and learn faster than traditional methods, regardless of the differences between them.

Also, Al-Rifai (2006) examines the degree of utilizing school laboratories in teaching chemistry among teachers at the secondary level in schools in Sana'a Governorate in Yemen. The results also show that there are obstacles to using the laboratory, such as the lack of availability of practical laboratories, the expiration of the materials used, the lack of training and educating teachers on conducting experiments, and the importance of virtual tests in education.

Moreover, Al-Hammadi (2007) identifies the extent of implementing practical chemistry experiments for the secondary stage in Sana'a schools, the availability of the equipment, materials, tools, and devices necessary to carry out the experiments, and the most important obstacles to laboratory work. The results show the low implementation of experiments by teachers from the students' and teachers' perspectives and the lack of student participation in implementing the experiments from their perspectives.

Likewise, Al-Masaieed and Abu Zeina (2013) identify the effect of using virtual physics laboratories on the achievement and science fiction of Jordanian university students. The results indicate a statistically significant difference in achievement and science fiction in favor of the experimental group taught utilizing a virtual laboratory and the absence of a statistically significant difference in achievement and science fiction depending on the supervisory authority "public or private university".

By the same token, Al-Ghasham and Al-Hammadi (2017, p. 1) investigate "the impact of utilizing virtual laboratory technology in developing creative thinking skills among outstanding students in high school". The findings show the necessity of providing the necessary tools, supplies, and techniques for students to benefit from important technological innovations, namely: virtual laboratories.

A thorough look at the previous studies shows that the current research paper has taken advantage of the previous Arab and foreign studies by getting a lot of information in the field of the virtual laboratory and conducting the practical experience of this research, in addition to enriching the current research. Importantly, this paper also benefits from the results of previous studies and their recommendations from the statistical processes used in the studies, identifying the suitability of the descriptive survey method for the current study, and reviewing and identifying several important references. More importantly, the current research study - in addition to being an online questionnaire - is distinguished from previous studies in addressing the degree of using virtual laboratories in learning modern languages among university students in Jordan and the obstacles to use. In turn, the percentage of studies tackling the impact of using virtual laboratories in learning modern languages is very small and almost rare in this area. Hence, this piece of research can be an addition to the Arabic and foreign libraries in this domain. Practically speaking, it helps provide educators with the foundations for producing virtual laboratories as a structure that simulates real laboratories for teaching modern languages, as educators and university administrators can benefit from employing virtual laboratories in teaching modern languages.

3. Method

3.1 Research Approach

The methodology utilizes the descriptive survey approach, as this approach is defined as studying the phenomenon as it exists and paying attention to it as an accurate description that expresses it qualitatively and quantitatively (Al-Dulaimi, 2014).

3.2 Research Population

The study population comprises all students enrolled in foreign language majors at Al-Zaytoonah University of Jordan for the academic year (2023/2024).

3.3 Research Sample

The study sample consists of (520) randomly selected students who are both users and non-users of virtual laboratories, as the sample consists of (223) students, making up (42.9%) of the study sample, and (297) female students, making up (57.1%) of the sample.

3.4 Research Instrument

With a detailed review of the educational literature and previous studies (see Al-Masaieed & Abu Zeina, 2013; Barefield, 2010), an initial form of a 45-item questionnaire is designed and distributed in two dimensions:

1. The degree of use of virtual laboratories in learning modern languages, which is answered by students who use virtual laboratories.

2. Obstacles to using virtual laboratories, which are answered by students who do not use virtual laboratories. The second area also includes an open question for students about the obstacles to using virtual laboratories from their perspective.

3.5 Instrument Validity

The instrument "questionnaire" validity is checked through reviewing the questionnaire by a group of (12) validators,

including faculty members specialized in teaching methods, educational technology, educational administration, curricula, and the Arabic language to ensure the suitability of the items, their suitability to the sample, their linguistic correctness, their comprehensiveness of the related domain to measure the degree of using virtual laboratories in learning modern languages among Jordanian university students, the obstacles facing their use, and the degree to which the items belong to the area included in it "degree of use and obstacles to using". With that, the instrument in its final form comprises (32) items including (17) items for the first area and (15) items for the second area.

3.6 Instrument Reliability

With testing the questionnaire to the exploratory sample consisting of (25) male and female students "users of the virtual laboratories" who answered the items in the first questionnaire area, and (38) male and female students "non-users of virtual laboratories" who answered the second questionnaire area, the internal consistency method according to the Cronbach Alpha's equation I utilized to calculate the reliability coefficient. Table (1) illustrates the reliability coefficients for the two dimensions of the questionnaire.

Table 1: ***Reliability Coefficient for the Two Dimensions of the Questionnaire Using Internal Consistency Method "Cronbach's Alph"***

No.	Questionnaire Dimensions	Reliability Coefficient "Cronbach's Alph"
1	Degree of Use	0.74
2	Obstacles to Use	0.81

These reliability coefficients are acceptable and appropriate for the current study. Thus, the questionnaire has attained appropriate validity and reliability that allows it to be applied to the original study sample. Moreover, the response to the questionnaire is designed according to the 5-point Likert model, i.e. "Strongly Agree (5)", "Agree (4)", "Neutral (3)", "Disagree (2)", "Strongly Disagree (1)". The questionnaire's negative wording is also considered when transcribing the data so that the positive items take the following direction of the mark "Strongly Agree (5)", "Agree (4)", "Neutral (3)", "Disagree (2)", "Strongly Disagree (1)". However, negative items are marked in the following form "Strongly Agree (1)", "Agree (2)", "Neutral (3)", "Disagree (4)", and "Strongly Disagree (5)".

For the current study, students' responses to the questionnaire items are calculated as follows:

- The value of the category is calculated by subtracting the minimum limit of alternatives (1) from the maximum limit of alternatives (5), which equals (0.8). The weights of the items are calculated as follows:
- An item with a mean from (1) to less than (1.8) indicates that "the degree of use or the degree of obstacles" is very low.
- An item with a mean from (1.8) to less than (2.6) indicates that "the degree of use or the degree of obstacles" is low.
- An item with a mean from (2.6) to less than (3.4) indicates that "the degree of use or the degree of obstacles" is medium.
- An item with a mean from (3.4) to less than (4.2) indicates that "the degree of use or the degree of obstacles" is high.
- An item with a mean between (4.2) and (5) indicates that the "the degree of use or the degree of obstacles" is very high (Al-Dulaimi, 2014).

3.7 Statistical Analysis

To answer the three research questions, means, standard deviations, ranks, and degrees of the sample's responses to the questionnaire items that measure the degree of use of virtual laboratories in learning modern languages among Jordanian university students arranged in descending order".

4. Results

Results of Question No. One

"What is the degree of use of virtual laboratories in learning modern languages among Jordanian university students?"

Table 2: ***"Means, Standard Deviations, Ranks, and Degrees of Students' Responses to the Questionnaire Items that Measure the Degree of Use of Virtual Laboratories in Learning Modern Languages among Jordanian University Students Arranged in Descending Order"***

Item No.	Text of Item	AM	SD	Rank	Degree
13	Using virtual laboratories increases my enthusiasm for studying modern languages.	4.29	0.69	1	Very High
17	Using virtual laboratories helps me learn.	4.22	0.64	2	Very High
5	I prefer to use virtual learning at university.	4.19	0.73	3	High
10	Using virtual laboratories helps me learn other languages.	4.19	0.75	3	High
12	I see that the learning method through virtual laboratories is an effective method in learning languages.	4.18	0.74	5	High
6	I have fun learning through virtual laboratories.	4.17	0.65	6	High
11	I find that using virtual laboratories provides me with sufficient time for thinking and linguistic interaction.	4.17	0.82	6	High
15	Using virtual laboratories helps me get closer to the culture of the country whose language I want to learn.	4.16	0.75	8	High
9	Using virtual laboratories makes me feel happier than using a traditional laboratory.	4.13	0.80	9	High
14	Using virtual laboratories makes me feel as if I am in the country whose language I am learning	4.12	0.76	10	High
16	Using virtual lab tools makes them feel like real tools.	4.12	0.71	10	High
2	Using virtual laboratories fits my learning style.	4.10	0.66	12	High
4	Using virtual laboratories increases my learning level in an easy way.	4.04	0.79	13	High
1	I prefer to learn modern languages through the virtual world at home.	4.02	0.77	14	High
3	I prefer to use untraditional methods in my learning.	3.74	0.97	15	High
8	Virtual laboratories reduce the need for a teacher to learn languages.	2.06	0.95	16	Medium
7	Using virtual laboratories saves more time for language learning.	2.06	0.87	16	Medium
Degree of Use of Virtual Laboratories		3.88	0.36		High

As illustrated in Table (3), the research sample's responses regarding the degree using virtual laboratories in learning modern languages among Jordanian university students are high, as the mean of their responses is (3.88) with a standard deviation of (0.36). Regarding the items, the students' responses have ranged from "very high to medium", with (2) items being very high, (13) items being high, and (2) items being medium. Item (13) stipulating "Using virtual laboratories increases my enthusiasm for studying modern languages" is ranked first with a mean (4.29), standard deviation (0.69), and a high degree. Item (17) stipulating "Using virtual laboratories helps me learn" is ranked second with a mean of (4.22) and a standard deviation of (0.64) and a very high degree. However, items (8) and (7) stipulating "Virtual laboratories reduce the need for a teacher in learning languages" and "Using virtual laboratories saves more time for language learning" are ranked last with a mean of (2.06) and a standard deviation of (0.95) (0.87) and a medium degree.

Results of Question No. Two

"What are the obstacles facing the degree of use of virtual laboratories in learning modern languages among Jordanian university students?"

Table 3: ***"Means, Standard Deviations, Ranks, and Degrees of Students' Responses to the Questionnaire Items that Measure the Obstacles Facing the Degree of Use of Virtual Laboratories in Learning Modern Languages among Jordanian University Students Arranged in Descending Order"***

Item No.	Text of Item	AM	SD	Rank	Degree
2	Class time is not enough to use modern technologies in teaching modern languages.	4.10	0.86	1	High
15	There is lack of sufficient support and funding to employ virtual laboratories within the university.	4.07	0.78	2	High
12	There is difficulty in providing virtual laboratory software to student devices at their homes.	4.07	0.77	2	High
5	There is low effectiveness of educational devices and technologies available in universities.	4.07	0.82	2	High
4	Poor qualifications and training reduce the teacher's use of modern techniques in language teaching.	4.06	0.84	5	High
9	There is a lack of special training courses using virtual laboratories for the teacher and student.	4.05	0.81	6	High
10	There is poor communication and exchange of experiences between universities.	4.03	0.79	7	High
3	There is fear of bearing obligations for the malfunction of modern educational devices and content while being used by teachers in teaching modern languages.	4.03	0.89	7	High
8	There is a negative view from the perspective of teachers regarding the use of virtual laboratories.	3.98	0.86	9	High
11	There is a lack of student interaction when applying the virtual laboratory.	3.96	0.87	10	High
6	There is weakness among students in using modern technologies such as smart boards, tablets, and virtual laboratories.	3.95	0.93	11	High
14	Virtual laboratories cannot replace real laboratories.	3.91	0.87	12	High
1	The lack of availability of the Internet within the laboratory hinders using the virtual laboratory in teaching modern languages.	3.90	0.80	13	High
13	Virtual laboratories reduce dialogue, communication, and interaction with students.	3.87	0.90	14	High
7	The university does not have a clear vision for virtual laboratory applications.	2.10	0.92	15	Medium
Obstacles Facing the Use of Virtual Laboratories		3.88	0.46		High

As shown in Table (3), the research sample's responses to the obstacles facing the degree of using virtual laboratories in learning modern languages among Jordanian university students are high, as the mean of their responses is (3.88) with a standard deviation of (0.46). Regarding the items, the students' responses have ranged from "high to medium", with (14) items being high and (1) item being medium. Item (2) stipulating "Class time is not enough to use modern technologies in

teaching modern languages" is ranked first with a mean (4.10), standard deviation (0.86), and a high degree.

Also, items (15), (12), and (5) stipulating "There is lack of sufficient support and funding to employ virtual laboratories within the university", "There is difficulty in providing virtual laboratory software to student devices at their homes", and "There is low effectiveness of educational devices and technologies available in universities" are ranked in the second rank, with a mean of (4.07) and a standard deviation of (0.78), (77), and (82) and a high degree. However, item (13) stipulating "Virtual laboratories reduce dialogue, communication, and interaction with students" is ranked in the penultimate rank with a mean of (3.87), a standard deviation of (0.90), and a high degree. Then again, item (7) stipulating "The University does not have a clear vision for virtual laboratory applications" is ranked last with a mean of (2.10), a standard deviation of (0.92), and a medium degree. On the other hand, the content of the open-ended responses of the study sample is analyzed, where the obstacles facing the using virtual laboratories in learning modern languages among Jordanian university students are identified, alongside calculating the frequencies of each idea as shown in Table (4).

Table 4: ***"The Obstacles Facing the Degree of Use of Virtual Laboratories in Learning Modern Languages among Jordanian University Students Arranged in Descending Order According to the Content Analysis of the Open-ended Responses"***

No.	The Obstacles Facing the Degree of Using Virtual Laboratories in Learning Modern Languages	Frequency	Percentage	Frequency-Based Rank
1	The high financial cost of virtual laboratories.	51	%26	1
2	Difficulty in using virtual laboratories.	18	%9	2
3	Delay in keeping up with technology.	15	%8	3
4	Negative culture towards the use of technology and virtual laboratories.	15	%8	3
5	Insufficient time to use virtual laboratories.	14	%7	5
6	The university's unwillingness to develop and use virtual laboratories.	11	%6	6
7	Poor qualification of faculty members to use virtual laboratories.	8	%4	7
8	Lack of support and funding allocated for virtual laboratories from universities.	8	%4	7
9	Lack of training courses for students in using virtual laboratories.	7	%4	7
10	Virtual laboratories require more effort than traditional methods.	6	%3	10
11	Virtual laboratories need continuous maintenance.	5	%3	10
12	Lack of technology for virtual laboratories.	5	%3	10
13	The number of students increases compared to the number of virtual laboratories in universities.	4	%2	13
14	The negative perception of faculty members towards virtual laboratories.	4	%2	13
15	Virtual laboratories require more effort than traditional methods.	4	%2	13
16	Weak financial capabilities of universities.	4	%2	13
17	Weakness of students using virtual laboratories.	4	%2	13
18	Virtual laboratories cannot replace real laboratories.	3	%2	14
19	Lack of communication and interaction between students and responsible teachers.	3	%2	14
20	Lack of software for using virtual laboratories.	3	%2	14
21	Lack of training courses for faculty members in employing virtual laboratories.	2	%1	15
Overall Value		194	%100	-

As illustrated in Table (5), an analysis of the content of the open-ended responses among the research sample equals (194) responses, as the obstacles facing the use of virtual laboratories are identified from their perspective, and their frequencies and percentages are attained and arranged according to the number of frequencies. The findings show that item (1) stipulating "The high financial cost of virtual laboratories" is ranked first place from the perspective of the research sample, with several frequencies reaching (51) and a percentage of (26%). Also, item (2) stipulating "Difficulty in using virtual laboratories" is ranked second with several frequencies of (18) and a percentage of (9%). However, items (3) and (4) stipulating "Delay in keeping up with technology" and "Negative culture towards the use of technology and virtual laboratories" are ranked third with several frequencies of (15) and a percentage of (8%).

5. Discussion

This section discusses the most prominent study results and the degree of agreement with some past relevant studies.

First: Discussion of the Results of Question No. One

As revealed in Table (4), the research results related to this question show that the research sample's responses regarding the degree of use of virtual laboratories in learning modern languages among Jordanian university students are high with a mean of (3.88). This result is attributed to the fact that virtual laboratories allow students to gain almost real communicative experiences, enrich their language with vocabulary and linguistic patterns, and learn about the cultures of other people who have the mother tongue.

On the other hand, this result can also be explained by the tendency of the younger generation, including university students, towards using technology and employing it in their learning, as technology is an integral part of their daily lives. This finding is along the lines of the result of Chen's study (2006), hinting at the student's ability to comprehend the content more through virtual reality activities, regardless of their varying spatial abilities and individual differences. This confirms that employing virtual reality technology in the educational process can help students understand more and learn faster than normal methods, regardless of mental and individual differences between them.

In addition, Chen's research study recommends the necessity of employing virtual reality technology in the educational process because of its effective and noticeable impact in improving the level of students in general. The research results also show a variation in the means of the items in this area, as the means ranged between (4.29), i.e. a very high degree, and (2.06), i.e. a medium degree. With the items arranged in descending order according to the degree of use of virtual laboratories in learning foreign languages, item (13) stipulating "Using virtual laboratories increases my enthusiasm for studying modern languages" is ranked in the first place, with a mean of (4.29) and a very high degree. This is due to the multiple factors of excitement included in the virtual laboratory software and the interactive nature of these laboratories, which makes the learner active and involved in the learning process, thus increasing his enthusiasm for learning foreign languages. This finding is consistent with the study results by Woodfield et al. (2004), indicating that students learn better by using the virtual laboratory, especially analytical skills, with positive attitudes from students to use the virtual laboratory.

Moreover, the results also show that item (17) stipulating "Using virtual laboratories helps me learn" is ranked second with a mean of (4.22) and a very high degree. This result indicates the great benefits of virtual laboratories, as they open wide horizons for students for self-learning, which is considered one of the most effective and lasting types of learning that stems from the individual's self and his or her desire to learn. This finding is consistent with the finding of Obaid's study (2014), indicating no significant differences in students' academic achievement, as virtual laboratories help them deal with modern technology learn about its most important advantages and disadvantages, and master practical experimentation skills, which created a positive trend toward the virtual laboratory, empowered their self-confidence while using experiments, saved time for students and professors, in addition to providing a collaborative learning environment.

On the other hand, items (8) and (7) stipulating "Virtual laboratories reduce the need for a teacher in learning languages" and "Using virtual laboratories saves more time for language learning" are ranked last with a mean of (2.06) and a standard deviation of (0.95) (0,87) and a medium degree. This finding is because of the study sample's awareness of the significance of the teacher in learning languages despite the use of technology, which cannot replace the teacher, as this involves direct

human interaction, guidance, and role models for the students. This result is also because virtual laboratories require more time than direct teaching, and therefore they do not provide more time for learning foreign languages. However, this result contradicts the results of Kim & Taepark's study (2001), demonstrating a higher level of academic achievement for students in the group that relied on virtual reality programs in education, and an increase in students' sense of satisfaction and their feeling that they understood much better, as the students preferred the subjects in which this technique was used much more than the other subjects.

Second: Discussion of the Results of Question No. Two

As revealed in Table (5), the research results related to this question show that the research sample's responses to the obstacles facing the use of virtual laboratories in learning modern languages among Jordanian university students are high with a mean value of (3.88). This result is due to the lack of modern supplies, techniques, and technology necessary to practice learning through virtual laboratories due to their high financial cost. This finding is in line with the result of the study by Al-Ghasham and Al-Hammadi (2017), indicating the necessity of providing the necessary tools, supplies, and techniques for students to benefit from important technological innovations, namely: virtual laboratories. However, it differs from the result of Al-Baltan's study (2010), indicating the availability of science laboratories in all secondary schools in the Kingdom at a rate of (37%), as virtual laboratories integrated within the real laboratory are available at a rate of (38.2%), and that the science laboratory can operate and deal with a computer to a great extent, and understands the nature of a virtual laboratory and uses it to a medium degree. The results also show a convergence in the means of all items in this area, as the means ranged from (4.10) to (3.87) to a high degree, except item (7), whose mean is (2.10), that is, to a medium degree.

With the items arranged in descending order according to the degree of use of virtual laboratories in learning foreign languages, item (2) stipulating "Class time is not enough to use modern technologies in teaching modern languages" is ranked first with a mean (4.10), standard deviation (0.86), and a high degree. This result can be explained by the belief of the study sample that does not use virtual laboratories that the teaching session time is limited, and that virtual laboratories require longer and continuous time and are not intermittent with time intervals as is the practice of lecture systems in Jordanian universities. Another belief is that the nature of interaction and engagement in virtual laboratories is subject to programmed mechanisms of transmission and reception that are set at a specific time that may exceed the time of traditional lectures. This result is along with the result of Al-Hammadi's study (2007), indicating insufficient classes, limited time for classes, and the large size of the textbook that is not proportional to the number of classes, as virtual laboratories require longer and continuous time rather than intermittent with time intervals

Also, the results indicate that items (15), (12), and (5) stipulating "There is lack of sufficient support and funding to employ virtual laboratories within the university", "There is difficulty in providing virtual laboratory software to student devices at their homes", and "There is low effectiveness of educational devices and technologies available in universities" are ranked in the second rank, with a mean of (4.07) and a standard deviation of (0.78), (77), and (82) and a high degree. These results indicate that the study sample feels weak support for employing virtual laboratories, as the cost of establishing them and purchasing the associated software is high considering the limited university budgets and spending and funding priorities. This finding is in line with the finding of Taha's study (2008), which indicated that the most important obstacles to practical applications include the lack of physical equipment for the virtual laboratory and its high cost.

At the level of "There is difficulty in providing virtual laboratory software to student devices at their homes", this is attributed to students' desire for self-learning in their homes to develop their linguistic competencies, implement linguistic projects, and consolidate what they learned at university; however, they believe that the software that universities may be able to provide in virtual laboratories is too difficult to install on students' home devices. Regarding the item stipulating "There is low effectiveness of educational devices and technologies available in universities", it is due to the rapid development of computers and related tools, and the inability of universities to keep pace with this rapid development, and thus the presence of devices that may not be compatible with virtual laboratories and their software, whether in terms of capacity or speed. This result is along with the result of Al-Radi's study (2008), demonstrating the necessity of integrating

virtual laboratories, as well as striving to design virtual laboratories according to the foundations and principles of educational design that are compatible with virtual laboratories and their software, whether in terms of capacity or speed.

Conversely, item (7) stipulating "The University does not have a clear vision for virtual laboratory applications" is ranked last with a mean of (2.10), a standard deviation of (0.92), and a medium degree. This finding is expounded by the fact that students believe that other factors that hinder the use of virtual laboratories are not related to the university's vision. Many universities have a desire to develop, change, and keep pace with modern methods of education, but they encounter limited financial resources that prevent them from implementing their vision of development. However, a percentage of students believe that the universities themselves may not have a clear vision of virtual laboratory applications due to their lack of awareness of their importance or because of their funding priorities, which is why this item is ranked last with a medium degree.

Regarding the analysis of the content of the open-ended responses about the obstacles facing the use of virtual laboratories from the student's perspective, the results related to this question shown in Table (8) show that item (1) stipulating "The high financial cost of virtual laboratories" is ranked first place from the perspective of the research sample, with several frequencies reaching (51) and a percentage of (26%). This result is consistent with the results shown by students' responses on the closed questionnaire, as the item related to the high cost of virtual laboratories is ranked second, and this result has been discussed above.

Also, item (2) stipulating "Difficulty in using virtual laboratories" is ranked second with several frequencies of (18) and a percentage of (9%). This result seems to contradict the characteristics of university students and their ability to use technology and the results of the first area of the questionnaire, as most of its items indicate the opposite of this result. This contradiction is attributed to the fact that the students who responded to the first area of the questionnaire are those who used virtual laboratories, while the students who responded to the second area of the questionnaire are those who have never used virtual laboratories. Therefore, the lack of experience of many students makes them believe that it is difficult to use virtual laboratories, contrary to what might be the case on the ground.

However, items (3) and (4) stipulating "Delay in keeping up with technology" and "Negative culture towards the use of technology and virtual laboratories" are ranked third with several frequencies of (15) and a percentage of (8%). Regarding the delay in the use of technology, this result is consistent with what is indicated by the result of the closed questionnaire, i.e. item (5) stipulating "There is low effectiveness of educational devices and technologies available in universities," as its reasons are discussed above, along with the fact that computer technology and software are mostly imported from abroad. Therefore, this result seems natural considering the lack of self-reliance and national expertise in producing software related to virtual laboratories. Concerning the negative culture towards the use of technology and virtual laboratories, it may be attributed to the lack of awareness of many workers in the administrative and academic field in Jordanian universities of the benefits and advantages of virtual laboratories and their positive repercussions on students' learning of foreign languages. This finding is together with the finding of Al-Rifai's study (2006) hinting at the fact that there are obstacles to using the laboratory, such as the lack of availability of practical laboratories, the expiration of the materials used, the lack of training and educating teachers on conducting experiments, and the importance of virtual tests in education.

6. Conclusion

In a few words, the current paper gives a key insightful exploration of the usage degrees of virtual laboratories in learning modern languages among Jordanian university students, including the obstacles associated with their implementation. Also, a descriptive survey approach is effectively used to analyze the data and provide valuable insights into how virtual laboratories impact language learning.

7. Recommendations

In short, the current research paper recommends key points such as providing the necessary funding and support to establish virtual laboratories in foreign language departments in public and private universities, networking between public

and private Jordanian universities to benefit from the capabilities available in universities regarding virtual laboratories to enhance students' learning of foreign languages, connecting virtual laboratories at the university with students' devices so that students can self-learn foreign languages, regardless of the factors of place and time, and furnishing universities with qualified technical and academic personnel to deal with virtual laboratories.

Likewise, other key recommendations include raising students' awareness in foreign language departments of the importance of virtual laboratories in developing their linguistic competencies and encouraging them to use them, holding training courses for faculty members in academic departments of foreign languages in using virtual laboratories in learning foreign languages, securing flexibility in the timing of foreign language lectures to match the time allocated and sufficient for using virtual laboratories in universities, and conducting other future studies on utilizing virtual laboratories and their positive effects on learning foreign languages. The article also recommends outlining actionable steps for universities, such as securing targeted funding or fostering collaboration to overcome financial and technical barriers

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