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Obstacles of Implementation of Dry Laboratories from the Science Teachers' Perspective in Na'our District

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Abstract
The current study aimed to identify the obstacles ofimplementation of dry laboratories from the science teachers' perspective in Na'our District. The study used the descriptive analytical method.To collect data, a questionnaire wasdeveloped. In its initial form, this questionnaire consisted of (50) items and in its final form (49) items They are divided into (5) fields: the computer lab equipment, (10) items, the curriculum: (11) items, the school administration: (9) items, the teacher's field: (11) items and the student's field: (8) items. The study population consisted of all science teachers in Na'our District, who were (92) male and female teachers - (47) male and (45) female teachers- according to the statistics of the Jordanian Ministry of Education for the academic year 2021/2022. The sample was chosen randomly as (59) male and female teachers accounted for (64%) of the study population. The results showed that thedegree of obstacles of implementation of virtual laboratories from the perspective of the science teachers in Na'our District was high, and the results of the study indicated that there were no statistically significant differences at the level of The significance ($\alpha \geq 0.05$) in the obstacles to implementationof virtual laboratories from the perspective of science teachers in Na'our District was attributed to gender, scientific qualification and experience. The study introduced several recommendations, the most important of which is providing the appropriate infrastructure for the implementation of dry laboratories through qualified and trained human resources, as well as the required communication lines. Also, the need to prepare training programs for students, teachers and administrators in schools to make the most from technology in conducting dry experiments. Other recommendations were the Ministry initiative to develop policies and strategies for education based ontoday's requirements and scientific and technical development, and adopting educational and technological plans to utilize scientific transformations in comprehensive human development projects.
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INTRODUCTION

In the present era, rapid revolutions in the fields of education and technology are witnessed so it has become necessary for educational institutions to take advantage of modern technologies to serve the educational process and ensure the quality of educational outputs. At the present time, and after the spread of the Corona virus, we find that most countries of the world have resorted to distance education using modern technological techniques through the Internet (Saati, 2020). It is a "virtual learning and teaching environment aimed at developing students' laboratory work skills. This environment is located on one of the websites .The website usually contains a home page and has several links or icons (tools) related to laboratory activities, their achievements and their evaluation."

The use of dry laboratories enriches the scientific content of science subjects, contributes to arousing motivation towards self-learning, and thus achieves the permanent understanding sought by the education process. in turn, these subjects are considered a reinforcement for real laboratories, and offer an opportunity for laboratory work outside school. On the other hand, dry laboratories are considered a solution to the problems of lack of laboratory materials and equipment, and they evade the danger of conducting some experiments that require a high degree of safety in traditional real laboratories (Al-Bayati, 2006). One of the features of dry laboratories is also that it provides the opportunity for students to conduct experiments that cannot be conducted in real laboratories, and it makes learning enjoyable and increases students' confidence in their learning. This contributes to the development of thinking and raisesstudents' level of academic achievement (Abd, 2019).

Therefore, the use of the dry educational environment represents an educational system, which includes the various tools and means of learning and teachingto improve and implement technology in the educational process, and thus maximizestheir various educational outcomes. Moreover, theireffective role in active interaction at its different levels between the parties of the educational process (Subhi,2018).

From the above, it is clear that the study of dry laboratories is of great importance in promoting science learning and teaching in various educational systems, and given that many previous studies indicate that dry laboratories promote student understanding, and pose a good alternative to real laboratories, the researcher reports the role of the obstacles of implementation of dry laboratories from the perspective of science teachers in

Na'ourDistrict.

THE STUDY PROBLEM

with reference to the status of teaching under and epidemic conditions due to the spread of the Corona virus and the challenges it posed toeducation, especially the general science curricula and the failure to activate the school scientific laboratories because of the defense orders, it was necessary to find an alternative to implement the practical aspect, which is the use of dry laboratories. Through supervisory visits to school,the researcher sought to emphasize the importance of implementation dry laboratories to enhance the practical aspect of science curricula. However, after follow-up visits to those schools, it was found that there was a weakness in the implementation of dry laboratories for many reasons that limit the use of general science teachers of dry laboratories in Na'our District. It is essential to identifythose reasons and find appropriate solutions to them, taking into account the available potentials in the district's schools.

STUDY QUESTIONS

The study attempts to answer the following questions:

THE FIRST QUESTION: Obstacles to implementation dry laboratories from the perspective of science teachers in Na'our District?

THE SECOND QUESTION: Were there statistically significant differences at the significance level ($\alpha \geq 0.05$) for the obstacles to implementation dry laboratories from the perspective of science teachers in the Na'our District attributed to the variables (gender, qualification, experience)?

OBJECTIVES OF THE STUDY

The current study aims to:

1-Identifying the obstacles that restrict the implementation of dry laboratories among general science teachers in public schools in Na'our District.

2-Highlighting the importance of implementation dry laboratories alongside with the traditional science laboratories in the school.

3-Determining the obstacles that hinder the implementation of dry laboratories among general science teachers in Na'our District public schools according to the study variables (gender, academic qualification, years of experience, specialization, training courses).

STUDY IMPORTANCE

The importance of this study emerges from the necessity of the practical aspect of general science curricula in the educational process to improve and develop teachers' performance in the classroom, with its positive reflection on the students' performance and their academic level, especially in light of the epidemic conditions. This study also gains its importance as it addresses the reasons that hinder the implementation of dry laboratories in the classroom and will provide some appropriate solutions that the Ministry of Education in Jordan may utilizetoconstruct treatment plans and activities accompanying science curricula, and prepare special training programs to enable teachers to use dry laboratories in order to serve the educational process in schools.

STUDY TERMS:

-OBSTACLES: Obstacles is an administrative term defined as a difficult situation within ambiguity that prevents the effective achievement of goals. It can be seen as the cause of the gap between the expected level of achievement and the actual achievement (Darwish, 2005).

Procedurally, the researcher defines obstacles as the reasons or difficulties that prevent science teachers from optimal use of dry laboratories to conduct scientific experiments and achieve learning outcomes in general science curricula.

-DRY LAB: It is a virtual learning environment in the form of online programs that simulate traditional real laboratories that develop students' laboratory work skills (Bodily, 2004).

The researcher defines them procedurallyas interactive electronic laboratories that contain computers connected to the Internet and reinforced with computer educational programs.

STUDY LIMITATIONS:

TIME LIMITATIONS: This study was conducted in the second semester of the 2021/2022 academic year, when the world - and Jordan as well - is still suffering from the Corona pandemic.

PLACELIMITATIONS: The study was conducted in public schools in Na'our District.

HUMAN LIMITATIONS: The study was conducted on science teachers (physics, chemistry, biology, earth sciences, general sciences) in public schools in Na'our District.

THEORETICAL FRAMEWORK AND PREVIOUS STUDIES

E-LEARNING:

E-learning is a method of education using modern communication mechanisms, such as a computer, the Internet and its various accessories that activate sound, image and graphics, whether online or inside the school laboratory, so it is an educational system to provide educational programs using interactive information and communication technology that grantaccessto knowledge content regardless ofplace and timeand takes into account students' individual differences (Khalil, 2011).

THE IMPORTANCE OF E-LEARNING (AMER, 2015):

1-It develops thinking skills and enriches the learning process.
2-It offers learning opportunities for different levels of students.
3-It helps the learner to achieve self-reliance.
4-It provides learning opportunities in different circumstances and according to the capabilities.

CHARACTERISTICS OF E-LEARNING (AMER, 2015):

1-It is electronically managed and provides content to the learner easily.
2-It facilitates learner's active interaction with the educational content and peers.
3-Low cost of e-learning.
4-It is flexible and time and effort saving, and it guarantees rapid education.

DRY LABS:

They are defined as digital scientific laboratories, containing computers, with high speed, storage capacity, appropriate scientific software and means of Internet connection to enable the teacher to perform repeated digital scientific experiments, and observe interactions and results without being harmed and with minimal effort and cost (Al-Mannai, 2008).

THE MERITS OF DRY LABORATORIES IN THE TEACHING-LEARNING PROCESS (ATIF, 2018):

1-Conducting experiments that cannot be otherwiseconducted in a traditional laboratory because of their danger.
2-Contributing to raising the level of students' academic achievement and developing their thinking.
3-self-learning and achieve the principle of individualization of education.
4-The possibility of documenting the results of experiments, to facilitate their analysis.
Involving as many students as possible in conducting and re conducting experiments.

FEATURES OF PROGRAMS THAT SUPPORT THE VIRTUAL LABORATORY (AL BALTAN, 2012):

1-Mobile laboratories can be used whenever you want.
2-The conditions of the experiment, the quantities, the concentrations, and the materials used can be controlled.
3-Gives options to save, copy, paste, and order.
4-It affords the user the free design, creativity, and employment the appropriate show tools.

OBSTACLES:

These are the difficulties that prevent science teachers from utilizing the dry laboratories available in teaching. Al-Tuwairqi, 2015 classifies these obstacles into:
1-Obstacles related to teachers, including:
2-Teachers adhere to traditional education.
3-Workloads and insufficient time to prepare.
4-Lack of financial means of the departments.

OBSTACLES RELATED TO EDUCATIONAL ADMINISTRATION:

1-failure in the rehabilitation of the competent staff.
2-E-learning has not been given its due attention.

OBSTACLES RELATED TO SOCIETY:

1-The spread of computer illiteracy.
2-The weak role of the school as a social institution.

OBSTACLES RELATED TO COMPUTER SIMULATION AND SOFTWARE PRODUCTION:

1-requiring time and effort for planning and design.
2-The absence of sufficient convictions among educational administrations of the importance of e-learning.
3-requiring a team of teachers and specialists.

PREVIOUS STUDIES

Balfakih (2020) conducted a study aimed at identifying the obstacles to the use of virtual laboratories relevant to the teacher and learner, school administration, science courses, computer technologies and school equipment, from the perspective of natural science teachers at the secondary stage in Taif governorate. The study followed the descriptive survey approach. The study tool was a questionnaire consisting of two main parts; The first part: general information, and the second part: consists of five axes; The obstacles related to the teacher, the learner, and school administration science curricula, computer technologies and school equipment. it included (74) items and was applied to a pilot sample to ensure validity and reliability. The study population consisted of (313) secondary stage natural sciences teachers who were selected through complete census, after excluding (30) of the pilot sample. The final number was (283) teachers, then (280) questionnaires were retrieved and analyzed. The results of the study showed that the total mean of the degree of obstacles to the use of dry laboratories among teachers of natural sciences in the secondary stage was (3.49) with a significant degree. The obstacles related to computer technology and equipment was first and with a significant degree (3.72), then the obstacles related to science curricula to a large degree and an average of (3.58), then the obstacles related to school administration to a large degree with an arithmetic mean of (3.49), and in the fourth rank were the obstacles related to the learner to a large degree with a mean of (3.47), then the obstacles related to the teacher at the last rank, with a medium

degree of (3.18),. it was found that there were statistically significant differences of the average responses of the sample about estimating the obstacles related to the teacher and the learner, school administration, science curricula, computer technologies and school equipment attributed to specialization in favor of chemistry teachers, to years of teaching experience in favor of the less experienced, and to training courses in favor of those without training courses in dry laboratories. there were also differences in favor of teachers in secondary schools that do not have an independent resource room. There is a need to address the obstacles that the study revealed, and to provide computer software related to natural science curricula, especially chemistry, and there is a need to train teachers to implement dry laboratories in teaching natural science curricula, and to benefit from experienced teachers in virtual laboratories.

Al-Maamari (2018) conducted a study aimed at revealing the impact of virtual laboratories in developing the skills of conducting chemical laboratory experiments among students of the industrial chemistry department at the college of Applied Sciences, Hajjah University, and their attitudes towards it. The quasi-experimental approach was used, where a group of students studied the issue of equilibrium calibrationsin the analytical chemistry course using the virtual lab, and another group studied the subject through the traditionalmethod. The results were in favor of the experimental group in the post-measurement of the skills of conducting laboratory chemical experiments, as well as the improvement of students' attitudes towards the virtual laboratory. The study also showed that there was no statistically significant difference between the mean scores of the students of the experimental and control groups in the post-measurement of cognitive achievement.

Al-Ghaith (2017) also conducted a study aimed at identifying the situation of science teachers' implementation of virtual laboratories in teaching science, the obstacles to their use, and the attitudes of science teachers in the intermediate school towards the use of dry laboratories in teaching science. The study was confined to middle school schools in Al-Quway'iyah in the Riyadh region - the Kingdom of Saudi Arabia. The study was applied during the second semester of the 2015/2016 academic year. The study population consisted of all science teachers in intermediate schools that contain virtual laboratories in Al-Quway'iyah. The schools were (40) and the science teachers were (120). The study sample consisted of (14) schools that were chosen by the simple random method with (42) teachers. They were distributed according to the variables: academic qualification, specialization, type of qualification, and the years of experience. As for the measurement tool, it was a questionnaire divided into two parts: the first part included general demographic data about the targeted teachers, and the second contained (28) items distributed equally on two axes: The teachers' use of dry laboratories, and the obstacles ofusing virtual laboratories. The results indicated that the means of each statement related to the situation of teachers' use of virtual laboratories in the intermediate stage, and the obstacles of using dry laboratories were high on both axes. In light of the results of the study, the researcher presented many recommendations and suggestions, including The necessity of providing a sufficient number of virtual laboratories in intermediate schools, improving Internet services in schools, conducting a similar study in other educational stages such as primary and secondary.

Al-Juhani (2013) conducted a study entitled "obstacles to using virtual laboratories in teaching science at the secondary level in the Medina region from the *perspective of supervisors and teachers and their attitudes towards them" with the aim of identifying the obstacles of using virtual laboratories related to the school environment, teachers, students, science courses, and the software of Crocodile Company distributed to schools in Saudi Arabia, as well as identifying the supervisors and teachers' attitudes toward the use of virtual laboratories. The study found that the most important obstacles to the use of dry laboratories were: the lack of a sufficient number of computers, the lack of training programs on the use of dry laboratories, the overcrowded classrooms, and the focusActivity books on experiments in real laboratories, and the lack of multiple copies of the Crocodile software in secondary schools. The study also found there were positive attitudes among supervisors and teachers towards dry laboratories.

METHOD AND PROCEDURES

The study addressed the situation of obstacles to implementation of dry laboratories from the perspective of science teachers in Na'our District.

METHODOLOGY: The current study followed the descriptive analytical approach.

STUDY POPULATION: The study population consisted of all science teachers in Na'our District, who were (92) male and female teachers, (47) male and female (45) female teachers, according to the statistics of the Jordanian Ministry of Education for the academic year 2021/2022.

STUDY SAMPLE: The sample was chosen randomly, where (59) male and female teachers were randomly selected, and they accounted for (64%) of the study population. Table (1) shows the distribution of study sample members by gender, qualification and experience:

TABLE (1): DISTRIBUTION OF STUDY SAMPLE MEMBERS BY GENDER, QUALIFICATION AND EXPERIENCE.

variable	Category of the variable	Number
Gender	male	28
	female	31
	total	59
Qualification	bachelor	48
	postgraduate	11
	total	59
Experience	less than 5 years	16
	From 5-less than 10 years old	20
	10 years old	23
	total	59

STUDY TOOL

To achieve the objectives of the study, the researcher developed a questionnaire after the educational literature and previous studies review. In its initial form, the study consisted of 50 items, and 49 in its final form .it is divided into (5) fields: the field of computer lab equipment;10 items, the curriculum field; 11 items, the school administration field 9 items, the teacher's field; 11 items, and the student's field; (8) items.

FACE VALIDITY

The indications of face validity were verified using the validity of the arbitrators by distributing the questionnaire in its initial form to (5) arbitrators who were professors in Jordanian universities in the College of Education. In light of their amendments, and suggestions, item (43) was deleted as the agreement was (80%) and in light of their amendments, some itemswereparaphrased.

The validity of the questionnaire was also verified using the internal consistency validity by calculating the correlation between the degree of the item and the degree on the dimension to which the item belongs on a pilot sample of (30) male and female teachers who were randomly selected from the population and were not included in the study sample, and Table (2) shows that:

TABLE (2): THE VALIDITY OF THE INTERNAL CONSTRUCTION OF THE QUESTIONNAIRE BY CALCULATING THE PEARSON CORRELATION COEFFICIENT BETWEEN THE DEGREE ON THE ITEM AND THE SUB-DEGREE ON THE FIELD TO WHICH THE ITEM BELONGS (N = 30).

item	correlation coefficient	item	correlation coefficient	item	correlation coefficient	item	correlation coefficient	item	correlation coefficient
computer lab equipment		obstacles related to the curriculum		obstacles related to school administration		obstacles related to the teacher		obstacles related to the student	
1	.627**	11	.525**	22	.412*	31	.708**	42	.723**
2	.526**	12	.437**	23	.525**	32	.462**	43	.625**
3	.696**	13	.561**	24	.707**	33	.623**	44	.681**
4	.361*	14	.374*	25	.388*	34	.500**	45	.399*
5	.651**	15	.358*	26	.629**	35	.364**	46	.572**
6	.469**	16	.614**	27	.709**	36	.555**	47	.476**
7	.629**	17	.593**	28	.635**	37	.657**	48	.619**
8	.561**	18	.641**	29	.444**	38	.467**	49	.418*
9	.649**	19	.562**	30	.365**	39	.714**		
10	.499**	20	.669**			40	.481**		
		21	.375*			41	.655**		

Table (2) shows that the questionnaire achieved good internal construct validity indicators, as the correlation coefficients ranged between (0.361-0.714), and the correlation coefficient between the degree on the field and the total score on the questionnaire was calculated as in Table (3):

TABLE (3): CORRELATION COEFFICIENT BETWEEN THE SCORE ON THE FIELD AND THE TOTAL SCORE ON THE QUESTIONNAIRE.

Field	correlation coefficient
Obstacles related to computer lab equipment	**0.683
obstacles related to the curriculum	**0.544
Obstacles related to school administration	**0.644
Obstacles related to the teacher	**0.789
Obstacles related to the student	**0.643

****SIGNIFICANCE LEVEL (A≥0.01).**

It is evident from the data in Table (3) that the correlation coefficients for the field ranged between (0.643-0.789), all of which were statistically significant. This indicated that the questionnaire had appropriate internal consistency indicators.

QUESTIONNAIRE RELIABILITY

The significance of the scale's reliability was verified in two ways: The first was by using the Test Retest, where the questionnaire was applied to the pilot sample, which is from outside the study sample and from insidepopulation-(30) individuals-then their scores were taken, and then re-applied to the same members of the survey sample (14) days after the first application. Pearson correlation coefficient was calculated between the scores on the questionnaire between the two times of the application. The questionnaire's reliability was also calculated using the Cronbach's alpha equation for internal consistency on the same pilot sample, and the table (4) shows the reliability indicators of the questionnaire:

TABLE (4): THE RELIABILITY COEFFICIENTS OF THE QUESTIONNAIRE.

Field	number of items	Cronbach's alpha	Retest
Obstacles related to computer lab equipment	10	0.87	0.89
Obstacles related to the curriculum	11	0.85	0.88
Obstacles related to school administration	9	0.83	0.85
Obstacles related to the teacher	11	0.84	0.85
Obstacles related to the student	8	0.81	0.83
Total	31	0.90	0.92

It is evident from Table (4) that the reliability coefficient of the repetition of the questionnaire as a whole was (0.90) and for the fields ranged between (0.89-0.83). The reliability coefficient of Cronbach's alpha for the questionnaire as a whole was (0.91) and for the fields it ranged between (0.81-0.87).

QUESTIONNAIRE CORRECTION

The response to the questionnaire is done according to the five-point Likert scale (very high degree, high degree, moderate degree, weak degree, very weak degree), and the scores were given (5, 4, 3, 2, 1) respectively, and the degree of approval is judged based on the following standard:

The level compared to the arithmetic mean	Arithmetic mean
Low	1-2.33
average	2.34 – 3.67
High	3.68 and above

STATISTICAL TREATMENT

To answer the questions of the second study, the following statistics were used:

1. Arithmetic means and standard deviations to answer the first question.
2. Three Way ANOVA).
3. Pearson correlation coefficient to calculate the internal construct validity.
4. Cronbach's alpha equation for internal consistency to calculate reliability.
5. The obstacles intensity was judged based on the following criteria:

The level compared to the arithmetic mean	Arithmetic mean
low	1- 2.33
average	2.34 – 3.67
high	3.68 and over

DISCUSSION OF THE STUDY RESULTS

Results related to the first question: Obstacles to implementation of dry laboratories from the perspective of science teachers in Na'our District?

To answer the question, the arithmetic means and standard deviations were calculated, and the table (5) shows that:

TABLE (5): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE TOTAL AND FIELDS OF THE DEGREE OF OBSTACLES TO IMPLEMENTATION DRY LABORATORIES FROM THE PERSPECTIVE OF SCIENCE TEACHERS IN NA'OUR DISTRICT.

Field	Arithmetic mean	Standard deviation	Rank	degree
Obstacles related to the computer lab equipment	3.70	.31	3	High
Obstacles related to the curriculum	3.73	.25	1	High
Obstacles related to the school administration	3.63	.60	5	High
Obstacles related to the teacher	3.71	.36	2	High
Obstacles related to the student	3.69	.35	4	High
Total	3.69	.24	-	High

As seen in Table (5) that the degree of obstacles to the implementation of dry laboratories from the perspective of science teachers in the Na'our district was high, with a mean of (3.69) and a standard deviation of (0.24), where the field (obstacles related to the study subject) ranked first and at a high degree and with an arithmetic mean (3.73) and a standard deviation (0.25), while obstacles related to school administration came in the last rank with a mean level and an arithmetic mean (3.63) and a standard deviation (0.60).

The results indicated that the degree of obstacles to implementation dry laboratories from the perspective of science teachers in Na'our District was high. This could be attributed to the unqualified educational environment in schools in terms of lack of electronic services, infrastructure, educational curricula, and qualified human cadres. Thus, it is not compatible with the new educational system, especially the use of dry laboratories. Consequently, the necessary interaction cannot be achieved as the curricula and infrastructure prevent teachers fromconducting scientific experiments. in addition, most educational institutions don't implement modern technology within their educational plans, and Ministry of Education schoolshad old computers and software. Theysuffer from many problems that do not meet the students' desires. There are also problems related to access to information due to weak networks and lack of devices for students. It may also be due to the weakness in teachers' use of interactive technology as teachers lack some technical and computer skills, so they must be trained on how to use the Internet in the educational process and conduct dry scientific experiments.The use of programs will serve the educational process to achieve proper communication between the teacher and the student.

This result can be attributed to the lack of pre-approved educational software in the Ministry of Education, which made students' progress in theoretical aspect at the expense of practical aspects. This may also be due to the fact that the educational staff in the Ministry of Education has not been trained to employ computers in dry experiments as this requires well command of computer and communication. In addition to the above, the reason may be due to the unavailable coverage of the Internet in some areas

With regard to solutions in the field of (obstacles related to the study material), and to a high degree in the first place, the curricula do not keep pace with the development in e-learning, the lack of teacher booksto use the virtual laboratory, and the lack of reference in textbook and in the activities to the use of the virtual laboratory. As for the solutions to the field (obstacles related to school administration) in the last and medium rank, this may be attributed to the school principals' awareness regarding the importance of using dry laboratories, and their cooperation with teachers to employ and use dry laboratories in the teaching process.

The following are the arithmetic means and standard deviations of the items for each field of the questionnaire:

FIRST: OBSTACLES RELATED TO COMPUTER LAB EQUIPMENT

TABLE (6): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE ITEMS IN THE FIELD OF OBSTACLES RELATED TO COMPUTER LAB EQUIPMENT.

Number	Item	Arithmetic mean	Standard deviation	rank	degree
3	The number of computers is not sufficient compared to the number of students.	3.92	.72	1	High
2	The shortage in the dry lab programs in the school's computer lab.	3.80	.76	2	High
10	computersavailablehave specifications that are not compatible with the virtual laboratory.	3.79	.84	3	High
1	Internetproblems in the computer lab of the school.	3.73	.88	4	High
6	Lack of regular maintenanceof the laboratoryequipment.	3.71	.85	5	High
8	There is no technician for support.	3.69	.89	7	High
7	The computer lab is not constantly available for teaching of science materials.	3.68	.86	6	High
9	Computer lab curatoris not a specialist.	3.66	1.02	8	Average
5	Constant power failure.	3.41	.69	9	Average
4	The school does not have a computer lab.	3.36	.67	10	Average
Obstacles related to computer lab equipment		3.70	.31	----	High

As noted in Table (6), item No. (3), which states “the number of computers is insufficient compared to the number of students.” It ranked first with a high degree, with an arithmetic mean (3.92) and a standard deviation (0.72), while the item No. (4) which states that "there is no computer lab in the school" was in the last rank with a medium degree, with an arithmetic mean (3.36) and a standard deviation (0.67).

SECOND: THE FIELD OF OBSTACLES RELATED TO THE STUDY SUBJECT

TABLE (7): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE ITEMS IN THE FIELD OF OBSTACLES RELATED TO THE SUBJECT.

Number	Item	Arithmetic mean	Standard deviation	rank	Degree
21	Teaching strategies are not suitable to dry laboratories.	4.00	.69	10	High
11	Class time is not sufficient to implement dry laboratories.	3.86	.73	11	High
13	the experiments offered in dry laboratories are irrelevant the academic content.	3.85	.82	9	High
17	Experiments in the virtual laboratory do not suit the required experiments.	3.83	.98	7	High
15	The teacher's guide is not usedduring dry laboratories.	3.78	.87	6	High
14	The activities in the material content do not refer to the use of dry laboratories.	3.77	.83	8	High
16	Shortage of time for experiments during the semester.	3.75	.92	5	High
20	Lack of subjects commensurate with the dry experiments.	3.73	.74	2	High
12	The overload of academic content hinders the use of dry laboratories.	3.63	.90	1	Average
19	Difficulty in using practical activity books in the laboratory.	3.54	.99	3	Average
18	Lack of practical aspects in the teaching content.	3.29	1.23	4	Average
Obstacles related to the curriculum		3.73	.25	---	High

It is noted from Table (7) that item No. (21) which states that " Teaching strategies are not suitable to dry laboratories." came in the first place with a high degree, with an arithmetic mean (4.00) and a standard deviation (0.69), while item No. (18) Which states " Lack of practical aspects in the teaching content." is ranked last in a medium degree, with an arithmetic mean (3.29) and a standard deviation (1.23).

THIRD: THE AREA OF ADMINISTRATION-RELATED OBSTACLES

TABLE (8): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE ITEMS IN THE ADMINISTRATION -RELATED OBSTACLES FIELD.

Number	Item	Arithmetic mean	Standard deviation	rank	Degree
27	The lack of decentralization in the application of dry experiments within the school.	3.95	.73	1	High
29	The school administration's focus is confined to the theoretical aspects of scientific materials.	3.76	.77	2	High
23	The school administration's sense fear to conduct dry experiments.	3.75	.97	3	High
26	The school administration requires that experiments to be conducted in real laboratories rather than dry laboratories.	3.68	.99	4	High
28	Lack of cooperation between the school principal and science teachers.	3.67	.86	5	Average
24	The school administration is not interested in lab computer maintenance	3.58	1.11	6	Average
25	The school administration does not organize classes related to dry laboratories in the computer lab.	3.46	1.04	7	Average
30	Lack of awareness of the importance of dry experiments in school.	3.37	.94	8	Average
22	Scarcity of school meetings between teachers and school administration.	3.26	.92	9	Average
Obstacles related to the school administration		3.63	.60	----	Average

It is noted from Table (8) that item No. (27), which states “The lack of decentralization in the application of dry experiments within the school.” came in the first place with a high degree, with an arithmetic mean (3.95) and a standard deviation (0.73), while item No. 22, which It states " Scarcity of school meetings between teachers and school administration" in the last rank with a medium degree, with an arithmetic mean (3.26) and a standard deviation (0.92).

FOURTH: THE FIELD OF OBSTACLES RELATED TO THE TEACHER

TABLE (9): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE ITEMS OF THE OBSTACLES OF THE FIELD RELATED TO THE TEACHER.

Number	Item	Arithmetic mean	Standard deviation	Rank	degree
41	Lack of teacher computer training programs.	3.97	.69	1	High
35	It is difficult for the teacher to understand the language used in the programs of dry laboratories.	3.80	.82	2	High
36	The teacher does not have his own tablet.	3.76	1.04	3	High
38	The use of dry experiment is neglected in teacher's evaluation.	3.75	.86	4	High
37	Preparation for dry experiments requires a long time.	3.73	.90	5	High
40	It is difficult to control students during dry experiments.	3.72	.94	6	High
39	Teacher isreluctant to be responsible for computer lab equipment.	3.71	.93	7	High
31	The teacher lacks sufficient knowledge of dry laboratories.	3.69	.87	8	High
32	The teacher lacks sufficient skill to run programs for dry laboratories.	3.66	.95	9	Average
33	The teacher does not master the skill of implementing dry laboratories in teaching.	3.61	1.00	10	Average
34	The teacher's lack of satisfaction in the importance dry laboratories in teaching.	3.41	.69	11	Average
Obstacles related to the teacher		3.71	.36	----	High

It is noted from Table (9) that item No. (41) which states “Lack of teacher computer training programs” came in

the first place with a high degree, an arithmetic mean (3.97) and a standard deviation (0.69), while item No. (34) which states: " The teacher's lack of satisfaction in the importance dry laboratories in teaching." in the last rank with a medium degree, an arithmetic mean (3.41) and a standard deviation (0.69).

FIFTH: THE FIELD OF OBSTACLES RELATED TO THE STUDENT

TABLE (10): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE ITEMS OF THE STUDENT'S OBSTACLES FIELD

Number	item	Arithmetic mean	Standard deviation	rank	degree
44	The student does not have their own tablet.	3.98	.68	1	High
46	Lack of students' reinforcement to use virtual reality.	3.78	.74	2	High
48	Students are reluctant to be responsible for the computer lab equipment.	3.75	.82	3	High
43	The student does not have sufficient skill to use the programs for dry laboratories.	3.69	.87	4	High
49	It is difficult for students to deal with English terms related to dry experiences.	3.68	.90	5	High
42	The student lacks the motivation to use dry laboratories.	3.66	.84	6	Average
47	Students' computer skills don't cope with the implementation of dry experiments.	3.63	1.00	7	Average
45	Students' inability to deal with technical problems whenever happen.	3.36	.66	8	Average
Obstacles related to the student		3.69	.35	----	High

It is noted from Table (10) that item No. (44), which states that "The student does not have their own tablet." ranked first with a high degree, with an arithmetic mean (3.98) and a standard deviation (0.68), while item No. (45) which stated that " Students' inability to deal with technical problems whenever happen." in the last rank with a medium degree, with an arithmetic mean (3.36) and a standard deviation (0.66).

RESULTS RELATED TO THE SECOND QUESTION: WERE THERE STATISTICALLY SIGNIFICANT DIFFERENCES AT THE SIGNIFICANCE LEVEL (A≥0.05) IN THE OBSTACLES TO IMPLEMENTATION OF DRY LABORATORIES FROM THE PERSPECTIVE OF SCIENCE TEACHERS IN NA'OUR DISTRICT DUE TO THE VARIABLES (GENDER, EDUCATIONAL QUALIFICATION, EXPERIENCE)?

To answer the question, the arithmetic means and standard deviations were calculated as in Table (11):

TABLE (11): ARITHMETIC MEANS AND STANDARD DEVIATIONS OF THE DEGREE OF OBSTACLES TO IMPLEMENTATION OF DRY LABORATORIES FROM THE PERSPECTIVE OF SCIENCE TEACHERS IN NA'OUR DISTRICT, ACCORDING TO THE VARIABLES (GENDER, EDUCATIONAL QUALIFICATION, EXPERIENCE)?

variable	Category of variable	Arithmetic mean	Number	Standard deviation
gender	male	3.69	28	.26
	female	3.67	31	.21
qualification	Bachelor	3.68	48	.23
	Postgraduate	3.70	11	.25
Experience	less than 5 years	3.65	16	.32
	From 5- less than 10 years	3.71	20	.20
	10 years and over	3.69	23	.20

It is noticed from Table (10) that the arithmetic means of the obstacles to implementation of dry laboratories from the perspective of science teachers in Na'our District according to gender (males = 3.69, females = 3.67), academic qualification (bachelor = 3.68, postgraduate studies = 3.70) and experience (less than 5 years = 3.65, from 5-less than 10 years = 3.71, 10 years and over = 3.69), and these differences were apparent, and to verify the significance of the differences between the arithmetic means, the Three Way ANOVA was used, as in Table (12):

TABLE (12): RESULTS OF THREE-WAY ANOVA TO INDICATE THE DIFFERENCES BETWEEN THE ARITHMETIC MEANS OF THE DEGREE OF OBSTACLES TO IMPLEMENTATION OF DRY LABORATORIES FROM THE PERSPECTIVE OF SCIENCE TEACHERS IN NA'OUR DISTRICT, ACCORDING TO GENDER, QUALIFICATION AND EXPERIENCE.

Source of variation	Sum of squares	degree of freedom	mean of squares	F value	significance
gender	.007	1	.007	.114	.737
qualification	.007	1	.007	.121	.730
Experience	.036	2	.018	.300	.742
error	3.246	54	.060		
total	804.713	59			
corrected total	3.288	58			

It is noted from Table (12) that there were no statistically significant differences at the significance level ($\alpha \geq 0.05$) in the obstacles to implementation of dry laboratories from the perspective of science teachers in Na'our District, due to gender, academic qualification and experience, where the calculated (P) values was (0.114, 0.121, 0.300) and its significance level was (0.737, 0.730, 0.742), respectively.

The researcher attributes the lack of differences between male and female teachers in their appreciation of the obstacles to implementation of dry laboratories from the science teachers' perspective, to many reasons, including the similar conditions of both sexes, in terms of the similarities of instructions ,learning the same subjects, and their work on the same educational platform, the same conditions in the use of technologies and electronic network of the two sexes, especially in light of the pandemic. With regard to the lack of differences due to academic qualifications, this may be due to the fact that all teachers with different qualifications undergo the same conditions and live in the same environment, experiencethe same difficulties at work where the teacher focus on the scientific material presented to the students distracts him from professional development, as this may be due to the fact that training and rehabilitation programs are offered to all teachers regardless of their qualifications, gender and experience, and they do not differ between different academic qualifications.

The results of this study were consistent with Malkawistudy (2020), which indicated that there were no differences between the sexes in distance learning and its challenges during the pandemic of the Corona virus "Covid 91".

RECOMMENDATIONS AND SUGGESTIONS

In light of the findings of the study, the Jordanian Ministry of Education is recommended to:

1- Holding training courses for science teachers to develop their skills in using computers and dealing with dry laboratories.

2- Including the skill of using dry laboratories in the training programs for preparing science teachers.

3- Preparing educational pamphlets about dry laboratories and how to use them by science teachers and how to employ them to serve the educational process.

4- Providing the necessary computer equipment for dry laboratories, and special software for dry experiments that are commensurate with the content of science subjects.

5- Benefiting from the experiences of human cadres in designing virtual laboratories and electronic content related to the practical side of science subjects in cooperation with the National Center for Curricula and making them available on the Internet or distributing them to schools using external storage units.

6- providing practical activities whose implementation requires the use of dry laboratories in science curricula.

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