

Distance learning Difficulties from the Science Teachers' Point of View During COVID-19 Pandemic

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Abstract

This study aimed to identify the difficulties of implementing distance learning from the science teachers' point of view, and to investigate whether the teachers' viewpoints towards these difficulties differ according to their years of experience. The study sample consisted of (220) male and female science teachers in government schools affiliated to the directorates of education in the Jordanian capital, Amman. To achieve the objectives of the study, the researchers prepared a questionnaire consisting of (43) items, whose validity and reliability were verified. The results of the study showed that the difficulties faced by science teachers in implementing distance learning were generally moderate; The difficulties related to the infrastructure of public schools topped the list of those difficulties, followed in the second rank by the difficulties related to the competencies of the science teacher in the application of distance learning, and the difficulties related to technical and administrative support for the science teacher in the application of distance learning came in the third rank, and in the last rank came the difficulties related to students and science textbooks. The results also showed that teachers' viewpoints about the difficulties they face in implementing distance learning differ according to their years of experience.

Keywords: Distance Learning, Science Teachers, COVID-19 Pandemic.

Introduction

The Corona pandemic has invaded most countries of the world and posed new pressures on various areas of life like educational sector. It has cast a shadow over the educational institutions, so that all these institutions such as schools prompted the closure of their doors to reduce the chances of its spread and forced to shift from face-to-face education that allows for physical closeness, which constitutes an opportunity for transmission of infection to distance learning, so resorting to this type of learning was the fastest emergency solution in order to preserve student education (Dhawan, 2020; Basilaia & Kvavadze, 2020; Pokhrel & Chhetri, 2021). According to UNESCO statistics, Affouneh et al (2020) pointed that 1.5 billion children and young people in 188 countries around the world had to stay in their homes after the closure Schools and institutions of higher education.

Studies confirm that Corona pandemic considerably reduced support services provided for Students from low socio-economic backgrounds lack gadgets like laptops and smartphones; students lack digital competence to use recommended learning tools; technological access and connectivity issues because of geographical locations and unavailability of internet and; dealing with lack of family support in understanding the shift in online learning

from home, so that educational technologies will be more accessible if they consider the learning context, and are designed to provide a supportive environment (Verulava et al, 2022; Chand et al, 2022).

Distance learning has imposed itself strongly as a result of the Corona pandemic, it has become an important substitutional to reforming the entire traditional learning system. Both teachers and students have had to change their behavior, teaching and evaluation methods, to retain rapidity with distance learning material and procedures (Alkhawaldeh et al, 2021).

Therefore, various countries, including Jordan, have taken distance learning as a way for students to continue receiving their education, as the Jordanian ministry of Education has set plans to maintain the sustainability of the educational process and reduce the effects of the Corona crisis by taking the distance learning system and adopting a mechanism that guarantees the rights of students and the difficult economic conditions that schools are going through. Many distance learning tools have been used in Jordan during the Corona pandemic, such as social media like Facebook and WhatsApp, as well as platforms such as Microsoft teams and darsak platform, which gave the teacher a real opportunity to prepare his lessons and follow up on the education of his students from outside the school (Graiabhei et al, 2020).

Despite the procedures and means that have been adopted in Jordan to ensure the continuity of education during the Corona pandemic, there are a number of difficulties that students and teachers faced during distance learning. Therefore, this study came to identify the difficulties of implementing distance learning from the science teachers' point of view, and to investigate whether the teachers' viewpoints towards these difficulties differ according to their years of experience.

Literature Review

Teaching-learning process in many educational institutions faces a set of challenges, most notably the increase in the student's number, and the shortage of qualified teachers and trainers, which prompted these institutions to use technological tools and modern methods of communication to face these challenges and problems. Another challenge related to the nature of technology where perceptions vary in terms of locations, an educational technology that has been progressing and perceived in one location may not necessarily be perceived and applied in another. This is due to a framework of potency civilized, socio-economic and national differences that affect behavioral intention as regards using technology as a supporting intermediary within the instructional field (Amarin & Habashneh, 2020).

Yildirim et al (2020) showed that distance learning has existed for more than a hundred years, and the previous forms of it were adopted through correspondence courses that began in Europe, and this method of remained the basis of distance learning until the middle of this century when radio and television education became more common. With technological progress, the concept of distance learning has changed, and it includes video lectures, the use of audio tapes, and lessons sent by mail (Ajmal et al., 2019). Schwantler & Tellioglu (2021) indicated that distance learning is more than simply moving the lessons from the classrooms home. In particular, topics such as social contact and personal relationship building, which are a matter of course in classroom teaching, must be given special consideration in distance learning in order to prevent negative effects on students, teachers, parents and all persons involved in everyday school life. Moreover, Sinclair et al (2015) showed that using of distance learning also assists in engaging a large group of students at one time (where lectures may not be possible) with options of both synchronous and asynchronous learning.

In addition to the above, distance learning is an increasingly expanding environment, which enable users the flexibility to operate outside the barriers of place and time (Al Rawashdeh et al, 2021). This was confirmed by Yulia (2020) who concluded that distance learning will be the dominant learning pattern in the future, given that the current generation is characterized by its attachment to smart phone devices and the use of various applications, so the integration of technology in the educational process has become a global trend, and interaction with educational activities through mobile devices has become a catalyst for learning rather than being satisfied with traditional study.

Despite the importance and advantages of distance learning, many studies have indicated various difficulties that students and teachers face while using this style of learning. Pozdnyakova & Pozdnyakov (2017) indicated that there are many problems faced by students who study remotely, including anxiety, fears related to the education process, lack of support from the family, a feeling of despair, and the lack of importance of their education. Also, Rostislav (2018) confirmed that one of these difficulties is that distance learning need comprehensive technical security and requires extensive preparation and providing students with all the materials, duties and tasks that they have to perform, and this requires a lot of work from a technical, methodological and educational point of view by teachers, in addition students need to be more motivated to learn and more able to organize, plan and deal with time efficiently. Moreover, the study of Diana et al (2020) pointed that the difficulties faced by teachers in implementing the distance learning are mostly related to technological devices ownership and ability to utilize the devices, parents' involvement during online learning, inadequate facilities and internal factor from teachers. Sifau & Abdullah (2020) indicates that the level of difficulties that prevent the application of distance learning in teaching chemistry to high school students from the point of view of supervisors, teachers and students is high. Also, this study stated that the difficulties of the contexts came in the first order, while the technological difficulties in the second order, while the individual difficulties in the third arrangement, and finally the difficulties of the curriculum in the ranking Fourth. In addition to the above, the study of Ozudogru (2021) stated that the mainly problems faced students and teachers in using distance learning were the lack of time spared for live courses, failure of establishing communication with friends, absence of internet, sound problems and lack of communication.

Based on the above, and given the importance of distance learning, the significance of present study is to highlighted the difficulties of implementing distance learning from the science teachers' point of view during the COVID-19 pandemic in government schools affiliated to the directorates of education in the Jordanian capital, Amman. More specifically, the current study attempted to answer the following two questions:

1. What are the difficulties of implementing distance learning from the science teachers' point of view in public schools in the Jordanian capital, Amman?
2. Do science teachers' viewpoints about the difficulties they face in implementing distance learning differ according to their years of experience?

Methodology

Study Sample

A randomly sample consisted of (220) science teachers was conducted from the public schools in the Jordanian capital Amman for the school year 2020/2021 distributed according to the experience years' variable which showed in table 1.

Table 1

Distribution of the sample according to the experience years' variable

Variable	Level of variable	Frequency	Percentage
Years of experience	1-5 years	66	30.0
	6-10 years	76	34.5
	11 years and over	78	35.5
	Total	220	100.0

Data collection

Questionnaire development

The researchers developed a questionnaire consisting of (42) items distributed on four fields of science teachers' difficulties of implementing distance learning which showed in table 2. All items used a 5 point Likert scale ranging from 1 to 5 (1 "strongly disagree", 2 "disagree", 3 "neutral", 4 "agree", 5 "strongly agree").

Table 2

Fields of science teachers' difficulties of implementing distance learning

№	Difficulty fields	Number of items
1	Difficulties related to science teacher competencies in distance learning application	11
2	Difficulties related to technical and administrative support for science teacher in distance learning application	8
3	Difficulties related to the infrastructure of public schools	11
4	Difficulties related to students and science textbooks	12
Total		42

Questionnaire validity and reliability

To ensure the validity of the questionnaire, it was presented to a jury of specialized reviewers in Jordanian universities, and a group of educational supervisors for science subjects. Some items were amended in light of the recommendations especially with regard to the linguistic and scientific structuring of the items. Also, to ensure the reliability of the questionnaire, Cronbach's alpha Coefficient was used with value of (0.87) which showed in table 3.

Table 3

Fields of science teachers' difficulties of implementing distance learning

№	Difficulty fields	Cronbach's alpha Coefficient
1	Difficulties related to science teacher competencies in distance learning application	0.89
2	Difficulties related to technical and administrative support for science teacher in distance learning application	0.84
3	Difficulties related to the infrastructure of public schools	0.88
4	Difficulties related to students and science textbooks	0.85
Total		0.87

Statistical Treatment

To answer the study questions, the researchers conducted the following statistical treatments:

1. Means and standard deviation for the difficulties of implementing distance learning from the science teachers' point of view in public schools in the Jordanian capital, Amman.
2. To find out the degree of difficulty; Statistical grading was used to categorized this degree into three levels (low, Moderate, and high) according to the means which showed in table 3.

Table 3

Distribution of the statistical grading of the means

Statistical grading of the mean	Degree of the difficulties
From 1 to 2.33	low
From 2.34 to 3.67	Moderate
From 3.68 to 5	High

3. One-way ANOVA to find out the significant differences science teachers' means estimates of the difficulties they face in implementing distance learning according to their years of experience.

Results and Discussion

This section gives insight into the results and discussion related to the questions of the study.

First question

What are the difficulties of implementing distance learning from the science teachers' point of view in public schools in the Jordanian capital, Amman?

To answer this question, means, ranks and standard deviations of the science teachers' estimates on the fields of the questionnaire are calculated (Table 3).

Table 3

means, standard deviations and ranks of the science teachers' estimates on the fields of the questionnaire

N	Difficulty fields	Mean	Std. Deviation	Difficulty Degree	Rank
1	Difficulties related to science teacher competencies in distance learning application	3.476	0.840	Moderate	2
2	Difficulties related to technical and administrative support for science teacher in distance learning application	3.343	0.870	Moderate	3
3	Difficulties related to the infrastructure of public schools	3.753	0.643	High	1
4	Difficulties related to students and science textbooks	3.306	0.868	Moderate	4
For all fields		3.475	0.733	Moderate	

It is evident from Table (3) that the mean of the study sample' responses to the fields of the study tool combined amounted to (3.475). This means that the degree of difficulties in implementing distance learning from the science teachers' point of view is generally moderate. It also appears from table (3) that the difficulty fields ranked as: firstly, the difficulties related to the infrastructure of public schools with mean (3.753), secondly the difficulties related to science teacher competencies in distance learning application with mean (3.476), thirdly the difficulties related to technical and administrative support for science teacher in distance learning application mean (3.343), fourthly the difficulties related to students and science textbooks with mean (3.306). For further clarification; means and standard deviations were calculated for each item of the difficulty fields, as follows:

1. Difficulties related to science teacher competencies in distance learning application:

This field consisted of (11) items, and table (4) shows the means and standard deviations for each of those items.

Table 4

means, standard deviations, difficulty Degree and ranks of the science teachers' estimates on the field one

N	Items	Mean	Std. Deviation	Difficulty Degree	Rank
1	Weak conviction of the importance of using distance learning in science teaching	3.836	0.951	High	3
2	The belief that distance learning eliminates the role of the teacher in teaching science	3.877	0.950	High	2
3	Difficulty accepting innovation and change in the transition from traditional education to distance learning	3.727	0.997	High	5
4	The difficulty of following up on large numbers of students through distance learning tools	3.918	0.817	High	1
5	The weakness of the science teacher's use of electronic programs in preparing teaching plans	3.746	0.793	High	4
6	The lack of follow-up by the science teacher to everything new in the field of distance learning	3.186	0.829	Moderate	10
7	The low ability of the science teacher to define the objectives of the electronic curriculum according to scientific standards	3.305	0.903	Moderate	8
8	The weak ability of the science teacher to choose the appropriate scientific content to achieve the goals of distance learning	3.523	0.899	Moderate	6
9	The low ability of the science teacher to evaluate the educational level of students during distance learning	2.559	0.755	Moderate	11
10	The science teacher feels that distance learning is an additional burden for him	3.246	0.832	Moderate	9
11	Lack of internet for some science teachers	3.314	0.858	Moderate	7
For all items		3.476	0.840	Moderate	

It is evident from table (4) that the means of the difficulties field items related to the science teacher competencies in applying distance learning ranged between (2.559 - 3.918). The item that stipulated “the difficulty of following up large numbers of students through distance learning tools”, where its mean reached (3.918) and ranked first with a high degree of difficulty. Also, the item that stipulated “the low ability of the science teacher to evaluate the educational level of students during distance learning”, where its mean was reached (2.559) and ranked last with a moderate difficulty.

2. Difficulties related to technical and administrative support for science teacher in distance learning application: This field consisted of (8) items, and table (5) shows the means and standard deviations for each of those items.

Table 5

means, standard deviations, difficulty Degree and ranks of the science teachers' estimates on the field two

N	Items	Mean	Std. Deviation	Difficulty Degree	Rank
1	The lack of difficulty sufficient to motivate the science teacher to implement distance learning	3.268	0.814	Moderate	5
2	The scarcity of school administration encourages the science teacher to use distance learning	3.123	0.868	Moderate	7
3	The prevailing school management system considers distance learning secondary	3.986	0.849	High	1
4	The scarcity of school administration encouragement of teamwork among science teachers to implement distance learning	3.450	0.740	Moderate	2
5	The lack of sufficient computer skills for the science teacher to apply distance learning	3.436	0.930	Moderate	3
6	The scarcity of laboratory supervisors in the school to implement distance learning	3.127	0.863	Moderate	6
7	The school's financial planning did not include sufficient items to support distance learning	3.323	0.790	Moderate	4
8	The scarcity of providing specialized courses on a continuous basis to develop the skills of the science teacher in distance learning	3.027	0.881	Moderate	8
For all items		3.343	0.870	Moderate	

It is evident from table (5) that the means of the difficulties field items related to technical and administrative support for science teacher in distance learning application ranged between (3.027 - 3.986). The item that stipulated “the prevailing school management system considers distance learning secondary”, where its mean reached (3.986) and ranked first with a high degree of difficulty. Also, the item that stipulated “the scarcity of providing specialized courses on a continuous basis to develop the skills of the science teacher in distance learning”, where its mean was reached (3.027) and ranked last with a moderate difficulty.

3. Difficulties related to the infrastructure of public schools:

This field consisted of (11) items, and table (6) shows the means and standard deviations for each of those items.

Table 6

means, standard deviations, difficulty Degree and ranks of the science teachers' estimates on the field three

N	Items	Mean	Std. Deviation	Difficulty Degree	Rank
1	The school education environment is not suitable for the application of distance learning	3.523	0.733	Moderate	11
2	Lack of sufficient financial support to prepare distance learning courses	3.696	0.635	High	8
3	The lack of sufficient computers in science laboratories in some public schools	3.555	0.687	Moderate	10
4	Poor internet service in some public schools	3.577	0.885	Moderate	9
5	The scarcity of the difficulty of the rooms that meet the needs of training on the use of distance learning	3.836	0.711	High	5
6	Lack of modern equipment and tools needed for distance learning	3.786	0.680	High	6
7	The scarcity of the difficulty of an electronic library that contains electronic books	3.759	0.603	High	7
8	The scarcity of the difficulty of modern software needed for the distance learning process	3.900	0.629	High	3
9	The high cost of modern software for distance learning	3.915	0.640	High	1
10	The lack of difficulty for technicians specialized in government schools to solve technical problems related to distance learning	3.905	0.671	High	2
11	Lack of periodic maintenance of computer laboratories and the Internet in government schools	3.845	0.722	High	4
For all items		3.753	0.643	High	

It is evident from table (6) that the means of the difficulties field items related to the infrastructure of public schools ranged between (3.523-3.915). The item that stipulated “The high cost of modern software for distance learning”, where its mean reached (3.915) and ranked first with a high degree of difficulty. Also, the item that stipulated “The school education environment is not suitable for the application of distance learning”, where its mean was reached (3.523) and ranked last with a moderate difficulty.

4. Difficulties related to students and science textbooks:

This field consisted of (12) items, and table (7) shows the means and standard deviations for each of those items.

Table 7

means, standard deviations, difficulty Degree and ranks of the science teachers' estimates on the field four

N	Items	Mean	Std. Deviation	Difficulty Degree	Rank
1	Poor awareness of students about the importance of distance learning	3.509	0.789	Moderate	3
2	Low response of students to distance learning and its applications	3.709	0.815	High	1
3	Lack of internet service for some students	3.477	0.897	Moderate	4
4	Lack of sufficient computer skills for students during distance learning	3.536	0.814	Moderate	2
5	Failure to provide appropriate training for students for distance learning	3.255	0.888	Moderate	7
6	The scarcity of students' enjoyment when learning at a distance	3.155	0.813	Moderate	10
7	Students during distance learning lack direct encouragement and motivation from the teacher	3.400	0.803	Moderate	5
8	Students feel anxious during electronic exams	3.250	0.811	Moderate	8
9	Distance learning lacks social interaction between students themselves and between students and the science teacher	3.314	0.751	Moderate	6
10	Students get used to using school science books	3.232	0.812	Moderate	9
11	Adaptation of the educational content of textbooks to science textbooks for traditional teaching rather than distance learning	2.877	0.822	Moderate	12
12	The difficulty of employing supportive educational activities during distance learning	2.964	0.852	Moderate	11
For all items		3.306	0.868	Moderate	

It is evident from Table (7) that the means of the difficulties field items related to students and science textbooks ranged between (2.877-3.709). The item that stipulated “Low response of students to distance learning and its applications”, where its mean reached (3.709) and ranked first with a high degree of difficulty. Also, the item that stipulated “Adaptation of the educational content of textbooks to science textbooks for traditional teaching rather”, where its mean was reached (2.877) and ranked last with a moderate difficulty.

The researchers attribute these results to the weak capabilities available to public schools, the increase in the number of students in the classrooms of these schools, and the poor possession of students and teachers of English language skills that contribute to increasing their implementation of distance learning. The researchers also attribute this result to science teachers' focus in public schools on using the traditional method of teaching, and their use of textbooks as a single source of diverse learning resources. Also, these results may be attributed to the

lack of time for science teachers in public schools to implement distance learning due to the large teaching load assigned to them, as the application of distance learning requires great preparation and effort. In addition to the above, this result may be attributed to the neglect of some science teachers in public schools for the aspects of self-development in the use of various educational technologies. These results about distance learning difficulties in general agree with the results of previous studies.

Second question

Do science teachers' viewpoints about the difficulties they face in implementing distance learning differ according to their years of experience?

To answer this question, means and standard deviations of the study sample responses were calculated according to experience years' variable, and table (8) shows this.

Table 8

Means and Standard deviations of the study sample responses according to experience years' variable

Field	Experience years	N	Mean	Std. Deviation
Difficulties related to science teacher competencies in distance learning application	1-5 years	66	3.707	0.702
	6-10 years	76	3.348	0.871
	11 years and over	78	3.406	0.887
	Total	220	3.476	0.840
Difficulties related to technical and administrative support for science teacher in distance learning application	1-5 years	66	3.527	0.837
	6-10 years	76	3.263	0.904
	11 years and over	78	3.264	0.852
	Total	220	3.343	0.870
Difficulties related to the infrastructure of public schools	1-5 years	66	3.964	0.679
	6-10 years	76	3.756	0.650
	11 years and over	78	3.579	0.616
	Total	220	3.756	0.663
Difficulties related to students and science textbooks	1-5 years	66	3.535	0.841
	6-10 years	76	3.199	0.885
	11 years and over	78	3.218	0.846
	Total	220	3.306	0.868
For all fields	1-5 years	66	3.667	.70584
	6-10 years	76	3.374	.74278
	11 years and over	78	3.410	.72513
	Total	220	3.475	.73333

Table (8) shows that there are apparent differences in the study sample responses means about distance learning difficulties due to the experience years' variable, and to know the statistical significance of these differences One Way Anova analysis was used, and table (9) shows this.

Table 9

One Way ANOVA results of the experience years' variable

Field		Sum of Squares	df	Mean Square	F	Sig.
Difficulties related to science teacher competencies in distance learning application	Between Groups	5.140	2	2.570	3.730	0.026
	Within Groups	149.502	217	0.689		
	Total	154.642	219			
Difficulties related to technical and administrative support for science teacher in distance learning application	Between Groups	3.189	2	1.594	2.127	0.122
	Within Groups	162.627	217	0.749		
	Total	165.816	219			
Difficulties related to the infrastructure of public schools	Between Groups	5.297	2	2.649	6.325	0.002
	Within Groups	90.863	217	0.419		
	Total	96.160	219			
Difficulties related to students and science textbooks	Between Groups	4.955	2	2.478	3.357	0.037
	Within Groups	160.156	217	0.738		
	Total	165.112	219			
For all fields	Between Groups	3.521	2	1.761	3.344	0.037
	Within Groups	114.250	217	0.526		
	Total	117.771	219			

**The mean difference is significant at the 0.05 level*

It is noticed from Table (9) that there are statistically significant differences at the significance level ($\alpha \leq 0.05$) between the arithmetic averages of the responses of the study sample members to the study tool items due to the variable years of experience. To find out between any of the levels of the years of experience variable, these differences were; The dimensional comparisons were made between these levels using the Scheffe test, and Table (10) shows this.

Table 10

Multiple Comparisons between levels of the experience years' variable using Scheffe test

Dependent Variable	(I) experience	(J) experience	Mean Difference (I-J)	Std. Error	Sig.
Difficulties related to science teacher competencies in distance learning application	1-5 years	6-10 years	0.356*	0.140	0.039
		11 years and over	0.301	0.139	0.098
	6-10 years	1-5 years	-0.356*	0.138	0.039
		11 years and over	-0.058	0.134	0.912
	More than 11 years	1-5 years	-0.301	0.133	0.098
		6-10 years	0.058	0.131	0.912
Difficulties related to technical and administrative support for science teacher in distance learning application	1-5 years	6-10 years	0.263	0.146	0.197
		11 years and over	0.262	0.144	0.197
	6-10 years	1-5 years	-0.263	0.145	0.197
		11 years and over	-0.001	0.140	1.000
	11 years and over	1-5 years	-0.262	0.141	0.197
		6-10 years	0.001	0.142	1.000
Difficulties related to the infrastructure of public schools	1-5 years	6-10 years	0.208	0.101	0.163
		11 years and over	0.385*	0.108	0.002
	6-10 years	1-5 years	-0.208	0.109	0.163
		11 years and over	0.177	0.104	0.240
	11 years and over	1-5 years	-0.385*	0.107	0.002
		6-10 years	-0.177	0.104	0.240
Difficulties related to students and science textbooks	1-5 years	6-10 years	0.337	0.145	0.068
		11 years and over	0.317	0.143	0.090
	6-10 years	1-5 years	-0.337	0.144	0.068
		11 years and over	-0.020	0.130	0.990
	11 years and over	1-5 years	-0.317	0.143	0.090
		6-10 years	0.020	0.138	0.990
For all fields	1-5 years	6-10 years	0.292	0.122	0.059
		11 years and over	0.256	0.121	0.110
	6-10 years	1-5 years	-0.292	0.130	0.059
		11 years and over	-0.036	0.117	0.954
	11 years and over	1-5 years	-0.256	0.121	0.110
		6-10 years	0.036	0.116	0.954

* The mean difference is significant at the 0.05 level

It is noticed from Table (10) that there are statistically significant differences at the significance level ($\alpha \leq 0.05$) between responses means of the study sample on the tool items due to the variable experience years and in favor of science teachers with greater experience. These results are attributed to the fact that the different experience

years of science teachers and what is reflected as a result of that experience led to a different view of the different obstacles of this type of modern learning styles.

Recommendations

Based on the previous results, the study recommends the following:

1. Reducing the teaching burden for science teachers and providing them with sufficient time to apply distance learning.
2. Encouraging science teachers to develop their skills in the use of computers, the Internet, and other modern technologies by holding specialized training courses for them.
3. Work on developing the skills of students and teachers in the English language, which will facilitate their application of distance learning.
4. Providing the necessary support for public schools in terms of educational materials, infrastructure, computers and other technologies related to distance learning.
5. Conducting more studies similar to this study to address other areas of distance learning obstacles, and variables different from the ones that were addressed.

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