Science and Math Teachers' Satisfaction Level towards the Electronic Educational Supervision

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***Abstract*—The study aimed to identify the satisfaction level of Jordanian science and mathematics teachers toward electronic educational supervision and their relationship with educational supervisors. The study population included all Jordanian teachers of science and mathematics. The sample size of the study was 184 male and female teachers. The data was collected using a questionnaire that the researchers built and ensured its validity and reliability, and then published it to the study community electronically according to the snowball method. The study concluded that the average level of Jordanian science and mathematics teachers' satisfaction with electronic supervision and their relationship with educational supervisors was within the middle category. The results indicated statistically significant differences in the satisfaction of Jordanian science and mathematics teachers with the educational supervisors of the school type in favor of private schools. The results did not indicate statistically significant differences in the level of Jordanian teachers' satisfaction with the electronic supervision of the rest of the study variables (the teacher's gender, the number of years of experience, and the teacher's possession of technical skills). Accordingly, the study reached several recommendations: maintaining a culture that fosters distance learning by promoting mechanisms for the use of technology in teaching, learning, and supervision at the course level or at the school level annually.**

***Keywords*—distance education, electronic supervision, science and mathematics teachers, teachers' satisfaction level, educational supervisors**

I. Introduction

E-learning and distance education have become necessary and more than just a requirement in public and university education. Different countries have learned a big and important lesson from the COVID-19 pandemic about the need to provide alternatives to face-to-face education and to be fully prepared to continue the educational process regardless of the challenges and environmental conditions [1–3].

Studies [4–8] indicate that, despite the importance of distance education and the use of technology with added value, there are many positives and negatives facing this type of teaching and learning. Many studies [2, 4–8] indicate that e-learning has several advantages and positives. It makes education available to everyone, facilitating learners' access to virtual classrooms, avoiding travel hassles. It also makes students more flexible, allowing them to study from anywhere and at any time convenient. This increased availability makes it easier for them to organize their time, especially for workers. At the same time, it allows them to obtain academic degrees and develop their knowledge and skills.

On the other hand, we find that some studies [2, 3, 7, 9,10] confirm the existence of defects and challenges facing e-learning, as the financial factor, which includes providing devices for e-learning and providing the Internet and its infrastructure, especially for large families that have many students, is considered one of the most challenges in this field. In addition to the importance of training learners on the mechanisms of using various technologies in teaching and learning [11], some students also have difficulty committing to learning and organizing themselves. They need a teacher who motivates them face-to-face manners. In addition, many students feel isolated and lack a distance learning environment, such as building friendly relationships with colleagues and teachers. Studies [2, 3, 8, 10, 12, 13] also indicate that direct and in-person feedback is essential to student learning.

There has been a need to reconsider the overall supervisory processes at the level of thought and practice proceeding from the role of educational supervision aiming at improving and developing the educational system in all its elements, as well as bringing about integration among them to ensure the improvement of the qualitative outputs of the different learning environments; the organizational structure of educational supervision requires professional development plans that enable supervisors to perform their duties efficiently and effectively, which means development of several skills, such as planning, leadership, mentoring, and technical resources that allow for a dynamic and creative environment [8, 14, 15].

As the scientific and technological progress is becoming significantly apparent globally, and nations' progress and development is increasingly measured through achievement and reform within their educational systems, the role of the supervisor in the success of educational system is becoming more important [15]. In light of the significant and surprising change witnessed in the educational system in exceptional circumstances in general and at the global level—the COVID-19 pandemic as a model, this forced educational institutions in public and university education to move from the face-to-face approach to the adoption of distance education and virtual classrooms, and then to use blended learning [2, 3, 15–17].

Based on the discussion above, most countries have tended to develop teaching methods, acquire information, and

program it electronically based on integrating technology into education [18, 19], hence the need to work on employing social networks to activate the educational process [20].

Educational supervision was not far from that, so there was an urgent need for education supervisors to employ information technology and modern technologies to advance the educational process [21]. Therefore, supervision entered a new curve called electronic supervision, where training programs and supervisory methods can be applied through extensive use of information and communication technology [15].

Electronic educational supervision is becoming more desirable because of its capabilities to concentrate on the technical performance aspects, also because it allows the process of supervision process more efficient and quicker, with no disruption of tasks and roles within the educational institute. Further, it contributes to raising the efficiency of stakeholders, despite being male and female supervisory or education cadres or male and female teachers, since it is a modern education supervisory trend with a practical and significant impact on the entire supervisory process [22].

The educational system faced a crisis that led to the closure of schools and the turning to e-learning; here, education supervisors needed to assist teachers [2, 9]. Therefore, this relationship had to be based on the principle of cooperation and guidance to achieve professional growth for teachers in light of these conditions encountered in the educational process and for the electronic supervisor to be ready to guide and support the educational process. In this context, the researchers raised many observations and questions: What should education supervision during COVID-19 do to make the teaching-learning process effective, and does it carry out its tasks with its current means [3, 15]?

Naturally, supervision was subjected to severe deficiency and confusion for some time due to a lack of aptitude in thought, experience, and resources. To see the difficulty of the change encountered, the most straightforward activity to be carried out by the supervisor was a viewing session. For example, when supervisors wish to measure the extent to which procedural educational goal is achieved, they monitor several aspects of the lesson, including: 1) the teacher's ability to determine the objective of the lesson; 2) the compatibility of the materials and procedures with the lesson objective; 3) the feasibility of achieving the goal within the lesson's allotted time; 4) recognizing the learners' developmental and cognitive levels; 5) the appropriateness of the methods and means and the performance of the teacher to the requirements of achieving the goal; 6) the extent to which all of this is capable of attracting the attention of learners and causing the positive interaction required from them and with them; and 7) interacting everyone with the surrounding environment.

Due to missing the possibility of synchronizing most of these elements, which makes the image of a distance education class a deficient one, only a few of these intertwined elements can be captured, such as amputated data that cannot be relied upon in building a perception of what happened; therefore, it is not possible to form a treatment plan. Based on that, what is more critical and complex, how do you act in such a situation? Accordingly, the current study has come to answer the following questions:

1) What is the level of satisfaction of Jordanian science and mathematics teachers with their relationship with education supervisors during electronic teaching during the outbreak of COVID-19?
2) Does the level of satisfaction of Jordanian science and mathematics teachers differ from their relationship with education supervisors during electronic teaching at the time of the outbreak of COVID-19 according to some variables (sex, class of school, number of years of experience, possession of information technology knowledge and skills)?

The importance of the study came from the reality that all humanity lived under the COVID-19 pandemic, which forced countries to continue education by employing technology by activating electronic classes and distance education (virtual classes). Hence, the current study was conducted to identify the degree of satisfaction of Jordanian science and mathematics teachers with their relationship with their educational supervisors.

The researchers hoped that the findings would present recommendations that serve all workers in the educational system, led by teachers, education supervisors, decision-makers, and school principals, and finally, help the student as the focus of the teaching-learning process.

The strength of this research lies in identifying the level of satisfaction of science and mathematics teachers with the performance of their educational supervisors during distance education. This takes several aspects, the most important of which is remote teaching of essential subjects that are considered the most difficult for students, in addition to the great interest in integrating science and mathematics courses with technology and engineering under the Science, Technology, Engineering, and Mathematics (STEM) Approach.

II. Literature Review

There is no doubt that education supervision is an essential element in the educational process because it is a collaborative, democratic, scientific, flexible, continuous process for improving and making the educational process more beneficial [23]. Because supervision is an administrative process, the supervisor's function is based on planning, organizing, coordinating, implementing, directing, following up, evaluating, and communicating [24]. When planning, it is essential to educate supervisors about modern education methods to be understood and used by teachers.

Furthermore, the teacher is considered an active and influential element in the educational process; hence, developing and training teachers has become critical. Additionally, many countries have invested significant amounts of money in training teachers, monitoring their performance, and paying attention to their professional growth to improve the quality of education they provide [25]. Preparing teachers encounter some challenges. These challenges include cultural challenges, sustainable development, information revolution, professionalization of education, and technology management. The teacher is not required to use technical means proficiently but must design the technology environment and its programs [26].

A successful educational supervision program is built to meet teachers' needs and concerns. Teacher professional

growth aims to help teachers face their problems and meet their needs, which usually differ due to their different preparation, experiences, abilities, inclinations, physical aptitudes, and general conditions. The education supervisor starts work from where the teachers stand and embarks on their mutual and individual needs. This matter requires knowledge of their academic qualifications, experience, conditions in which they work, and their professional and personal attitudes. This applies to new and old teachers alike. The education supervisor begins with the new teacher by providing him with a clear picture of his profession, the school in which he will work, the nature of the school environment, and the pattern of thinking that runs the local community; thus, the teacher can deal and interact successfully with others around him along with planning to visit the teacher in his school to help him start work with the least possible degree of tension to ensure harmony between the teacher and his new career. One of the tasks of the education supervisor is to search for ways to develop teachers and their continuous development so that they can meet the requirements of knowledge explosion, especially in the field of teaching careers and the employment of technology. This can be accomplished through theory accompanied by actual practice and scientific application aimed at increasing the competence of teachers and giving them the opportunity for research and experimentation [27].

The teacher is the main engine of the educational process and the source of its spirit, just as the education supervisor is considered the field leader of the educational process and the one seeking to achieve its goals represented in bringing about desirable changes in student behavior and ways of thinking. The creative education supervisor is the one who seeks to prepare the creative teacher who can build the creative student. This supervisor is the one who can invest the capabilities and preparations available to teachers to enable them to generate new constructive and practical ideas, carry out elaborate work, build cooperative human relations, and employ everything new in achieving the goals of education [28].

Al-Asadi and Ibrahim [29] argued that supervisors' play an integral role in developing teachers' skills and abilities. This role can be referred to as a leadership, democratic, cooperative, democratic, cooperative, and organized process that deals with the educational situation with all its elements, including the curriculum, means, methods, the teacher, and the student. The aim of studying the factors influencing that situation is to improve and organize them to achieve the best learning and teaching goals.

Some studies dealt with the level of teachers' satisfaction with their relationship with education supervisors. One of these was the study of Al-Omari [30], which aimed to identify the levels of teachers' satisfaction with the methods of education supervision practiced by education supervisors in the Irbid Governorate. The study concluded that the teachers were not satisfied with the supervision methods practiced by education supervisors in the Irbid governorate. Further, the degree of satisfaction with the methods of educational supervision did not differ according to the educational qualification and educational stage, while the degree of satisfaction with the methods of education supervision differed according to gender and experience.

Ghatashah [31] conducted a study to identify the degree of basic-stage teachers' satisfaction with the supervisory communication methods in the schools of Jerash Governorate. The study found that the levels of satisfaction of basic-stage teachers with the means of supervisory communication practiced by education supervisors were low on the whole tool; the highest degrees of satisfaction of teachers were in the field of individual interviews, and the lowest degrees of satisfaction of teachers were in the field of applied lessons. The researcher recommended holding seminars, courses, and intensive meetings for education supervisors in all supervisory communication media.

The study of Al-Kasasbeh [32] aimed to identify the degree of job satisfaction for secondary school teachers in public and private schools in the capital, Amman, and the factors influencing them. One of the most prominent findings of the study was that there were statistically significant differences in job satisfaction for teachers due to the sector variable and in favor of private sector teachers, and there were statistically significant differences due to the gender variable in favor of females. Further, this study confirmed that the human relations between the education supervisor and the teacher leave a positive impact on the hearts of teachers whenever they move away from evaluation, accountability, and monitoring.

Warren [33] also conducted a study to identify the relationship between the quality of communication, the quality of supervision, and job satisfaction. The researcher used questionnaires distributed to employees of (146) American and international colleges in North Carolina at the Conference Center to collect data. Among the most important findings were the quality of communication and supervision related to job satisfaction; further, the quality of communication contributed to explaining the level of job satisfaction of individual employees more than that of the quality of supervision.

Ghadah [34] conducted a study aimed at identifying the supervisory practices of education supervisors in the Amman governorate and their relationship to the attitudes of the upper-basic-stage teachers towards the profession. The researchers used two questionnaires: the first to measure supervisory practices and the second to measure teacher attitudes toward the career. The findings revealed that the level of supervisory practices came to a medium degree, and the level of attitudes of teachers of the upper-basic stage towards the teaching career came to a medium degree. Moreover, it revealed that there is a correlation between supervisory practices and teacher attitudes toward the profession.

The study by Hamad [35] aimed to identify the degree of education supervisor practice of human relations in secondary schools in the governorates of Gaza and its relation to teacher job satisfaction. The researchers prepared two questionnaires to achieve the objectives of the study: the first one was to measure the degree of education supervisor practice of human relations, and the second was to measure and achieve job satisfaction. The findings of the study revealed that the

education supervisor practice of human relations in secondary schools came to a large degree with no statistically significant differences in the averages of secondary school teacher estimates in the Gaza governorates associated with the degree of the supervisor practice of human relations due to the variable of gender, educational qualification, and years of experience. Moreover, there were no statistically significant differences in the averages of the teacher estimates of the degree of their job satisfaction due to the variables of gender, educational qualification, and years of service. However, there is a statistically significant correlation between the averages of secondary school teacher estimates in Gaza governorates of the degree of education supervisor practice of human relations and their job satisfaction averages.

The study by Al-Sawalmeh and Al-Qutaish [36] aimed to identify the degree of education supervisors' use of the Internet. Here, the researchers applied a questionnaire consisting of 32 items. The findings revealed that the degree of education supervisor use of the Internet was small. Further, the findings showed statistically significant differences in the degree of education supervisors' use of the Internet due to gender in favor of males; however, there were no statistically significant differences in the degree of education supervisors' use of the Internet due to the variables of experience and the research supervised.

Obada and Ababneh [21] aimed to identify the degree of effectiveness of employing Internet technologies in educational supervision in private schools in Amman from the point of view of teachers and educational supervisors. The most significant findings were that the degree of effectiveness of employing Internet technologies in educational supervision in private schools in Amman was vast for all fields; the study recommended that the rest of the private schools move to electronic supervision.

Dabab and Latrash [25] conducted a study aimed at identifying the preparation of teachers in Algeria and developing them professionally according to the lifelong learning concept, as this concept has become one of the basic concepts in modern educational systems that call for the necessity of continuing education even after the learner or student obtains higher certificates, even in professional, social and cultural life; this can be achieved through effective and creative contribution and diversification of educational tools, means, and methods in line with development to make the teacher a professional, a producer of knowledge, and a continuous developer of his professional practices. The globalization of the economy, continuity, progress of science and technology, and changes in society were among the reasons for adopting this concept. These reasons have led to severe problems and challenges. Algeria has worked to include lifelong learning to better train teachers in all educational stages, given the integration it preserves with the concept of sustainable professional development for them, as it contributes to increasing the teacher's professional growth and improving their performance in all aspects.

Selem's study [37] targeted schools in the Sultanate of Oman and followed the descriptive analytical approach through a questionnaire prepared for this purpose. It indicated the importance of electronic educational supervision and referred to its various roles in teaching and learning. It emphasized the need to activate this approach for its decisive role in learning reinforcement.

The study of Vaiz and Minalay *et al.* [38] reached similar findings. It emphasized the importance of electronic educational supervision instead of the traditional one, especially since many teaching and learning institutions have begun to adopt a mixed approach in teaching: traditional and distant. Further, the same study indicated that electronic supervision is remarked on by speed, ease, and low cost; additionally, it is more effective and compatible with online teaching and helps teachers achieve professional development.

Habibi *et al.* [39] reached similar conclusions in their qualitative descriptive study on teachers' perceptions of electronic supervision conducted in Indonesia. It indicated that 75% of the teachers support the development of this type of educational supervision because this can be activated at any time, regardless of the location of the education supervisor. Notes and feedback can be discussed directly and easily through the electronic platform to develop plans for amendment later. Moreover, it is possible to overcome some of the challenges and problems in education and direct educational or traditional supervision.

Kusmaryono *et al.* [3] found that Distance learning has increased in popularity during the COVID-19 pandemic as a new method of learning. However, the implementation via management learning systems still faces a problem. Regardless of the pros and cons, the results of the literature research suggest that distance education is as effective as face-to-face learning. The application of distance learning has many opportunities to develop rapidly as most academic institutions shift to this model. Improving the quality of distance learning programs poses a real challenge in developing challenging content that covers the curriculum and is engaging. It is strongly predicted that distance learning will be part of the normal learning process and completely replace the current face-to-face conventional teaching and learning.

III. Materials and Methods

A. Research Design

The researchers adopted the descriptive approach using inferential statistics [40]. They used descriptive statistics such as means, standard deviations, and the rank of each item of the study tool; then adopted advanced statistics using a One-way Analysis of Variance test (One-way ANOVA) since the requirements of this test were achieved.

B. The Study Population and Its Sample

The study population consisted of all Jordanian science teachers working in Jordanian schools in Irbid Governorate, Northern Jordan—for the academic year 2020/2021. The researchers built the questionnaire through the application of Question-Pro. Then, the questionnaire was distributed after verifying its validity and stability using the snowball method. It was sent to the biggest possible number of male and female teachers through their communication groups on social networking sites, especially WhatsApp. The study sample was distributed according to its variables, as shown in Table 1.

Table 1. Description of the study sample of teachers according to the study variables

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Teachers' Gender	Female	120	65.2	65.2	65.2
	Male	64	34.8	34.8	100.0
	Total	184	100.0	100.0	
School Type	Government	116	63.0	63.0	63.0
	Private	68	37.0	37.0	100.0
	Total	184	100.0	100.0	
Experience (years)	1–5	53	28.8	28.8	28.8
	6–10	41	22.3	22.3	51.1
	11–15	39	21.2	21.2	72.3
	>15	51	27.7	27.7	100.0
	Total	184	100.0	100.0	
Possessing technical skills	Yes	119	64.7	64.7	64.7
	No	65	35.3	35.3	100.0
	Total	184	100.0	100.0	

It is noted from Table 1 that the sample of the study included 184 male and female teachers, of whom 120 were females, 65.2%, and 64 males, 34.8%. They were distributed among public schools, 63%, and private schools, 37%. The number of years of experience of teachers was divided into four levels: the first level 1–5 years (No. 53, 28.8%); the second level 6–10 years (22.3%); the third level 11–15 years (21.2%); however, the fourth level, was from the category of teachers whose number of years of experience was more than 15 years (27.7%). Since the study is concerned with the relationship of teachers with digital educational supervision during the COVID-19 pandemic, and as distance education is conducted through the employment of technology, the study sample was classified in terms of their possession of information and communication technology knowledge and skills. Male and female teachers with technological knowledge and skills were 119 out of 184 (64.7%), and male and female teachers without technical knowledge and skills were 65 (35.3%).

C. Study Instrumentation

The researchers reviewed the theoretical literature and previous studies concerned with educational supervision and the nature of the relationship between teachers and supervisors [2, 3, 40]. Then, they built a tool according to the six-point Likert scale (strongly agree: 6; agree: 5; somewhat agree: 4; somewhat disagree: 3; disagree: 2; strongly disagree: 1) for positively formulated items, and vice versa for the negative paragraphs. They considered this when analyzing the findings through the Statistical Package for the Social Sciences (SPSS) program instead of the five-way to avoid respondents resorting to the medium (neutral) option to increase the accuracy and credibility of the findings. The tool contained 20 items in its initial form, in one dimension aimed at identifying the level of teachers' satisfaction with the mutual relationship between teachers and electronic educational supervision, especially during the COVID-19 pandemic.

D. Validity and Reliability of the Instrument

To test the validity of the instrument, the preliminary version, consisting of 20 items, was submitted to a board consisting of six experts. Two were faculty members at Yarmouk University, Jordan majoring in science and mathematics curricula; two education supervisors for science and mathematics at MoE, Jordan; one female teacher majoring in physics and one male teacher majoring in mathematics. The experts were invited to give their feedback regarding the clarity and suitability of individual items and their appropriateness for gauging the goals designed to measure. In light of their comments and opinions, the arbitrators deleted four items according to some criteria, necessary adjustments were made to three items, and the final version of the instrument included 16 items. The researchers also calculated the reliability factor through the Cronbach Alpha equation, obtaining 0.932. This result is considered good and acceptable for scientific research purposes [41, 42].

E. Statistical Standard

Items of the questionnaire are classified into three categories denoting Weak (W), Medium (M), and Strong (S) according to the numerical value of the mean (m) of the individual items. For item classification, we adopt the following equation [43, 44] to obtain the paragraph class width P.

$$P = \frac{U - L}{N}$$

where U and L represent the upper and lower limits of the scale, respectively, and N represents the number of required categories. To obtain the numerical value of P, we substitute for U, L, and N in the above equation, which yields.

$$P = \frac{6-1}{3} = 1.67$$

Using the numerical value of P, namely $P = 1.67$, the three category intervals are determined along the range between 1.00 and 6.00. They were found to take the following values: W $\in$ (1.00, 2.67), M $\in$ (2.68, 4.35), and S $\in$ (4.36, 6.00), representing weak, medium, and strong, respectively. As an example, an item who's mean (m) lies within the range of 4.36 to 6.00, i.e., satisfies the inequality ($4.36 < m < 6.00$), is categorized as S, denoting strong.

IV. Result and Discussion

A. Result

Assumptions associated with normality and linearity of regression. Based on the range of the value suggested by Mallery and George [45], it was found that the skewness and the kurtosis values were approaching zero, which led to the conclusion that the distribution of the results scores was close to the normal shape. Also, the findings of this study did not violate the assumption of a linear relationship between variables.

To answer the first question: "What is the level of satisfaction of Jordanian science teachers with their relationship with education supervisors during the COVID-

19 outbreak?" The researchers calculated the arithmetic means and standard deviations of the level of respondent satisfaction in each of the sixteen paragraphs of this tool, noting that the number of respondents was 184 male and female teachers. Table 2 exhibits the findings.

Table 2. Means, standard deviations, and item classification for the level of satisfaction of Jordanian science and Math teachers concerning their relationship with education supervisors (*N*=184)

No	Items	Mean	SD	Category
1	The educational supervisor's electronic visits and directions enhance my teaching to my students	3.91	1.46	M
2	Electronic educational supervision helps the teacher in solving the problems he encounters	4.02	1.34	M
3	The teacher has a positive change after the educational supervisor's electronic visit	4.13	1.34	M
4	The educational supervisor appreciates the teacher's conditions if he informs him of them, especially under electronic supervision	4.27	1.20	M
5	The educational supervisor provides teachers with opportunities to develop their level, especially regarding distance education	4.09	1.31	M
6	The educational supervisor encourages teachers to employ technology in education in all circumstances	4.38	1.19	S
7	The reports of the educational supervisor for the electronic visit on the teacher are in conformity with reality	3.92	1.25	M
8	The educational supervisor is fair in his dealings with teachers in electronic visits	4.20	1.15	M
9	The educational supervisor evaluates the teachers comprehensively in distance education	3.92	1.23	M
10	The educational supervisor provides teachers with the most outstanding field experiences, especially regarding distance education	3.88	1.30	M
11	The educational supervisor provides notes and feedback in an appropriate manner in electronic supervision.	4.04	1.26	M
12	The educational supervisor provides updates on the teaching material on an ongoing basis, especially in distance education	4.08	1.32	M
13	I find enough space for effective dialogue with the educational supervisor during electronic supervision	4.22	1.28	M
14	I feel satisfied with my work as a distance-learning teacher	4.95	1.04	S
15	I welcome the visit of the educational supervisor to a remote classroom visit at any time	4.59	1.16	S
16	I would like to work under the current supervisor and do not want to change him\her	4.45	1.13	S
The overall level of teachers' satisfaction towards their educational supervisors		4.2		M

The findings in Table 2 show that the general arithmetic mean of the items related to the level of satisfaction of Jordanian science teachers with their relationship with education supervisors during the COVID-19 outbreak period was 4.20. This indicates that the level of Jordanian science teacher satisfaction with education supervisors came within the middle category. At the time, the highest arithmetic mean came for the paragraph 14, which amounted to 4.95, indicating the teacher's satisfaction with his career. The two paragraphs, 16 and 15, which shared the second highest arithmetic mean, amounted to 4.45 and 4.59, respectively, because the fourteenth paragraph indicated a continuous and open welcome for education supervisors to visit classroom sessions; however, the sixteenth paragraph confirmed the teacher desire to work in the same place under the supervision of the same education supervisor emphasizing unwillingness to change his supervisor. Despite this, it is found that some of the paragraphs came within the middle category, and paragraphs 10, 1, 7, and 9 were the lowest, with arithmetic means 3.88, 3.91, 3.92, and 3.92, respectively. This refers to the weakness of the education supervisor in providing teachers with the best teaching and learning practices, especially those related to e-learning and distance learning. The first paragraph confirmed this, as it indicated a decrease in the effect of the education supervisors' visits to teachers concerning their teaching practices. In the same context, it is found that the responses agree with each other, as the teachers see that the education supervisors' reports do not correspond to a large extent with the reality in the field and that the evaluation of the education supervisors of the teachers avoided the comprehensive evaluation of the teachers. This can be attributed to the high level of teachers' expectations of the work of supervisors and their impact on developing and enhancing the skills and practices of teachers in the classroom. Perhaps this explanation is because many teachers in the field hold high academic degrees such as master's and doctorate, and this is reflected in the wide level of horizon expressed by the teacher whose satisfaction standard is high. On the other hand, there may be a weakness in teachers' understanding of the spaces and powers granted to education supervisors according to the applicable system.

To answer the second question, which states: "Did the level of Jordanian science teachers' satisfaction with their relationship with education supervisors differ during the COVID-19 outbreak, according to some variables (sex, class of school, number of years of experience, possession of information technology knowledge and skills)?" The researchers calculated the arithmetic means and standard deviations associated with the teacher's gender, class of the school, number of years of experience, and possession of information technology knowledge and skills. The findings are shown in Table 3.

Table 3 indicates the arithmetic means and standard deviations of the satisfaction of Jordanian science teachers' level about their relationship with education supervisors according to some variables. A very slight difference in the mean between males and females of (0.04) is found in favor of males, as the mean for males was 4.22 with a standard deviation of 1.006. The mean of females was 4.18, with a standard deviation of 0.815. The mean of the level of public-school teachers' satisfaction with the education supervisors

was 4.08, with a standard deviation of 0.926, while the arithmetic mean of the private sector teachers' satisfaction with education supervisors was greater and amounted to 4.38, with a difference of 0.30. The arithmetic means of the level of satisfaction of Jordanian science teachers about their relationship with education supervisors according to the number of years of experience varied. The lowest average was for the category of teachers with experience of 6–10 years, with an average of 4.094, while the highest average was for teachers with the lowest experience within the category of 1–5 years, with an average of 4.310; while the average for the two higher categories 11–15 years and over 15 years was close to 4.142, 4.197, respectively. Since the study during the COVID-19 pandemic was conducted online, it was concerned with the variable of teachers' possession of technical knowledge and skills. The arithmetic means for those with the lowest technical skills came to 4.183, while the average teachers' satisfaction with their relationship with their supervisors came from the category of those who do not possess the highest technical knowledge and skills at 4.218. By reading the above findings, it is found that there are apparent differences of varying size in the arithmetic mean of the level of satisfaction of Jordanian science teachers with their relationship with their supervisors for most of the study variables: gender, the type of school in which the teacher works, number of years of experience, and possession of information technology knowledge and skills. To ensure the significance of the differences, the researchers performed an ANOVA variance analysis. The findings are shown in Table 4.

Table 3. Means and standard deviations of the satisfaction of Jordanian science teachers' level with their relationship with their principals, according to some variables

Variable					95% Confidence Interval for Mean		
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound
Teachers Gender	Female	120	4.1807	0.81517	0.07441	4.0334	4.3281
	Male	64	4.2227	1.00624	0.12578	3.9713	4.4740
	Total	184	4.1953	0.88379	0.06515	4.0668	4.3239
School Type	Government	116	4.0841	0.92655	0.08603	3.9136	4.2545
	Private	68	4.3851	0.77580	0.09408	4.1973	4.5729
	Total	184	4.1953	0.88379	0.06515	4.0668	4.3239
Experience (years)	1–5	53	4.3101	0.91667	0.12591	4.0575	4.5628
	6–10	41	4.0945	0.77145	0.12048	3.8510	4.3380
	11–15	39	4.1426	0.78259	0.12531	3.8889	4.3963
	>15	51	4.1973	1.00936	0.14134	3.9134	4.4812
	Total	184	4.1953	0.88379	0.06515	4.0668	4.3239
Possessing technical skills	Yes	119	4.1828	0.94075	0.08624	4.0120	4.3535
	No	65	4.2183	0.77514	0.09614	4.0262	4.4103
	Total	184	4.1953	0.88379	0.06515	4.0668	4.3239

Table 4. One-way analysis of variance ANOVA for the level of satisfaction of Jordanian science teachers with their relationship with their education supervisors

Variable		Sum of Squares	df	Mean Square	F	Sig
Teachers Gender	Between Groups	0.073	1	0.073	0.093	0.760
	Within Groups	142.865	182	0.785		
	Total	142.938	183			
School type	Between Groups	3.886	1	3.886	5.086	0.025
	Within Groups	139.052	182	0.764		
	Total	142.938	183			
Experience (Years)	Between Groups	1.224	3	0.408	0.518	0.670
	Within Groups	141.714	180	0.787		
	Total	142.938	183			
Possessing technical skills	Between Groups	0.053	1	0.053	0.067	0.795
	Within Groups	142.885	182	0.785		

The findings in Table 4 indicate that there is a statistically significant difference in the level of satisfaction of Jordanian science teachers about their relationship with their education supervisors for the variable of the type of school in which the teacher works (F = 5.086, Sig = 0.025) in favor of private sector teachers. The findings show that the value of the statistical significance at $\alpha = 0.05$ for the level of satisfaction of Jordanian science teachers with their relationship with their education supervisors for the rest of the study variables: gender, number of years of experience, and the teacher's possession of information technology knowledge and skills is greater than 0.05. This means that there are no statistically significant differences for these variables. For Gender, F= 0.093, Sig = 0.760; for the Experience, F= 0.518, Sig = 0.670; for the Possessing technical skills, F= 0.067, Sig = 0.795.

B. Discussion

The finding of the average level of science and mathematics teachers' satisfaction with education supervisors was medium. This finding is considered good, but it is below the expected level, as it can be attributed to many factors, including the occurrence of this type of educational supervision due to the COVID-19 pandemic, which forced most educational and higher education institutions in the world to move towards virtual education and distance learning [2, 3, 15, 40]. This means the lack of appropriate readiness in the school infrastructure, on the one hand, as well as the lack of readiness and ability of teachers and supervisors to provide education requirements. Further, distance learning in their homes, in particular, was sometimes accompanied by curfews and the closure of markets, which means that there

was no opportunity to provide the requirements for this form of education and learning, in addition to the high financial cost of both the teacher and the supervisor, and thus limiting themselves to the minimum provision of the requirements of e-learning. Moreover, teachers and supervisors did not have sufficient knowledge and skills to employ technology effectively in their work, and the lack of time prevented the provision of professional development programs for them to carry out their work requirements. Also, educational supervisors are mostly those with long experience who tend towards regular and in-person teaching and educational supervision and do not trust or prefer electronic education and supervision, especially for science and mathematics. There were factors related to the strength of the Internet, its lack of coverage in some areas, and the great pressure on Internet servers [1, 2, 40]. This is in addition to the fact that the nature of the content had not been redesigned to comply with distance education, thus creating some dissatisfaction among teachers and supervisors regarding that matter as well as the lack of clarity in the mechanisms for dealing with that; additionally, the evaluation criteria and responsibilities were unclear for both the teacher and the education supervisor in employing electronic supervision appropriately.

The finding of the second question of the study confirms the existence of a statistically significant difference in the level of satisfaction of Jordanian science and mathematics teachers with their relationship with their education supervisors due to the school class and in favor of private school teachers. The variables are gender, number of years of experience, and possession of technical skills [1, 2, 40]. This can be attributed to many reasons, the most important of which is the interest of private schools in the continuous follow-up of the work of teachers and their readiness, as well as the presence of a resident supervisor for each field, such as science and mathematics; further, most private schools are located in cities with the availability of strong and appropriate Internet connections; additionally, private schools have provided services for teachers to continue work in a larger way than public schools because parents pay high fees for teaching their children and want distinguished and quality service. This requires schools to activate electronic teaching and supervision effectively, providing training programs for teachers and supervisors that enhance their knowledge and skills for digital mastery in their work; in addition to the fact that most of the mathematics and science teachers in private schools are from the new generation that is well versed in modern technology and its tools. The keenness of private schools to build close and professional relationships between teachers and education supervisors can be added. While government teachers are less committed to implementing school instructions, including the use of technology with added value, because they are government employees protected by law, the school administration and the educational supervisor cannot complete his work, whether directly or indirectly, compared to a private school teacher. This also applies to the government educational supervisor. This may be one of the reasons for their low level of satisfaction with electronic supervision. On the other hand, it was found that there are no statistically significant differences in the level of satisfaction of science and mathematics teachers with electronic supervision due to the teachers' gender, experience, and technological mastery. This finding seems logical, as the general circumstance - the COVID-19 pandemic—forced all schools for males and females, regardless of experience or technological ability, to resort to distance education; therefore, the work of supervision became distance as well. Moreover, the possibility of the ministry and the agencies providing necessary services for distance education, such as the Internet, computers, and other infrastructure, do not distinguish between the gender of the school or the experiences of its teachers and their mastery of technology. The conditions in which teachers work are similar for both males and females, and there is no preference for one over the other. In addition, the educational supervisor may be male or female and may visit a male or female teacher.

The findings of this study are consistent with some other studies in terms of the level of teachers' satisfaction with electronic educational supervision [21, 30, 32–35, 37–39]. It also differs from some studies [3, 31, 36, 40].

V. Conclusion

The results of the study indicated that the average level of satisfaction of Jordanian science and mathematics teachers towards electronic supervision was medium, and the satisfaction of science and mathematics teachers in private schools towards electronic supervision was better than in public schools. The results did not indicate differences in the level of Jordanian teachers' satisfaction with electronic supervision based on the teacher's gender, number of years of experience, or possession of digital skills. These results are considered important for educational planners and decision-makers in enhancing the requirements for electronic supervision, and training all stakeholders (students, teachers, educational supervisors, officials of technological laboratories in schools...and others) on how to employ technology in their work, including teaching and electronic supervision. It is also considered an indicator of the importance of providing the infrastructure for electronic supervision of schools and educational supervision offices.

Based on the study findings, the researchers concluded that e-learning and educational supervision become a necessity rather than a requirement; therefore, it is necessary to take all measures, including preparing the infrastructure and providing services that enhance the process along with enabling workers in the field, including teachers and supervisors, to activate technology with an added value that achieves the goals, as well as redesigning the various courses, not just science and mathematics, to be compatible with the theories and models of education and electronic education supervision.

Nevertheless, there are several limitations in this study. The study sample was limited to science and mathematics teachers working in public and private schools in Irbid Governorate in northern Jordan. This study was also limited to the academic year 2020/2021 and conducted within distance due to the outbreak of the COVID-19 epidemic; the study sample included 184 male and female teachers, which may not confirm the generalization of the findings to all teachers and demographic areas in Jordan; further, the findings of the study depended on the degree of validity and reliability of the tools used.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Dr. Ali Bawaneh, stated the research idea, wrote with Dr. Subreen Al-Salman, the introduction, and the problem statement of the study, Dr. Subreen collected the data, and Dr. Bawaneh analyzed the data and reported the results. Dr. Belal Rabab'h wrote theoretical literature and previous studies, and prepared references according to the journal's template, and Dr. Yazan Alghazo discusses the results as it was a joint work by all authors, Dr. Yazan also reviewing the reviewers' comments and linguistic verification, as English is his mother tongue, all authors had approved the final version.

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