

Measuring Students' Interaction in Distance Learning Through the Electronic Platform and its Impact on their Motivation to Learn During Covid-19 Crisis

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Abstract

This study aimed at measuring students' interaction in distance education through the electronic platform among intermediate school students, by identifying the level of students' interaction in distance education and differences between them, as well as its impact on their motivation to learn. To achieve the aim of the study, two scales were designed for this purpose and were applied to a sample consisting of (268) individuals. The results showed that the level of students' interaction through the e-learning platform was at a high level. The results also showed that there was no statistically significant difference between the mean scores of males and females in the scale of students' interaction through the e-learning platform. There was no statistically significant difference between them in their motivation for distance learning via the online platform. There were also no statistically significant differences related to the grade variable in the level of interaction through the electronic platform and in the motivation to learn, while there was a positive statistically significant effect of interaction through the electronic platform on students' motivation to learn.

Key words:

Measuring Students' Interaction; Distance Education; Electronic Platform; Learning Motivation

1. Introduction

The field of education and learning is one of the most diverse fields that contain multiplicity and difference in the possibility of presenting it and benefiting from it, based on many considerations, including the conditions of learners and their ability to interact and communicate with their teachers through various means, as well as the conditions of teachers and their capabilities in presenting and providing educational subjects and scientific guidance to learners (Almaleki, 2016; Wardley et al., 2016a).

Considering the scientific and technological revolutions that the world is experiencing today, technological development has become a feature of contemporary societies, and it has resulted in an increase in competitiveness between different countries in the use of technology and its applications in all fields, especially in the field of education. Distance education appeared through electronic platforms to play its basic role in

solving problems facing traditional education, such as a shortage of a cadre of teachers, and overcoming the barriers of time and space. With continuous development, e-learning went beyond the mere presentation of courses through websites to including all the requirements of managing the teaching and learning process. Most of the distance education platforms are among the most important e-learning management systems used by most educational institutions around the world because of their excellence in creating interaction between students and their teachers on the one hand and between students and each other on the other hand, through virtual classes, seminars and the ability to send and correct assignments and tests easily [3], [4].

With every crisis, profound challenges and opportunities emerge for transformation, previous education crises have shown that it is possible to rebuild better. If there is a future lesson for education systems in the world, it is that it should work with high flexibility, predicting future scenarios including epidemics, long-term disasters and comprehensive effects and teaching problem-solving skills, crisis management, thinking skills and communication skills which are considered the most important pillars of any successful education. This education must be directed by a flexible, technical citizen who is able to solve problems and communicate as Education will not stop at limits, nor will it stop when students are absent from schools. Rather, it can overcome considerations of time and place, tools, pandemics and crises [5]–[7].

Considering the Corona outbreak, and the measures taken by different countries to protect their citizens, including school and university students, on the list of these measures is the imposition of a complete and partial lockdown, so it has become imperative for educational institutions to replace classroom education with distance education. This rapid and sudden transformation has placed the responsibility on those in charge of teaching different subjects, and it has become imperative for everyone to employ distance learning platforms and the various software needed to teach their courses and

communicate with their students efficiently and effectively and try to raise their motivation to learn, especially since it is an unprecedented experience for public education students in most schools [8].

Therefore, distance electronic learning is considered one of the most prominent products produced by the modern revolution in communication and information technology, as the latest findings of these technologies in terms of devices, programs and electronic display methods have been harnessed in the educational process, which provides the opportunity for students to interact directly and indirectly with courses, teachers and colleagues [9], [10].

Distance education means all that is provided to students outside the physical limits of the educational institution, using electronic means that obviate their attendance to the classroom, as is the case in traditional educational institutions (school / university) through live or recorded broadcasts or CDs, or the ability to choose audio-visual programs and applications that contain interactive sites in the field of educational and teaching methods, including: WhatsApp, Google Meet, YouTube, Zoom, Black Board, Microsoft Teams and other modern educational sites that are available on the internet through laptops and smartphones to facilitate the process of communication between teacher and student. Distance education is not based on face-to-face meetings and direct self-communication, as it lacks the element of physical presence and attendance as is the case in traditional education [11], [12].

The electronic learning platform is also known as the platform or space that allows the electronic content to be displayed to students and allows the management of learning processes electronically starting from the registration of students in the course to the presentation and interaction with the content and the evaluation of the students' performance and the extent of their learning. Examples include: (Moodle), (Black Board) and (Microsoft Teams) systems [5], [13], [14].

Distance e-learning aims at several goals, perhaps the most important of which is creating an interactive learning environment using modern technologies, and the diversity in knowledge sources, means and methods of presenting them, taking into account the individual differences between learners. E-learning also seeks to provide learners with the skills of using communication technologies [12], [15]. It also helps the teacher to deliver scientific subjects in various forms and methods by employing modern technology skills. E-learning also supports interaction between students and teachers through educational experiences, discussions and targeted dialogues, using various communication channels such as e-mail, chat rooms in educational platforms and virtual classes [9], [10], [16], [17].

Xu and Xu [18] explained many of the characteristics of distance e-learning, including: the interactive environment provided by e-learning between teacher and student and between student and colleagues, the diversity of stimuli, flexibility in space and time, support for self and cooperative learning, and the ability to measure outcomes as in traditional learning. No matter how old a learner is, he can continuously enrich his learning. Basilaia and Kvavadze [19] adds that among the characteristics of e-learning: The increased interest in planning for teaching in this type of learning, the increase in cooperation between teachers and students, and the change of the role of teachers and students. Thus, we find that the characteristics of e-learning include all its components and focuses primarily on the student to be distinguished with initiative and effectiveness.

The issue of focusing on goals in the case of distance education takes us to what students need, as they are the main and effective party in the educational process and because of their scientific and practical stature in which they can overcome learning difficulties. This is represented in a set of abilities and skills that indicate their communicative and interactive competence in gaining knowledge, such as the ability to analyze, clarify, represent, construct, and engage in dialogue between them and the teacher via live line through discussion and commenting on the content of the presented course and practicing reading the main concepts of it. As well as their ability to present their scientific work in its procedural applicable side in a distinctive way, and in a persuasive manner that enhances their personalities and allows them to work and follow up with passion and ambition. Thus, this conversational interactive practice pushes them to follow and pay attention seriously and with interest and increases their motivation to learn and motivate them to creativity [20], [21].

Like most countries in the world, the Ministry of Education in the Kingdom of Saudi Arabia resorted this year to the application of e-learning at all levels of education, which was a new experience, especially for public education students in KSA, which requires studying, evaluating, and benefiting from it as much as possible. Because continuous communication and positive interaction of students in any educational environment, whether with their teachers or colleagues or the educational subjects they study, are considered the basis on which the goals of teaching and learning are achieved; the current study aims to identify students' interaction in distance education through the e-learning platform, and the measurement of the effect of this interaction on their motivation to learn (Adnan & Anwar, 2020; Alea et al., 2020; Almaleki, 2020, 2021; Wardley et al., 2016, 2019). Improving the education process and the quality of learning in the different school stages in order to prepare children and youths in a distinguished manner for an

increasingly complex life in this century which is characterized by rapid biotechnological development, the explosion of knowledge, and information and communication revolution, is considered one of the most important educational issues [3]. The importance of e-learning has recently become clearer greatly because the Corona pandemic has forced all educational institutions in all countries of the world to activate the process of distance education in all educational levels without exception. This opens a very large field for researchers to study the process of education and distance learning and evaluate it from several aspects, as well as measure its impact on many psychological variables, hoping that the results of these studies will help improve the distance education process and help those concerned with it in developing and improving it in order to achieve the desired goals as best they can (Daniel, 2020; Dost et al., 2020).

Given that distance education via electronic platforms requires a distinct quality of teaching and effective methods of learning, by creating an active learning environment in which the student interacts positively which in turn ensures his real learning and his acquisition of many new knowledge and information in order to achieve the expected ambitious educational levels. Therefore, electronic platforms must be taken into account as well as studying it and find out how and what kind of interaction could be done through it [5].

In light of the current circumstances that have made most educational institutions in most countries, including Saudi Arabia, to apply distance education as an alternative to traditional education, and based on the new perspective of education and achievement; we find that the use of technology in education has a clear effect on the performance of the teacher and the learner and their achievements in the classroom [31].

After reviewing the academic literature related to distance education, its patterns and means of activating it, and through the observation of the methods used in distance education through the e-learning platform in public education, whether by students or teachers, and believing in the importance of providing an active learning environment in which the student interacts positively with the course content that he study, with his teacher and with his colleagues in order for him to achieve real learning and acquire knowledge and information; the topic of the current study has been chosen, especially since distance education is considered a new experience for students in the general education stage in the Kingdom of Saudi Arabia, which requires studying and evaluating its effectiveness from several aspects. This study aimed to measure students' interaction in distance education through the electronic platform and to know its impact on their motivation to learn by discussing the following questions:

1. What is the level of student interaction in distance education via the electronic platform?

2. Are there statistically significant differences between the averages of students' scores in their interaction on the electronic platform due to the variables (gender, grade) ?
3. What is the level of students' motivation to learn through the electronic platform?
4. Are there statistically significant differences between the averages of students' scores in their motivation for distance learning through the electronic platform due to the variables (gender, grade) ?
5. What is the effect of students' interaction in distance education via the electronic platform on their motivation to learn?

Researching topics related to education is a necessary, vital and renewed requirement because of the importance of this field and the great impact on students in various fields. Distance education is currently considered a modern and pioneering experience in the Kingdom of Saudi Arabia. In light of the importance of e-learning, which has become a basic option in the current era, it appears to us the importance and need for this experiment, a study that can contribute to the benefit of the concerned authorities in knowing the extent of the success of this experiment, learning about its strengths and weaknesses, and helping decision-makers in making appropriate decisions about it to improve it and overcome the difficulties and obstacles it faces; to be able to achieve the goals for which it was set [17], [20].

This current study was of great importance because it was a study that focuses on shedding light on the students' interaction in distance education through the electronic platform and measuring the reality of this interaction and evaluating it from the students' own point of view. This in turn reflects positively on improving the quality of students' education, cognitive achievement, and their achievements. This study reveals specific reasons for students' positive interaction in distance education, which may increase their motivation to learn. The reasons that reduce their motivation for distance learning and limit their enthusiasm for interaction through the electronic platform can also be identified from an objective and realistic point of view. This study may be a new addition to scientific research and studies related to this topic [32], [32].

2. Theoretical Consideration

2.1 Distance Education

Educational systems have witnessed great developments at the level of learning and teaching strategies as a result of the development of the means of communication as well as the revolution of information

and technologies. So, it has become imperative to develop educational systems in line with the new technological revolution [5], [31], [33]. Dhawan [13] points out that no educational system can neglect special changes in technological and technical fields, rather it has become necessary to reform the educational system in line with the requirements of the educational process, and with the nature of modern communication and contact tools.

The world is currently witnessing a crisis that may be the most dangerous in recent times, which is the Corona pandemic, which has had a negative impact on all activities and sectors of life, including the education sector. According to the UNESCO report, "Education disruption due to the new Corona virus and its response", more than 100 countries closed schools, which affected more than half of the world's students, and this resulted in the choice of distance education to continue the educational process [7], [34], [35].

Distance learning is a process of interaction between the learner and educational experiences through various educational means. As what it provides in terms of virtual resources and interactive tools enable the students to communicate with the teacher in educational situations directly through technological and virtual means through which he can communicate with educational resources that are not in front of him directly, because modern technology maximizes learning resources and facilitates the process of acquiring them [36]–[38].

Distance education is a type of education in which educational subjects are re-produced electronically and then published using any technical means to enhance communication between teachers and learners and the educational institution as a whole. It is where students can interact with educational content at any time in relation to their educational needs [39]. It is a type of e-learning characterized by the absence of direct communication between the teacher and the student, as educational subjects are prepared electronically and then published using any technical means and the student is left free to choose the appropriate time to interact with the educational content [40].

Distance education can be implemented through several technical means such as the Internet, telephone, radio, television, messages, or e-mail communication during crises. However, the problem is that the current curricula are not designed for this type of education, but rather they are designed for traditional education, which reduces the effectiveness of distance learning in this case [32].

Distance education includes various types of education, including computer education, education using the MICROCOMPUTER, which includes mobile phones, computers, etc., and which also includes other types of education; including direct education through direct broadcasting on Google applications and others, including

indirect education through reordering lectures and upload them to YouTube for students and everyone who needs to watch them [12], [15].

Distance education is sometimes a strategic option for some educational institutions, but the most prominent development that pushed institutions to adopt distance education was the Coronavirus (COVID-19) pandemic, as the pandemic led to the closure of schools during the pandemic to stop the spread of the virus [7], [41].

Among the methods that have received approval during distance education and learning in light of the Corona pandemic is the use of video conferencing programs such as: Google Meet, Black Board, Zoom Meeting, Microsoft Teams because these programs offer the ability to share the entire screen or a specific window, which allows the sharing of presentation information such as documents, presentations, spreadsheets, interactive electronic software, and more [20], [31], [33], [42].

2.2 Distance Education Platforms include the following systems

Learning Management Systems: Education management systems are concerned with following up administrative processes, regardless of the learning content, as they handle the registration processes, set schedules, deliver educational content and tests, follow up on students' progress and try to overcome any difficulties that may face them (Almaleki, 2021).

Content Management Systems: It is a set of tools that enables the teacher to compose educational content for a specific course, and to present it through the internet without prior knowledge of programming languages [32].

Learning Activities Management Systems: Learning activities management systems provide a suitable environment for learners to communicate and interact. Electronic learning activities management systems are often open source to facilitate the editing of educational activities, as they provide many capabilities and facilities for the teacher to make groups of individual or participatory educational activities and provide appropriate feedback for learners, these systems can work separately or integrated into other systems [23], [42]. Examples of these systems are Microsoft Teams Moodle and Black Board.

There are several basic standards included in distance education, and if one of these criteria is absent, the situation will differ from what it is assumed that distance education is supposed to be. Wotta [35] and Giovannella [5] presents them as follows:

Institutional Performance: It is based on the idea of formal or traditional educational institutions (schools / colleges), and it is a condition of the distance education process, so we can distinguish between the concept of distance

education and the concept of self-learning or independent study.

The Temporal and Spatial Distancing between Teacher and Students: Some may think that distance education includes spatial distance of the vocational institution only, meaning that there is a physical distance separating the teacher and the learner, but this may also include temporal distancing, as asynchronous distance education means providing education at some time and receiving it by students at another time or at any time they choose. So, it is necessary to consciously determine the degree of temporal and spatial distancing between teachers and students.

Interactive Communication: It is a very important criterion, but not at the expense of the educational content, meaning that we provide suitable interaction for students to interact with their research resources or with the teacher in an available and organized manner at the same time.

Linking Teacher, Students, and the Presented Subject Together: It means making the student interact with the content of the prescribed subject to make education possible and successful. This content must be subject to appropriate educational design procedures, so that it can be accommodated within the educational experiences of students, and thus enhance learning. The presented subject may include visual, tangible, or audible sources.

These systems are main channels of communication between the teacher and his students. Each institution and each teacher choose what suits them and their students according to what is available to them. Some universities and schools use closed source commercial software in exchange for a fee for the production party, and here the user is well able to run the software and invest its capabilities, However, he is unable to modify or develop them as his own needs may require, so some educational institutions have left teachers and faculty members free to deal with open-source software to choose what is most suitable for them and their students. This type of software is often free and scalable, but it is difficult to adopt it largely due to the lack of technical support available to it [6], [38].

Science is one of the subjects whose teaching methods have varied, starting from the traditional method such as lecturing, discussion and some scientific methods, moving to modern trends in science education such as programmed education that depends on the idea of self-learning so that the learner carries out various educational activities according to his abilities, speed and level to achieve the learning outcomes required. The teacher's role is limited to the role of a guide, facilitator and encouraging of the learning process (Almaleki, 2016, 2021b, 2021c).

The use of technology has become one of the most important issues in science education today, especially as it

is one of the recommended scientific and engineering practices in the next generation of science standards according to the standards of the National Council of the United States of America [13], [46]; as it helps and facilitate the methods of teaching science electronically to better explain phenomena and processes, especially simulating dangerous phenomena, and linking abstract concepts with physical concepts, which encourages learners and increases their motivation towards the learning process[28], [47]. Also, students should study science and acquire it as a skill in order for this learning to be meaningful [48].

Given the characteristics of the science subjects that distinguish it from the rest of the school subjects in terms of the logical sequence of topics and their interrelationship, and the cumulative characteristic of students' cognitive construction; Specialists in curricula and methods of teaching science have found that it is a priority to take advantage of the capabilities and advantages of technological means to support its learning and develop methods of teaching based on what studies have indicated, such as the study of George [14] and Karakaya [49], in terms of teaching science in various educational stages using technological means, improves students' academic achievement, enhances their self-learning opportunities, raises their motivation, increases their positivity towards the subject and pushes them towards learning it [50].

Among the advantages of using e-learning in teaching science is that the learner becomes the centre of the educational process instead of the teacher, as well as the learner's progress in the learning process according to his speed and abilities, the positive interaction between the learner and the educational position, and the learner's self-evaluation without being shy of making mistakes in front of his colleagues [51].

2.3 Interaction in the E-Learning Process

There is no doubt that the education process is a continuous process of communication and interaction between each teacher and his students on the one hand, and the students themselves on the other hand. This interaction in the classroom is the backbone of e-learning. Through interaction, the student can fully immerse himself in the electronic learning environment. The nature of student interaction in the e-learning environment varies according to the type and nature of interaction as well. Interaction also depends heavily on the available techniques in designing student interaction with interfaces [29], [49].

There is no doubt that effective communication of students in educational situations increases their motivation to learn. It can be said that the diversity in methods of presenting the course subject and educational activities is one of the factors that leads to attracting

students' attention, keeps them away from distraction, reduces feelings of boredom and increases their feelings of enthusiasm, especially in distance education, which may make the student feel somewhat isolated from the learning environment. This confirms the importance of integrating him through positive interaction with his teacher and colleagues, in order to stimulate their desire to learn [51], [52].

Hence, the importance of the teacher's role and the contribution that he provides in terms of educational practices and situations in creating different interactions between learners and educational subjects, and between learners each other is emphasized. In addition, good experiences and a positive educational environment, which is free from negative repellents, stimulates students' motivation to learn. This would help the students to develop their own motivation in order to succeed, and to integrate into the educational process with motivation that emanates from the student, not imposed on him from outside [53], [54].

Several studies have identified the types of electronic learning interactions in e-learning environments, such as the studies of Ebner et al [55], Favale et al [56], Radha et al [57] and Aboagye et al [58]. All previous studies agreed on the types of electronic educational interactions, which are the interaction between the learner and the content, the interaction between the learner and the teacher, the interaction between the learner and the learner.

2.4 Interaction between the student and the content in the electronic educational environment

This type of interaction aims to deal with the goal of the interaction directly, which is to achieve the educational objectives contained in the content. This type of interaction is the basis for all other interactions. This type occurs when students study content, take exams, or participate in classroom activities.

The interaction between the student and the content is more interactive and positive within the virtual classroom if written, audio or visual educational materials are used that excite their senses, such as involving the learner in actively thinking about a specific content in order to understand and remember the information. The learner can be involved individually or in groups through questions, exercises and activities that stimulate thinking and constructive interaction with the materials [10].

The availability of this type of interaction in the e-learning environment encourages students to experiment and learn, and helps them to identify different points of view, develops their thinking through open discussions on the web, and also contributes to the development of assessment tools for the knowledge acquired through participation and discussion [59].

2.5 Interaction between the student and the teacher in the electronic learning environment

This type of interaction aims to simplify the educational subject through continuous instructions and guidance of the teacher with the simultaneous and asynchronous tools present within the electronic learning environment states that the teacher should organize the educational subject in e-learning in a way that raises students' thinking by asking interesting and exciting questions with the necessity to involve students in investigating questions of deep thinking, which has a great role in exchanging ideas between students and providing opportunity for them to express their ideas, in order to help them study and discover the information or concepts and skills to be acquired [2], [60], [61].

The study of Pianta et al [62] indicated that there is a positive relationship between the positive interaction between the student and the teacher and between educational achievement and students' behaviour in the classroom. There is a negative relationship between the late interaction between the student and the teacher and between the educational attainment and the behaviour of the students as it leads to a decrease in the level of achievement and negatively affects the student's behaviour.

Despite the importance of student interaction with the teacher in the electronic learning environment; the student misses some of the skills that he may acquire through his interaction with the teacher in the traditional classroom, such as learning good manners of talking, good appearance and personality [11].

This type of interaction in the electronic educational environment provides timely feedback, which helps to develop models for general learning and activate active learning, and to build electronic tests that allow giving the opportunity to submit the test more than once [63].

2.6 The interaction of Student-Student in the Electronic Learning Environment

This type of interaction is a necessary component for creating an effective electronic learning environment, as it allows learners to form a working group or involve in participatory learning through the internet. Each learner accomplishes the tasks and activities assigned to him at anytime and anywhere through the available simultaneous online interaction tools. This is done by using text, audio and image-based applications for distance discussions, at different times using e-mail, web pages, file-sharing sites, and more [57].

Although interaction via the electronic environment does not provide face-to-face interaction among students, it may be more effective for student interaction with his

mates to discuss, debate, and participate in building knowledge and improving the process of recalling academic content through the process of discussion and interaction with peers. The results of Ebner et al [55] indicated the effect of using electronic platforms in facilitating group learning, participation in group activities, and peer learning. The results also confirmed the existence of statistically significant differences in the participation of learners in educational activities due to the use of educational platforms for the benefit of the experimental group.

This type of interaction in the electronic educational environment provides different activities for social interaction, and a variety of methods of student's direct interaction with each other. It also encourages students to exchange opinions and experiences and provides them with different mechanisms to track the writing of topics among students.

Several studies have shown the effectiveness of types of electronic learning interactions in increasing motivation to learn. Bao [42] study found that electronic learning interactions led to an increase in students' achievement and motivation. Also, virtual classes contribute to students understanding of lessons and increase their enthusiasm for acquiring practical and cognitive skills. The study by Ferdig et al [46] also found that there is a significant effectiveness of the types of educational interactions in increasing students' achievement and motivation. Interaction in all of the previous types is identified within different levels, and these levels can be identified in four points:

Inactive interaction: The role of the learner is simple, and the interaction is limited in the form of attendance registration and browsing the electronic educational platform.

Limited interaction: The learner's response is simple and contains interactions related to solving the exercises required from him and admitting to the tests.

Compound interaction: The learner creates a set of educational responses, and the interaction increases with the student entering some information and participating in the classroom.

Direct interaction: The learner's response is direct and fast via the electronic instructional platform.

The research field on the subject of distance education is one of the important fields for educational researchers, as many of them have studied its reality, its effectiveness and its impact on many different psychological variables.

After reviewing several previous studies, it becomes clear that most of these studies have agreed on the effectiveness of e-learning and its preference over traditional methods. It is also clear that it has an effective effect on increasing students' motivation to self-learn and actively participate

in the activities of various courses. What distinguishes the current study is the measurement of students' interaction in e-learning under the current circumstances that led to the complete transfer of the educational process from traditional attendance to electronic platforms completely and abruptly, which may affect many psychological variables for students towards education and school and this what the study is trying to clarify.

3. Methodology

This study used the descriptive approach, for its suitability in answering the study questions and by measuring the interaction of students in distance education via the electronic platform and describing this reality accurately and clearly.

3.1 Population

The current study population consists of all intermediate school students in the first semester of the academic year 2020.

3.2 Sample

The study tools were applied in a preliminary form to a pilot sample of (60) intermediate school students, with the aim of verifying the psychometric properties of the tools and ensuring their clarity and clarity of instructions. After that, the study tools were applied to the main sample of (268) intermediate school students in order to answer the study's questions. Table 1 illustrates the description of the main sample.

Table 1: Table 1: Distribution of Sample According to Gender and Grade

Grade	Gender		Total sample
	Male	Female	
1st	30	74	104
2nd	35	52	87
3rd	29	48	77
Total sample	94	174	268

3.3 Measures

A. students' interaction through the e-learning platform scale.

This scale has been prepared in light of the definition of students' interaction through the e-learning platform, which states: Everything that happens between the student and the content of the educational subject, between the student and the teacher, or between the students and each other, including the participation, the presentation of the performances and point of views through the e-learning

platform in order to create a kind of regularity and interaction directed to effective learning.

After reviewing the educational literature and previous studies that dealt with the subject of students' interaction through the e-learning platform, as well as the scales used in these studies; the students' interaction through the e-learning platform scale was built and consisted of 13 statements as in Table 2 used four points Likert scale response options.

To verify the psychometric properties of the students' interaction through the e-learning platform scale, it was presented to a group of specialized raters, and then a statistical analysis was performed to verify the validity of the factor construction of the scale as well as the validity of its internal consistency and reliability.

Table 2. Students' Interaction through the E-Learning Platform Scale

Item	Statement
1	I can easily understand the lesson presented online via the platform
2	The teacher explains the lesson himself and uses some video clips
3	I am attracted by the diversity of electronic activities that the teacher incorporates into the lesson topic across the platform
4	The teacher encourages me and my classmates to take part in group discussion to enrich the topic of the lesson
5	The teacher helps me solve problems that I encounter in e-learning
6	The teacher directs us to share and evaluate assignment files with each other
7	The teacher allows us to communicate with him personally with ease via (e-mail / mobile / social networking sites).
8	My classmates and I can discuss the topic of the lesson and exchange ideas in the chat rooms of the online platform
9	The teacher adds on the E-platform educational files and group activities that enhance my understanding of the lesson
10	I help my colleagues by sending them enrichment resources that help them understand the lessons
11	I can easily present my questions to the teacher through the platform.
12	The teacher regularly assesses my assignments through the platform
13	The teacher allows group discussion to enrich the topic of the lesson

Validity of The Scale. Raters' Validity: The students' interaction through the e-learning platform scale was presented to a group of specialized raters in psychology, as each rater gave his opinion on each of the scale phrases in terms of their linguistic formulation, and their suitability to measure the trait. Based on the raters' suggestions, some phrases were deleted, and the wording of some statements were modified, and thus the number of phrases became (13) phrases represent the final form of the scale.

Construction Validity: An exploratory factor analysis method was used to identify the factor structure of the students' interaction through the electronic platform scale and to identify the factors that make up the scale. This measure is one of the indicators of the factor construction validity.

The conditions for using factor analysis were verified by the method of the principal components and the Kaiser criterion by:

1. Calculation of Bartlett's Test of Sphericity for the sample scores and this is explained in Table 3 shows that the value of Bartlett's test is statistically significant, which is an indicator of the fit of the matrix.

Table 3. KMO and Bartlett's Test of Sphericity Index Values for Sample Accuracy

Bartlett's Test of Sphericity	df	p-value
928,164	78	0,000

2. The Kaiser-Mayer-Olkin (KMO) coefficient value is (0.881). This value is higher than the acceptable level required by Kaiser (0.6), which means that the data is suitable for factor analysis.

The exploratory factor analysis method was used to identify the factor structure of the students' interaction through the electronic platform scale after applying it to the study sample. Pearson correlation coefficients were calculated between the statements, and then factorially analyzed by the principal components method of Hotelling. Guttman criterion was used to determine the number of factors. Table 4 shows the results of the correlation matrix for the statements of the students' interaction through the electronic platform scale by the method of the principal components according to the criterion of eigen value higher than one and loadings values higher than 0.3 before rotation.

Table 4: Correlation Matrix Method of The Principal Components Analysis

Statement No.	Factors		
	1 st	2 nd	3 rd
1	0.587		0.497-
2	0.433		0.304-
3	0.644		0.455-
4	0.430	0.442	0.427
5	0.723		
6	0.497	0.597-	
7	0.596		
8	0.694		
9	0.581		
10	0.596	0.469	
11	0.664		
12	0.549		
13	0.798		
Eigen value	4.674	1.070	1.039
Variance ratio	35.957	8.231	7.992
Total variance ratio	35.957	44.188	55.179
Hattie Value ratio	65.1642		
Reckase criterion	4.3682		

Table 4 shows that the factor correlations matrix extracted (3) factors which their eigen values are higher than one. The Reckase criterion and Hattie's criterion were used to judge the unidimensionality of the students' interaction through the electronic platform scale, where the tool is considered unidimensional according to the Reckase criterion when the value of the division of the eigen value of the first factor by the value of the eigen value of the second factor is higher than 2. According to Hattie's criterion, the tool is considered unidimensional if the value of the variance that refers to the first factor divide by the value of the total variance that refers to all factors is greater than 20%. Through it, it is clear that the scale of students' interaction through the electronic platform is a unidimensional scale, and therefore it consists of three axes.

It is noted from Table 4 the distribution of the loading values for the data of the students' interaction through the electronic platform scale on the extracted factors, and the overlap of these values in the factors composing the scale. Varimax orthogonal rotation was used. Table 5 shows the results of the correlation matrix for scale statements using the principal components method according to the eigen value higher than one and the loadings values higher than 0.3 after the rotation.

Table 5: Correlation Matrix for The Statements of The Scale

Statement No.	Axes		
	1 st	2 nd	3 rd
1		0.781	
2		0.504	
3		0.740	
4			0.743
5	0.529	0.434	
6	0.807		
7	0.634		
8	0.440	0.310	0.470
9		0.472	0.437
10			0.752
11	0.504	0.456	
12	0.455	0.372	
13	0.571		0.435

Table 5 shows that the first axis absorbed 35.957% of the total variance. (6) statements were loading to this axis. The values of the loadings of the statements ranged between (0.440 - 0.807). Most of the statements in this axis revolve around the teacher's role in organizing the educational subject in e-learning in a way that raises students' thinking, by the teacher asking interesting and exciting questions with the need to involve students in investigating questions of deep thinking, which has a great role in exchanging ideas between students and providing opportunity for them to express their thoughts, as well as to facilitate the process of communicating with him. Therefore, it is suggested that

this axis called "Interaction between the student and the teacher via the electronic educational platform".

The second axis absorbed 8,231% of the total variance. (4) statements were the loading of this axis. The values of the loadings of the statements ranged between (0,310 - 0,781). Most of the statements of this axis revolve around the student's interaction with the educational content in the electronic educational environment by following the lessons provided to them, being attracted to them, and getting to know the different points of view of their colleagues in the methods of presenting educational content. Therefore, it is suggested to call this axis "The interaction between the student and the educational content via the educational e-platform".

The third axis absorbed 7,992% of the total variance. (3) statements were the loading to this axis. The values of the loadings of the statements ranged between (0.435 - 0.752). Most of the statements on this axis revolve around the process of discussion and interaction with peers through the electronic platform. It is suggested to call this axis "Interaction between the student and his colleagues through the electronic platform".

Internal Consistency Validity. It is the calculation of the correlation coefficients for each statement with the total score of the scale. The validity of the internal consistency of the sample responses was calculated on the scale of students' interaction through the e-learning platform, and this is evident in Table 6 shows that all scale statements had good correlation coefficients with the overall score on the scale. All were statistically significant at the level of significance (0.01), and this indicates the validity of the scale and the reliability of its results.

Table 6. Pearson Correlation Coefficients between the Score for Each Statement and the Overall Score

Statement No.	Correlation Coefficient	Statement No.	Correlation Coefficient
1	**0.613	8	**0.710
2	**0.584	9	**0.686
3	**0.675	10	**0.656
4	**0.683	11	**0.646
5	**0.809	12	**0.668
6	**0.706	13	**0.750
7	**0.648		

Reliability of The Scale. The reliability of the scale scores was calculated using the Alpha Cronbach method for the statements of the scale, which consisted of (13) statements, and Table 7 shows its value.

Table 7. The Value of Alpha Cronbach Reliability Coefficient

No. of Statements	Alpha Coefficient
13	0.90

The value of the reliability coefficient was (0.90), which is a high and very acceptable reliability coefficient, which indicates the quality of the scale and the reliability of its results.

B. Motivation to Learn Scale

The motivation scale was used, consisting of (11) statements as in Table 8, and the scores for each statement on the scale ranged between (1-5) degrees: strongly agree (5), agree (4), undecided (3), disagree (2), strongly disagree (1)

Table 8: Motivation to Learn Scale

	Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1	My interest in school subjects leads to the neglect of everything around me					
2	I enjoy the new ideas I learn in the lesson					
3	I like to fulfil my academic responsibilities regardless of the results					
4	It is difficult for me to pay attention to the teacher's explanation and follow it up					
5	I feel that most of the lessons I study are not exciting					
6	I avoid school situations that require taking responsibility					
7	I'd prefer the teacher to give us difficult questions that requires thinking					
8	I would rather be interested in school subjects than anything else					
9	I do a lot of study activities with my classmates					
10	I have a strong desire to inquire about topics related to the lesson					
11	Collaborating with my classmates in doing my homework benefits me					

Validity of The Scale. The validity of the internal consistency of the scale was calculated by calculating the Pearson correlation coefficients between the score on each statement and the total score on the scale. Table 9 shows the values of the correlation coefficients.

Table 9: Pearson Correlation Coefficients between the Score for Each Statement and the Overall Score

Statement No.	Correlation Coefficient	Statement No.	Correlation Coefficient
1	**0.626	7	**0.590
2	**0.704	8	**0.664
3	**0.717	9	**0.656
4	**0.583	10	**0.656
5	**0.572	11	**0.674
6	**0.567		

It is evident from Table 9 that all the scale statements had good correlation coefficients with the overall score on the scale, and all of them were significant at a level of (0.01). This significance indicates the validity of the scale and the reliability of its results.

Reliability of The Scale. The reliability of the scale was verified by the Cronbach alpha method. Table 10 shows the value of the reliability coefficient.

Table 10: The Value of Cronbach's Alpha Coefficient

Statement No.	Alpha Coefficient
11	0.845

The alpha coefficient shows an acceptable reliability value which indicate the quality of the scale and its reliability.

4. Results

Question 1: What is the level of students' interaction in distance education through the electronic platform?

To answer this question and to know the level of interaction through the electronic educational platform among the members of the study sample, the arithmetic means, and standard deviations were calculated for the scale statements and its total score, and the level of interaction through the electronic educational platform was interpreted based on the following criterion:

Table 11. The Standard Adopted in Explaining the Level of Interaction through the E-Learning Platform

Mean		The level of interaction through the electronic educational platform
From	To	
3.25	4	Very high
2.50	3.24	High
1.75	2.49	Average
1	1.74	Low

Table 12: The Arithmetic Means and Standard Deviations of The Sample Responses on The Interaction through the E-Learning Platform Scale

Statement No.	M	SD	Interaction Level
1	3.13	0.794	High
2	2.88	1.046	High
3	2.94	1.055	High
4	3.37	0.849	Very high
5	3.26	0.906	Very high
6	2.70	1.099	High
7	3.19	1.012	High
8	3.12	0.952	High
9	3.25	0.933	Very high
10	3.51	0.850	Very high
11	2.94	1.095	High
12	2.76	1.149	High
13	3.16	0.927	High
Total	3.093		High

Table 12 shows that the level of student interaction through the e-learning platform was within the high and very high level, as the arithmetic mean ranged between (2.70-3.51), and these values are similar to each other, which indicates that the study sample respondents have a high level of interaction via the electronic instruction platform. This indicates that the virtual classroom enables

students to actively interact in educational situations.

Question 2: Is there a statistically significant difference between the averages of the students' grades in their interaction through the electronic platform due to the variables of gender and grade?

To answer this question, the t- test was used to indicate the differences. Table 13 shows that there is no statistically significant difference at the level of (0.05) between males and females in the scale of students' interaction through the e-learning platform.

Table 13: Students' Interaction through the E-Learning Platform

Gender	No.	M	SD	df	t	Sig.
Males	94	39.9889	8.0569	266	0.356-	0.722
Females	174	40.3333	7.2720			

To find out if there are statistically significant differences between the averages of the students' scores in their interaction via the electronic platform according to the grade variable, one-way ANOVA was used. Table 14 shows that there were no statistically significant differences at a level of (0.05) in the interaction of intermediate school students through the e-learning platform according to the educational grade of the sample members. Which means that the educational level had no effect on the students' interaction through the electronic educational platform among the sample members.

Table 14: One Way ANOVA of Different Students' Interaction through the E-Learning Platform

Variance source	SS	df	F	Sig.
Between groups	130.372	2	1.147	0.319
Within groups	15062.505	265		
Total	15192.877	267		

Question 3: What is the level of students' motivation to learn through the electronic platform?

To answer this question, arithmetic means, and standard deviations were calculated to determine the level of students' responses to each of the scale phrases, and on the scale as a whole, in order to judge the level of students' motivation to learn through the electronic platform. The arithmetic averages were divided into categories according to the criteria as shown in Table 15.

Table 15. The Criterion Adopted in Explaining the Level of Motivation to Learn

M		Motivation to learn Level
From	To	
4.3	5	Very high
3.5	4.2	High
2.7	3.4	Average
1.9	2.6	Low
1	1.8	Very low

Table 16 shows that the arithmetic means on the scale

statements and the overall score were also high. This indicates that the level of students' motivation to learn through the electronic platform is considered at a good level, especially since distance education is a new experience for most students.

Table 16: The Arithmetic Means and Standard Deviations of The Sample Responses on The Motivation to Learn Scale

Statement No.	M	SD	Motivation to Learn Level
1	3.9776	1.02381	High
2	3.8843	1.11075	High
3	3.9440	1.10525	High
4	3.9478	1.05871	High
5	4.1194	0.89145	High
6	4.2948	0.82950	High
7	4.0597	0.98118	High
8	4.0821	0.87878	High
9	4.0672	0.47147	High
10	4.1493	0.81197	High
11	4.0858	0.94220	High
Total	4.0556		High

Question 4: Is there a statistically significant difference between the averages of students' grades in their motivation for distance learning through the electronic platform according to the gender and grade variables?

To answer this question, (t- test) for independent samples were used to test the differences between the averages of the two groups after they were classified into a male and female group. Table 17 shows that the value of(t) was not statistically significant. This indicates that there is no difference between males and females in their responses to the scale statements, and therefore there is no difference in their motivation to learn through the electronic platform.

Table 17: The Value of (t) and Its Statistical Significance between The Mean Scores of Males and The Mean Scores of Females on The Motivation to Learn Scale

Gender	No.	M	SD	df	t	Sig.
Males	94	44.4894	5.35362	266	-0.277-	0.782
Females	174	44.6782	5.30240			

To find out if there are statistically significant differences between the averages of students' scores in their motivation for distance learning via the electronic platform according to the grade variable, the One-Way ANOVA test was used to find the significance of the differences between the three grades (1st intermediate – 2nd intermediate – 3rd intermediate) that exist in the study sample, based on the total score of the scale. Table 18 shows that the value of F was not statistically significant. This indicates that there are no differences between the different grades (1st intermediate – 2nd intermediate – 3rd intermediate) in their responses to the scale statements,

and there are no differences between them in the motivation to learn through the electronic platform.

Table 18. One-Way ANOVA Test to Denote Differences between Different Grades in Their Responses to The Motivation to Learn Scale

Variance source	SS	df	F	Sig.
Between groups	162.189	2	2.916	0.056
Within groups	7369.453	265		
Total	7531.642	267		

Question 5: What is the impact of students' interaction in distance education through the electronic platform on their motivation to learn?

To answer this question, the correlation coefficient between the two variables was first calculated, and then the correlation coefficient square was calculated to find out the effect, and the value of the Pearson correlation coefficient between the interaction of students in distance education through the electronic platform and their motivation for learning and the effect size evident in Table 19.

Table 19: Pearson Correlation Coefficient and Effect Size between The Two Variables

Pearson's Correlation Coefficient	Sig.	Effect Size
0.723**	0.000	0.523

It is evident from the table 19 that the value of the Pearson correlation coefficient is statistically significant at the level of 0.000 and this indicates that there is a statistically significant relationship between the two variables (interaction through the electronic platform and the motivation to learn). By multiplying the value of the correlation coefficient, the effect size was (0.523), which is considered significant effect based on criteria for interpreting effect size values. This means that positive interaction through the electronic platform affects approximately 52% of the students' motivation for distance learning.

5. Conclusion

According to the results of the statistical analysis, we find that the level of student interaction through the e-learning platform was at a high level. This indicates that the virtual classroom enables students to actively interact in educational situations. This result is somewhat compatible with the study of Abu Shkheidem et al., (2020), which indicated that the interaction of Palestine University students with e-learning was average at the time of the onset of the pandemic and at the beginning of the shift to distance learning through electronic platforms.

The researchers believe that the high level of student interaction can be explained by the fact that the electronic

educational platform provided the possibility of learning in the appropriate place for students, which created psychological comfort for them during learning. The researchers noted that the electronic educational platform provides multiple capabilities in presenting scientific subject topics in various forms (video, PowerPoints, links, pictures, movies). It also allows students to do voice and text conversations, and the access and use of it are easy. These educational methods adopted in the electronic educational platform may help to develop the way in which students learn and the way in which the teacher teaches, which may have a role in motivating students to learn and have interest in the educational subject other than abstract and symbolic methods as in explaining the teacher in the usual way. This is confirmed by the results of the level of motivation to learn science through the electronic platform, where the level was also high. This high level is a good indicator of the effectiveness of distance learning through the electronic platform, especially as it is a new experience of learning for intermediate school students and in its early experimental stages, which were imposed because of the Corona pandemic in a surprising way and was adopted to continue the educational process.

It can be said that the high level of interaction among students through the electronic educational platform and the high level of their motivation to learn may be due to the fact that the electronic educational platforms made the student the center of the educational process and moved the teacher from the role of direct guidance to the role of assistant to students. Thus, the student became more active and energetic and assumed new roles that encouraged him to interact, learn and participate positively in educational activity.

On the other hand, the results did not indicate that there are statistically significant differences between the mean scores of males and females in the scale of student interaction through the electronic educational platform. As well as there are no statistically significant differences between them in their motivation to the distance learning of science through the electronic platform. This can be explained by the fact that learning through the electronic educational platform has become the main source of learning for the students at present. All students, whether female or male, realize the importance and necessity of interacting through the educational platform in the learning process. Also, the sample members are intermediate school students, and the majority of this age group have high skills and ability to deal with digital platforms and technologies in education. This new technology is not only directed to the males more females. The researchers believe that the absence of the differences between them is due to the speed of adaptation of students in this particular age group to any development or change that may occur, and their love and passion for new experiences. The

e-learning experience is a new challenge for them because they were not accustomed to this method of learning, and at the same time it is a motivation and a catalyst for them to achieve success in various ways, especially if the method is compatible with technological developments that are considered attractive methods for them.

The results of the statistical analysis indicated that there were no statistically significant differences related to the grade variable, meaning that the student, whether he was in the first, second or third intermediate grade, this did not affect the level of his interaction through electronic educational platform. At the same time, the results did not show statistically significant differences between the three grades in motivation to learn as well, and this is a logical result because, in the opinion of the researchers, there are no breaks or obstacles in the level of interaction through the educational platform where the student in the first, second or third intermediate grade can obtain an equivalent ability to the other in the level of interaction through the electronic educational platform if he directs his energies and thoughts in the right destination. The researchers believe that the reason for this is the very close age of each group, as they are of the same generation, have the same interests, and have the same thinking styles that affect their electronic interaction as well as their motivation to learn and achieve.

When measuring the effect of distance learning via the electronic platform on students' motivation to learn, the result was statistically significant in a positive way. This may be due to the reliance of distance learning through electronic platforms in modern technologies that are considered the language of the new era and that are compatible with the interests of the new generation and their skills. So, learning through the electronic platform enables them to use their skills and interests in something useful, and at the same time electronic learning is more attractive and more enjoyable for them. This result is consistent with the study of Humeid (2020), which indicated that the teaching of two units of physics course through the strategy of probe thinking in electronic groups is an effective method and has a positive effect on the development of achievement motivation among the students of the study sample. The results also consistent with the results of the study of Al-Akkiah and Al-Baradei (2019), which concluded that the method of participatory electronic interaction (within and between groups) with the mechanism of organizing learning projects (organized) leads to an increase in the level of students' motivation to learn. In addition to Darwish study (2019), which indicated that the use of the Web Quest strategy is an effective method and positively affects motivation to learn physics. The results are also consistent with the results of Anseo (2018) study, which indicated the positive effect of employing the blended learning strategy of the life sciences course in increasing students' motivation to learn,

as well as Fouda study (2012), which indicated that the adoption of the integrated strategy that was proposed in the study and based on interactive electronic activities affects very positively and increases the motivation for learning and self-learning among students.

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