Learners' engagement assessment in e-learning during the COVID-19 pandemic: nation-wide exploration

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Abstract

The purpose of this study is to determine how learners feel about distance learning as a substitute for face-to-face learning. A nationwide survey of over 11,000 students was conducted during the covid-19 outbreak to evaluate how students in grades 8–12 responded to and viewed full-time e-learning practices. Two-thirds of students had negative attitudes toward e-learning, according to the findings of the survey in the five selected issues of effectiveness, ease of use, interactivity, motivation, and academic assessment of the e-learning platform. Regardless of the students' age, gender, grade, branch, or technology used, they all had a negative opinion regarding e-learning.

In addition to technological issues, the majority of students cited psychological and social factors as reasons for their negative attitudes toward e-learning, such as a lack of readiness and ability to adapt to a new style of education, ineffectiveness of the means and methods used, and poor communication with teachers and other classmate learners.

On the practical side, the study's findings point to the necessity to adapt the teaching style via the electronic platform to be more acceptable to students, particularly in terms of engagement and providing a stimulating learning environment.

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1 Introduction

The Covid-19 epidemic, which began in November 2019, has put the entire world in the midst of serious status in all realms of life, including education. In this context, UNESCO revealed in July 2020 that the epidemic has touched more than two-thirds of learners at various levels of their schooling, (UNESCO, 2020). They also reported that education has come to a halt in 110 nations, with over one billion learners unable to receive an education.

This scenario forced all educational institutions to switch to an electronic schooling style without any prior planning, preparations being psychologically, technically, or logistically (Van Lancker & Parolin 2020). As a result of this new status, distance education began to embrace practices such as simultaneous video streaming, social media use, discussion forums, and virtual classrooms in an attempt to compensate learners for the pandemic's disruption of educational opportunities. This new and evolving status has produced massive challenges to the educational community, mostly due to the absence of e-learning psychological and technical abilities among K-12 learners prior to this rapid move (Barbour & Reeves, 2009).

Several researches, including Molnar et al., (2019), Song et al., (2004), and Muilenburg & Berg, (2005), have observed that inexperience and a lack of learning motivation, Internet speed, and a shortage of digital content, are all barriers to full online learning utilization. In 2017, Barbour and La Bonte estimated that only around 10% of K-12 students have the sufficient knowledge and experience to use and learn via e-learning platforms. Even in societies where e-learning is rapidly growing, such as the United States, the United Kingdom, Germany, Japan, and a few other wealthy countries, this phenomenon is still valid (Barbour and La Bonte, 2017).

Although the cited studies shed some light on the wide-ranging consequences of e-learning, there are still a number of challenges to address in order to completely understand the phenomenon, notably in terms of learners' views and satisfaction levels. This study will focus on the acceptability and satisfaction that learners experienced while participating in e-learning activities throughout the epidemic. Officials will obtain a greater understanding of students' opinions of their e-learning experiences as a result of the current study's intended results, giving them a broader and deeper understanding of online learning during the epidemic.

According to the Palestinian Central Bureau of Statistics, the number of learners enrolled in schools for the academic year 2020–2021 was roughly 1,282 thousand, with 57,085 teachers (PCBS (1), 2020). Data issued by the Palestinian Central Bureau of Statistics, for the year 2020, indicate that 37% of Palestinian families own a computer, and 80% of the families do have a broadband connection to the Internet. The same study indicated that over 90% of Palestinian over the age of 10 years own a smart phone (PCBS (2) 2020). As of April 2020, The Palestinian Council of Ministers announced the implementation of the blended education model for the academic year 2020–2021, as part of an approved health protocol that provides children and their educational families with safety and prevention benefits. The Palestinian Ministry of Education has created electronic instructional materials, such as educational movies, learning cards, and electronic assessments, allowing teachers to give additional educational services via virtual courses.

More national studies, we believe, are required to completely understand what has occurred throughout the epidemic. This study was developed and implemented at a national level during the Covid-19 epidemic, namely from January to May 2021, in close coordination with the Palestinian Ministry of Education, where a total of almost 11,000 male and female students in grades eight through twelve were enrolled in the study.

2 Literature review

As of the beginning of 2020, most countries throughout the world had closed schools, educational institutions, and training centres due to social distancing and closures measures caused by the Corona epidemic. This sudden status sets e-learning in the spotlight as the only conceivable answer for the continuation of education. For both students and teachers, the abrupt move from face-to-face education to e-learning is a new experience that they must adjust to, as the sole available solution to all educational needs, (Soni, 2020).

This abrupt shift in educational processes, is the reason why students have struggled to comprehend the process of transition from traditional face to face to distance learning, resulting in psychological and emotional distress, particularly among the young kids (Petrie, 2020, Russ and Hamidi (2021)). According to Petrie (2020), the shift to the cyber environment requires a significant adjustment in the roles of both learners and instructors, in order to develop the necessary competencies to successfully employ technology in educational settings.

The global e-learning stage demanded the development of e-learning systems like Zoom, Microsoft Teams, and Google Classroom, which allowed educators to provide electronic content to students in an interactive manner. These platforms allowed students to participate in online chats, share various types of files, track their learning and assessment, and submit assignments and projects. Modern options made it easier for students to accept and adapt to these technology (Petrie, 2020).

The most crucial issues facing e-learning, according to scholars are; accessibility, cost, flexibility, and teaching techniques (Murgatrotd, 2020. Clemens et al., 2021). Berge (2005) was concerned about the effects of digital readiness on e-learning effectiveness, particularly in poor nations. This is in addition to those countries' educational traditions, especially their lack of experience with education technology. Students in low-digital-readiness countries face extra technology-related challenges than students in high-digital-readiness countries. According to Basuony et al. (2020), the Internet connection in Egypt's capital is unstable for 13.9% of students, and according to Agung (2020), more than two-thirds of rural Indonesian students do not have enough Internet capacity to access e-learning. Interactivity is another important component that determines the effectiveness of e-learning. Several studies have found that a high number of learners struggle with interactive learning via technology; see, for example, Barbour (2018), Agung (2020), Muirhead and Juwah (2004), Moore (1989), and Anderson (2018, 2003). On a psychological level, E-learning is projected to cause students to feel isolated, which will have a significant impact on their academic performance (McInnerney & Roberts, 2004). Consequently, the pro-

cess of incorporating interactive activities into the electronic educational process is required, and this setting brings e-learning closer to the face-to-face learning environment while also enhancing student attention(Garrison et al., 2010; Gaevi et al., 2015).

Unfortunately, several reports indicated that educational activities were generally absent of participatory and cooperative learning throughout the pandemic period (Bączek et al., 2021; Yates et al., 2020, Al-Maroof, 2021). Only 4% of students believe that the e-learning they have been exposed to is interactive, according to Bączek et al. (2021). According to Yates et al. (2020), more than two - thirds of students prefer interactive learning in classrooms to interactive learning on e-learning platforms. The issue of interactivity will be one of the topics addressed and explored in this study.

A number of studies have begun to appear recently, dealing with the details and repercussions of the use of e-learning at the school level on national level, (Badiuzzaman et al. 2021, Singh, et al. 2021, Adarwah, 202, and Shamir-Inbal, & Blau 2021). According to these reports, their countries' educational systems have been confused, and they have been unable to plan and deliver the prerequisites for the use of technology in education in a timely manner. When compared to face-to-face teaching, this resulted in poor educational processes in schools and lowered student cognitive achievement. Is this reality repeated in Palestine? The study will provide answers to this topic from a variety of perspectives.

The analysis of school students' viewpoints and perceptions during the Corona pandemic is still in its early stage, as evidenced by a review of a segment of the literature on the subject of the research. This experience of the global-wide and nationwide e-learning represents a unique opportunity for researchers to better understand the aspects and challenges of e-learning, which is what this study aims to achieve.

3 Research Methodology

This research used a large-scale online survey to gather feedback from Palestinian school students about their online learning experiences during the covid-19 pandemic. In order to answer the study questions, it used descriptive analysis, correlation analysis, T-test and ANOVA test analysis among others. Additionally, to help explain the results in a more accurate way, an open-ended questions were also distributed for a small group of randomly selected schools.

3.1 Survey Participants

The study employed stratified sampling approach, and completed in full cooperation with the ministry of education, which circulated the questionnaire to all directorates in all Palestinian governorates. The geographical distribution of the schools was taken into account while selecting schools, resulting in a sample that includes schools from Palestinian cities, villages, and refugee camps. To verify the accuracy and validity of the data, teachers from these selected schools were required to distribute the questionnaire electronically to the learners and explain the process of filling out the questionnaire. A total of 11,311 students in grades eight through twelve were polled for data. This represents around 4.2% of the targeted grades of the study, with 42% of

males and 58% of females. The reason for selecting students in the eighth to twelfth grades has to do with their ability to interact with the questionnaire and provide more accurate answers, especially because the questionnaire was completed through the Internet. This group of classes was chosen based on the recommendations of Ministry of Education experts. A sample of students from the same eighth through twelfth grades was utilized to survey students' views qualitatively in addition to the sample used to collect quantitative data. A total of 230 male and female students were included in this sample, and they were asked a series of questions about the quality of e-learning they had experienced.

3.2 Survey Instrument

A 57-item questionnaire was used in this research study. The questionnaire was divided into two sections: Sect. 1 was designed for demographic data, and Sect. 2 was designed for constructs which were designed to measure the behaviours and attitudes of learners towards distance learning, as shown in Table 2a&b. A seven-level Likert scale is used, with 1 corresponds to strongly disagree and 7 to strongly agree. Examples of some selected items from the E-learning Effectiveness construct is given below:

Item	Strongly Agree	Agree	Agree to certain extent	Neutral	Disagree to certain extent	Disagree	Strong-ly Dis-agree
E-learning makes it easier for me to understand educational content in a better way than face-to-face education							
E-learning allowed me to interact with educational materials in a better way than face-to-face education							
E-learning has allowed me to obtain a higher amount of information and knowledge than the face-to-face education							

The questionnaire's final draft incorporated eight demographic variables and six constructs that were carefully chosen to trace students e-learning perceptions from several perspectives. There were at least 5 indicators per construct. The items measuring student engagement were adapted from Sun and Rueda's (2012) validated instrument and, while the items assessing learners acceptance were informed by TAM work (Davis, 1989; Venkatesh & Bala, 2008) and sub-divided into perceived usefulness, ease of use, and intent of continuous usage.

Table 1 below displays the distribution of survey items, and describe their reliabilities. On average the questionnaire took 15–20 min to be filled by learners.

Table 1 The Survey Constructs, Reliability, and Validity Results of the Questionnaire	Construct	Cronbach's Alpha	Factor Loading	CR	AVE	√AVE
	E-learning Effectiveness	0.823	0.701–0.790	0.592	0.776	0.881
	E-learning Ease of Use	0.807	0.673–0.819	0.662	0.801	0.894
	Level of Interactivity	0.883	0.791–0.873	0.712	0.834	0.913
	Motivation towards learning	0.765	0.731–0.811	0.689	0.773	0.879
	E-learning Environment	0.723	0.631–0.759	0.701	0.862	0.928
	Assessment Effectiveness	0.872	0.752–0.849	0.754	0.852	0.923

3.3 Reliability Analysis

Reliability is the degree to which a measure of a construct is consistent or reliable. In other words, if we use this scale to measure the same concept over and over again, it should roughly give the same results each time, assuming the underlying phenomenon does not change. To make sure that the items are true representative of their indicated constricts, internal consistency reliability tests were performed over all constructs. Internal consistency reliability is a measure of consistency between different items of the same construct. If a multiple-item construct measure is directed to respondents, the extent to which respondents rate those items in a similar manner is a reflection of internal consistency. Cronbach's Alpha, was used to assess the items internal consistency of each construct. In other words, the higher the α coefficient, the more the items have shared covariance and probably measure the same underlying concept. A Cronbach's value greater than 0.7, according to Nunnally (1978), indicates that the construct has indeed high level of internal consistency of measuring the same concept, and therefore it is reliable. Cronbach's a coefficient for the 6 constructs were calculated using SPSS reliability tests, and recorded in Table 1, which reveals that all constructs are reliable with coefficients ranging from 0.723 (E-learning Environment) to 0.883 (Level of Interactivity), showing a high level of reliability

3.4 Validity Analysis

Validity of construct, or scale refers to the extent to which a measure adequately represents the underlying concept it is intended to measure. Validity can be assessed using theoretical or empirical approaches, and should ideally be measured using both approaches. Theoretical assessment of validity focuses on how well the idea of a theoretical construct is translated into or represented in an operational measure, which is performed with the assistance of experts. This type of validity has been performed by the research team, as the study is conducted in close cooperation with the Palestinian ministry of education. The questionnaire with all its constructs were carefully reviewed by the ministry experts and officials., and they were approved by them before they were used in data collection

The other kind of validity test, the empirical test, examines how well a given measure relate to one or more external criterion based on empirical observations. In our study we decided to use two types of empirical validity analysis, these are convergent and discriminant validity tests. Convergent validity refers to the closeness with which a measure relates to (or converges on) the construct that it is supposed to measure, and discriminant validity refers to the degree to which a measure does not measure (or discriminates from) other constructs that it is not supposed to measure. According to Campbell & Fiske (1959), these two types of validity test guarantee the validity of the constructs used in the study. The degree of shared variance of the indicators assessing a proposed construct is defined as convergent validity, and it is estimated using the items' standardized factor loadings, composite reliability (CR), and average variance extracted (AVE). Acceptable convergent validity, according to Bagozzi and Yi (1988), requires a factor loading greater than 0.7, a CR greater than 0.6, and an AVE greater than 0.5. As demonstrated in Table 1, all constructs included in the study meet these criteria and thus considered to have adequate convergent validity. The degree to which various constructs' measures are unrelated to each other's is called discriminant validity. This kind of validity can be constructed when the square root of the construct's AVE value is greater than its correlation coefficients with other constructs, as stated by Fornell and Larcker (1981). All of the questionnaire's constructs have square-root of AVE values between 0.879 and 0.928, which are all greater than the relevant correlation coefficients of the construct with other constructs. As a result, the discriminant validity of the questionnaire is also established

In establishing the reliability and validity of the constructs used in the study, data were collected from a sample of 342 students. The phase also included items optimization for each constructs, before the constructs were used in the collection of the main data set.

4 Results of the Data Analysis

The most significant results of the data analysis will be discussed in this section, starting with the results of the descriptive analysis of demographic variables and that of the constructs. The results of the inferential analysis will be presented in the second part of this section in an attempt to understand the role of any of factor that led to shape of students' impressions about e-learning.

5 Attitudes towards e-learning

The purpose of this section is to look at how students felt about the e-learning environment during the covide-19 pandemic. Remark that students were asked to express their views about the issues under investigation in contrast with traditional (face-to-face) learning. The following issues will be investigated:

- E-learning effectiveness.
- E-learning ease of use.

- E-learning interactivity.
- Motivation towards learning..
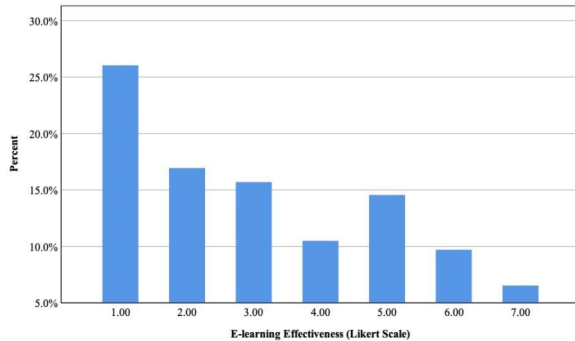
5.1 Effectiveness of e-learning

We investigated student reactions towards issues related to e-learning effectiveness, expressed in terms of 6 indicators which in total comprise e-learning effectiveness.

As is shown by Table 2; Fig. 1, the learners' responses are rather negative, with a mean of 3.2/7.0 which corresponds to disagree to certain extent. The standard deviation is roughly 2, implying that 68.2% of the sample has an opinion that falls between 1.0 (strongly disagree) and 5.0 (agree to some extent), emphasizing their negative attitude toward e-learning.

Table 2 Descriptive analysis results of the e-learning effectiveness as reported by the sample

N	Mean	Median	Mode	Stand. Deviation	Skewness	Kurtosis
11,311	3.21	3	1	1.92	0.40	-1.10

Fig. 1 Distribution of student's responses in relation to effectiveness of e-learning; 1:strongly disagree, 2:Disgree, 3:Disagree to some extent, 4: Neutral, 5: Agree to some extent, 6: Agree, 7: Strongly Agree

Fig. 2 Distribution of student's responses in relation to Ease of use of e-learning
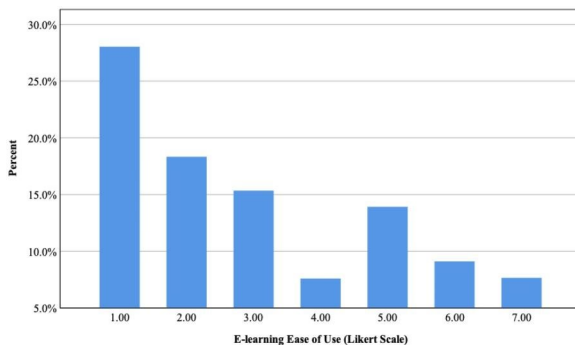
Figure 1 emphasized what Table 2 stated, namely, that students have a negative attitude toward e-learning as an effective alternative to face-to-face learning, stating that over 40% of the sample has a strong negative or negative attitude toward e-learning as an effective learning environment.

Ease of Use of E-learning.

This construct is estimated through the use of 5 indicators that signify diverse aspect of the ease of use of e-learning. Student's reactions towards ease of use of e-learning is pretty negative, as depicted by Fig. 2 below. The figure indicates that 45% of the sample are either strongly against (27%), or against (18%) the idea that e-learning is easy to use. It's also worth noting that as the level of Likert scale rises, support for the idea of ease of use of e-learning's drops, where just 5% of the sample considers e-learning to be really easy to use.

Table 3 presents the outcomes of data analysis on how easy it is to deal with the distance learning environment. The results show that students generally see these technologies as challenging and uncomfortable as a learning environment. The average student view occurs at 3.2/7.0, which corresponds to a level on the Likert scale that is somewhat against the ease of use of e-learning. If we consider the standard deviation of the results, which is 2.0, we can see that two-thirds of the sample finds the e-learning environment to be uncomfortable.

The interactivity construct is calculated using five indicators that represent various aspects of interactivity in e-learning. This construct assesses how much involvement learners have while using e-learning. The findings suggested that learners' attitudes were equivalent to the preceding two constructs of effectiveness and ease of use, as seen in Fig. 3. Students' perceptions on interactivity are dominated by negative attitudes, with roughly 60% of students' impressions falling on the negative side of the

Table 3 Descriptive analysis results of the e-learning effectiveness as reported by the sample

N	Mean	Median	Mode	Stand. Deviation	Skewness	Kurtosis
11,311	3.2	3	1	2.0	0.50	-1.10

Interactivity

Fig. 3 Distribution of student's responses in relation to interactivity of e-learning
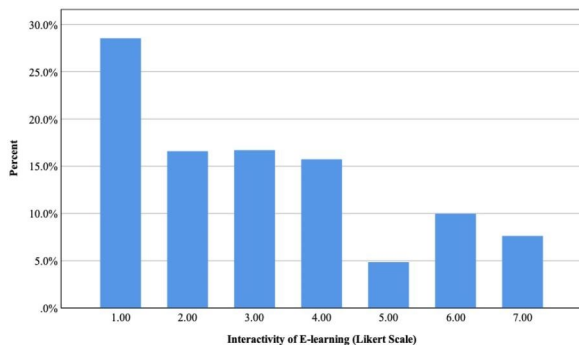
Likert scale. This to be added to 15% of students being neutral or unable to make a judgment in this regard.

The average student's perceptions are around the third level of the Likert scale, which is slightly negative, as is the median with a score of 3. When the standard deviation is factored in, 68.2% of the sample falls somewhere between 1 strongly disagree and moderately agree, see Table 4.

In the realm of education, motivation is one of the most crucial foundations for achieving educational goals, whether general, intermediate, or behavioural, and increasing the productive capabilities of the educational process' represented by students. The motivation construct is calculated using seven indicators that represent various aspects of e-learning motivation. As demonstrated by the results, students aren't really motivated to learn through the e-learning platform, as more than 65% of students believe the e-learning does not provide adequate motivation to pursue their education. Only a small percentage of the population have a good attitude toward using technology to learn, see Fig. 4. The figure clearly indicates that technology does not effectively work to motivate students to learn in the cyberspace, compared to face to face education.

The average response of learners is slightly lower than 3.0 (disagree to certain extent), and when the standard deviation is taken into consideration together with the mean value, then 68.2% of the sample have their responses between 1.0 (strongly disagree) to 5.0 (agree to some extent), which also designates a negative impression, see Table 5.

Table 4 Descriptive analysis results of the e-learning effectiveness as reported by the sample

N	Mean	Median	Mode	Stand. Deviation	Skewness	Kurtosis
11,311	3.1	3.0	1	2.0	0.59	-0.82

Motivation towards learning

Fig. 4 Distribution of student's responses in relation to motivation towards e-learning
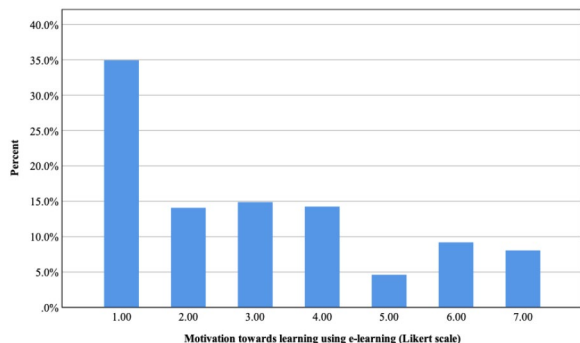
Table 5 Descriptive analysis results of the e-learning motivation as reported by the sample

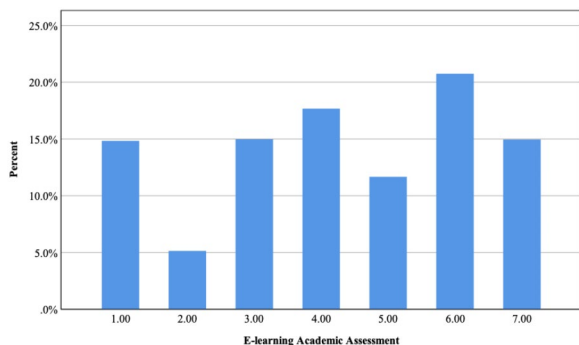| N	Mean	Median	Mode	Stand. Deviation	Skewness	Kurtosis
11,311	2.9	3.0	1	2.0	0.66	-0.80

6 E-learning Academic Assessment

In contrast to the issues stated above, students' perceptions of e-learning have evolved and tended to be positive in this issue. In comparison to face-to-face schooling, remote tests appear to be more convenient for students. Teachers faced enormous challenges as proctors while examining students online as it is very difficult to track what students are doing remotely. There is a clear shift towards positivity, as illustrated in Fig. 5, with around 45% of students' opinions falling on the positive side of the Likert scale, which is more than 4 points (neutral). This is the reality of one of the e-learning issues for which no solution has yet been found.

The results of the descriptive analysis of this construct show this pattern, as the mean rose sharply and approached 5, corresponds to some level of agreement. When the standard deviation is taken into consideration, 68.2% of students' opinions vary from 3 (slight disagreement) to 7 (strong agreement). This was also apparent in the reflection of the skewness value, which went negative, as indicated in the Table 6.

7 Results of Inferential analysis

The purpose of this part is to examine the factors that might influenced students' perspectives on the constructs discussed above. In this regard, we examined whether demographic variables have any role in manipulating the students' impressions, or that students' impressions are common and are not shaped by any external moderator. Age, grade, the student's academic level (defined by the score), and the speed of the

Fig. 5 Distribution of student's responses in relation e-learning academic assessment

Table 6 Descriptive analysis results of the e-learning assessment as reported by the sample

N	Mean	Median	Mode	Stand. Deviation	Skewness	Kurtosis
11,311	4.9	4.0	6	2.0	-0.27	-1.1

Internet line that the student used to attend the electronic lesson were all included in the study, are among these variables. The Pearson correlation coefficients were calculated among the demographic variables and all of the constructs that were included in the study to examine any possible effect of these variables on the students opinions concerning these constructs. As is depicted by Table 7, these variables have a trivial but significant (p-value=0.0) impact on the effectiveness, ease of use, interactivity, and motivation, and assessment of e-learning. It's worth noting that the majority of the correlation coefficient values range from 5 to 10%, indicating that these variables have tiny role in deciding students' attitudes toward e-learning.

Another critical question that the results presented in the table below can address is whether there is consistency amongst students' perceptions on the various constructs raised in the study. The answer to this question is exceptionally positive, as seen by the significant correlation coefficients that occur among the constructs, ranging from 0.80 to 0.90, except for the assessment construct, which has a value below 0.70.

It needs to be seen whether the gender of the student has any role in shaping their attitude toward the adoption of technology in the classroom, with respect to all constructs incorporated in the study. The results of the independent t-test shown in Table 8, demonstrate that there is a statistical significance difference between male and female views, though this difference is minor, as revealed by the column of the means difference, with values less than 0.3 on the Likert scale.

Table 7 Pearson correlation coefficient among the demographic and the study constructs

	Grade	Score	Internet speed	Ease of use	Effectiveness	Interactivity	Motivation	Assiss-ment
Grade	1	−0.042	−0.074	−0.070	−0.065	−0.053	−0.038	−0.058
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Score	−0.042	1	0.060	−0.091	−0.071	−0.090	−0.085	−0.061
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Internet speed	−0.074	0.060	1	0.068	0.074	0.064	0.055	0.059
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ease of use	−0.070	−0.091	0.068	1	0.840	0.860	0.845	0.674
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Effec-tiveness	−0.065	−0.071	0.074	0.840	1	0.824	0.815	0.644
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interac-tivity	−0.053	−0.090	0.064	0.860	0.824	1	0.864	0.677
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motiva-tion	−0.038	−0.085	0.055	0.845	0.815	0.864	1	0.670
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Assess-ment	−0.058	−0.061	0.059	0.674	0.644	0.677	0.670	1
Sig.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 8 Independent t-test of learners attitude towards e-learning vs. their gender

	t	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		99% Confidence Interval of the Difference	
					Lower	Upper	Lower	Upper
Ease of use	5.600	0.000	0.26975	0.04817	0.17533	0.36417	0.18717	0.3711
Effectiveness	3.492	0.000	0.16416	0.04701	0.07201	0.25631	0.0923	0.2605
Interactivity	4.952	0.000	0.23293	0.04704	0.14072	0.32514	0.16081	0.39553
Motivation	5.647	0.000	0.27320	0.04838	0.17836	0.36803	0.19019	0.39323
Assessment	3.180	0.001	0.15135	0.04760	0.05804	0.24465	0.07001	0.26312

The technology utilized to attend remote sessions is the final component we wish to examine for its impact on students' perceptions. Mobile phones, laptops, and PCs, which are the most popular technologies among students, were put to the test. There was a significant effect on some constructs like ease of use, effectiveness, and motivation, but no difference was identified in the case of interaction and assessment, see Table 9.

8 Discussion

The study's main goal is to determine how effective educational processes were during the Corona pandemic. The study's methodology is based on measuring learners' attitudes toward various educational issues in order to determine how effective e-learning is in comparison to face-to-face learning.

According to the results of the data analysis shown above, the majority of students have a negative attitude towards what has been practiced within the e-learning period. On a Likert scale, learners' overall attitudes averaged approximately around 3.0/7, which reflects disappointment to some extent with in e-learning ecosystem. Learners' perceptions of e-learning effectiveness, ease of use, interactivity, and motivation are recorded all to be negative, with little drift towards positivity for the assessment issue. Regardless of the students' age, gender, grade, academic branch, internet speed, level of IT skills, or technology used, a negative general attitude prevailed. These findings suggest that students' attitudes towards e-learning are inherited from the distance learning ecosystem's teaching-learning approach. The study's conclusion has been echoed in a number of studies conducted in various locations around the world. For

Table 9 Results of the one-way ANOVA test, of the impact of technology on the students attitude towards e-learning

Construct	Sum of Squares	df	Mean Square	F	Sig.
Ease of use	56.310	2	28.155	7.142	0.001
Effectiveness	36.990	2	18.495	4.932	0.007
Interactivity	17.504	2	8.752	2.327	0.098
Motivation	34.700	2	17.350	4.360	0.013
Assessment	13.439	2	6.719	1.747	0.174

example, see Bączek et al., 2021; Yates et al., 2020; Niemi & Kousa 2020; Artacho et al., 2020; and Yates et al., 2020, Artacho et al., 2020, and Trust and Whalen 2020.

The research team conducted a small size survey with open-ended questions in certain Palestinian public schools to better understand why students have such negative attitudes. Starting to speculate on the students' motives that shaped their viewpoint was preferable to taking this step. In that survey, students can express their feelings about e-learning by mentioning its benefits and drawbacks. The researchers were able to deduce from the results of this survey what is causing learners' negative sentiments regarding e-learning.

The majority of those who took part in the survey stated that they were taken aback by the pace with which they were transitioned from traditional to e-learning, without any prior preparation on either a physical or psychological level. Students were used to traditional learning and were suddenly forced to adapt to an entirely new environment in which they were required to stay at home and begin learning. A lot of scholars who attempted to determine the effects of implementing technology in teaching during the current Corona pandemic observed the same effect. According to those researchers, learners, particularly young learners, were unable to comprehend the abrupt change in educational patterns in all of their aspects (Petrie, 2020; Doucet et al. 2020; UNESCO 2021).

According to the students' reported views, psychological and social factors played a major role in the students' aversion to learning in the virtual world, particularly because it was accompanied by a deep fear of the epidemic spreading and the inability of even governments to predict when the wave would end. "In traditional learning, students take the space to think freely and in greater detail by asking all the questions that come to mind," one learner said, "but in the case of e-learning, we do not take the information seriously and we were not ready to take the words of a distant teacher seriously." Doucet et al. (2020) discussed a similar theme, claiming that students with fixed mindsets had a difficult time adapting to changing environments. According to Petrie (2020), the abrupt change in educational patterns produced some psychological and emotional distress for learners, particularly the young, and hindered them from participating constructively. Even before the pandemic, the same kind of anxiety on the part of the learners' psychology was recognized as a disadvantage of e-learning. According to McInnerney and Roberts (2004), E-learning is likely to cause students to feel isolated, which will have a significant impact on their academic performance.

The majority of students identified the ineffective teaching technique as the second concern. The incapacity of instructors to adapt with the new environment was cited by the majority of them as a key drawback of e-learning. Teachers, like students, were taken aback by the rapid move to cyberspace. Many of the research reports we manged to explore reported on similar concern, e.g. Artacho et al., 2020; Trust and Whalen, 2020; Ozkara & Cakir, 2018; UNESCO 2020; Pınar & Dönel, 2020; Fauzi, I., & Khusuma, I. H. S., 2020; Fauzi, I., & Khusuma, I. H. S., 2020; Fauzi, I., & Khusuma, I. H. S., 2020; Fauzi (2020). Instructors' ability to teach online were explored by Trust and Whalen (2020), who discovered that a high majority of teachers had difficulty teaching online because most of them have never done so before.

The lack of involvement and sociability is the third issue that a large percentage of students identified as a barrier to effective e-learning. According to our findings, 76%

of the sample gave unfavourable answers to interaction during e-learning classes, i.e. below 4 (neutral). Learners were unable to communicate with the teacher, each other, or even the content in online classes due to stagnation and inability to interact with the content. The lessons became rigid and monotonous to the point where many students left without informing the teacher since they were no longer convinced of the benefit of this approach. Many students expressed dissatisfaction with their teachers' ability to engage students and keep their attention throughout the class. Most educational activities carried out throughout the pandemic period, according to Bączek et al. (2021), were generally lacking of participatory and cooperative learning. Only 4% of students believe the e-learning they have been exposed to is interactive, according to Yates et al. (2020), which is consistent with our findings.

The majority of students had negative feelings over how easy it was to use e-learning. This, according to the researchers, was due to a number of difficulties raised by students throughout the qualitative part of the study. Students were having trouble joining virtual classes, participating in them, and completing and submitting their homework, among other challenges. Miemi et al. (2020) looked at student performance in Finnish schools and found that, in addition to the severe constraints of e-learning, students suffer from weariness, stress, and a sense of loss and confusion.

Concerning the applicability of electronic assessment, 13% of the students in the sample had a highly unfavourable opinion of assessment using an e-learning platform, and 50% of all students had a negative impression (i.e. a score of less than 4). (neutral). This, according to the researcher, is due to the fact that exceptional students vehemently reject the system of remote evaluation used in the e-learning environment, as opposed to less driven students who regarded it as a way to evade the duties and obligations imposed by exams. This is, of course, in addition to the excellent opportunity that e-learning provides for less motivated students to practice cheating and access a variety of external resources.

The results also show that we need to focus on developing the instructing skills of school teachers to make them more suitable for e-learning. The evaluated results showed that students are highly dissatisfied with the effectiveness of the educational process carried out by the teacher during the e-learning phase. Certainly, the methods teachers should follow in electronic learning are different from the methods used by the same teacher in face-to-face classes. This is a notable and important aspect of research, and the results should improve e-learning methods as needed.

9 Conclusion

The goal of the study was to assess the learners' reactions to a full-scale e-learning period as mandated by the COVID-19 pandemic. The study's overall conclusion revealed that learners feel frustrated, despairing, and skeptical that this framework of education can be a viable substitute to traditional, in-person education. The findings proved beyond a shadow of a doubt that there is no substitute for traditional education, and that e-learning cannot be a substitute for traditional education, particularly as it was implemented, which was not well received by students. Nearly two-thirds of students in Palestinian schools had negative attitudes toward e-learning, according

to the findings of the survey in the five selected dimensions that were used to assess the general opinion of upper-level students in Palestinian schools.

The majority of students cited psychological and social factors as reasons for their negative attitudes toward e-learning, such as a lack of readiness and ability to adapt to a new style of education, ineffectiveness of the means and methods used, poor communication with teachers and other classmate learners, and loss of dialogue, in addition to technological issues and an insufficient Internet connection.

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