The Zoom Boom: Assessing Videoconferencing Attitudes among College Students

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***Abstract*—This study examines the attitudes of college students enrolled with different specialties from two colleges, Applied Sciences and Arts and Educational Sciences at Palestine Technical University Kadoorie (PTUK), regarding their utilization of the Zoom platform. There is a strong need for this research to be carried out. Assessing students' attitudes will help to improve students' engagement and interaction while using Zoom. Additionally, this study will bridge the gap in this specific context. The investigation specifically focuses on certain demographic variables, namely gender, technical proficiency, Grade Point Average (GPA), and college affiliation. A quantitative research method was conducted with a total of 321 students from two different colleges were randomly selected. A questionnaire was designed to assess the attitudes based on the literature review. Findings indicate that college students exhibit favorable attitudes towards Zoom, perceiving it as user-friendly, flexible platform. Nonetheless, the study also reveals a stronger inclination towards traditional teaching because of concerns about assessment equity and privacy issues. The implications of these findings are valuable for educators. Results will help them to adapt their teaching methods to better align with students' preferences.**

***Index Terms*—college students, students' attitudes, Zoom, online learning**

I. Introduction

Research on online learning platforms has a long tradition. Technology has globally revolutionized teaching and learning at higher educational institutions. Diverse and innovative technological advancements and their applications trespassed the recent educational systems vigorously [1, 2]. The foreclosure of colleges, universities, and educational institutions during the pandemic recently forced them to switch and move traditional courses to online learning format [3]. As a result, numerous college educators chose to convert their courses into real-time synchronous online sessions by utilizing web conferencing platforms such as Zoom [4, 5]. There are growing appeals for understanding this in developing countries. Palestine is among many countries that made the unprecedented shift to teach online and close schools and universities to avoid the deadly spread of this pandemic, as social distancing was used as a preventative strategy to limit the spread of the virus [6]. This closure prompted higher educational institutions to shift to teach courses online and contemplate new approaches to online learning [7]. In Palestine, the infrastructure for online learning was established partly before the pandemic. Markedly, even before the pandemic, various sophisticated platforms like Moodle were already present within the Ministry of Education and higher educational institutions [6].

PTUK is the first public university in Palestine, founded in 1930. It has been implementing Moodle since 2007. Universities shifted from traditional to online learning to support students' learning [8, 9]. However, web video conferencing technologies and tools for online learning were novel and presented challenges [1]. Online learning relies on live online videoconferencing programs like Zoom to deliver instructional material and maintain communication between learners and their teachers with different geographical locations, so it offers synchronous meetings that enable learners and teachers to communicate [10]. On the other hand, there are certain limitations associated with the execution of real-time synchronous sessions, like timing issues, context, and engagement [11–13].

As videoconferencing applications are stated to dominate communication platform methods during this pandemic [14], it is important to understand the comprehensive artifacts produced by these currently used platforms. It is imperative to demystify the attitudes towards Zoom. This will lead to success in improving learning via this platform. Using videoconferencing tools at the college for technical fields at PTUK contributes to students' positive learning attitudes by motivating students and individualizing their learning [15].

Based on the short review above, one of the major topics to be investigated in this field is student attitudes. Thus, this study aims to investigate the attitudes towards the Zoom application. Their attitudes hold significance since they are crucial to enhance student's learning process. To the best of the researcher's knowledge, there have not been enough recent studies on attitudes towards Zoom application in higher education settings in Palestine. The researcher conducted a quantitative research method since it generates factual, reliable outcome data that are usually generalizable to some larger populations. For exploring the attitudes towards Zoom, it is preferred to employ a quantitative method to explore this new tool for students among different specializations.

Integrating online educational tools, such as videoconferencing, to enhance the educational experience is not a novel concept. Most of the research in this field is aimed at solving this problem. Instructors within higher education establishments have been integrating online educational tools for communication purposes for numerous years [12]. Several earlier investigations concentrated on using videoconferencing tools [15, 16]. This remains an open problem in the area. The utilization of synchronous videoconferencing tools, such as Zoom, has seen a marked rise [17, 18]. Videoconferencing is a technological solution that facilitates real-time meetings incorporating video,

interactive audio, text, and data exchange among multiple users [19]. Incorporating video conferencing into education offers several benefits, including facilitating virtual meetings with live features, bidirectional communication through video and audio, content sharing, and messaging between educators and students [20].

Additionally, it provides prompt student feedback, supports collaborative learning, and aligns with their educational requirements [21, 22]. Moreover, it simplifies online discussions between students and instructors without any restrictions on specific hardware or software. Services like Zoom, Google Classroom, Skype, and GoToMeeting have become prevalent choices for synchronous online teaching [23]. Utilizing Zoom in teaching promotes dynamic collaborative efforts. On the other hand, it faces technical issues like internet connectivity and accessibility [24].

Examining students' attitudes towards Zoom or any video conferencing platform has numerous implications and advantages in today's digital era. With the COVID-19 pandemic accelerating the adoption of virtual communication tools, comprehending how students feel about Zoom has grown progressively important. Technical departments at higher education institutions can enhance students' Experience, gaining insights into students' sentiments empowers Zoom and similar platforms to perpetually enhance their offerings. Moreover, students' beliefs also helps pinpoint weakness which subsequently leads to updates that refine user-friendliness, reliability, and the overall quality of the user experience. Additionally, college instructors can heighten their student's satisfaction, potentially resulting in stronger customer loyalty and prolonged usage. Finally, policymakers will be able to improve accessibility and offer guidance for decisions related to accessibility. By identifying areas for improvement, Zoom can enhance accessibility features for individuals with disabilities, ultimately making virtual meetings more inclusive.

In conclusion, assessing attitudes toward Zoom extends beyond the purview of refining a solitary platform; it holds broader ramifications for the trajectory of virtual communication [14]. By proactively seeking and deliberating user feedback and attitudes, Zoom can persistently evolve and adapt to the evolving needs of its user base, all while contributing to the broader discourse concerning technology's role in our lives.

Some studies explored Zoom specifically in the classroom [13, 21, 25]. Recently, researchers have been investigating online learning during the COVID-19 pandemic [3, 26–30]. Previous work indicated that at the end of 2019 and before COVID-19 widespread, the number of Zoom's daily meeting participants was only 10 million [31]. On the other hand, by March 2020, the usage had exploded to 200 million. The uniqueness of this study relative to previous findings lies in the context.

This study's novelty is investigating attitudes towards Zoom among two faculties that are different in specialization. College of Applied Sciences and College of Arts and Educational Sciences are two faculties that contain a variety of specializations. This study will support the literature with these findings. Moreover, even though some studies investigated attitudes, this study will offer new knowledge in the field of study and make a significant contribution to the variables that are explored and related to the attitudes of the students of these faculties compared to the study [28].

This study explores the attitudes in two colleges with different demographic variables. Moreover, this study was conducted after the pandemic, a unique situation where students are used to using Zoom and can judge and express their attitudes more rationally. Hence, there are two research questions:

1) Are there any statistical differences in using Zoom among PTUK students' attitudes due to gender, technical skills, college, and GPA?
2) What are college students' attitudes toward Zoom at PTUK?

II. Literature Review

A. Using Zoom in Education

The literature review shows that videoconferencing is a frequently employed tool for synchronous online education [32]. A series of recent studies have indicated that videoconferencing enables real-time interaction between educators and students, resembling the dynamics found in a conventional classroom setting [27–29, 33–35]. Interacting with students is crucial and imperative to achieve learning objectives [2, 36]. Previous studies have shown that students frequently desire a sense of community through the instructor's presence in online educational environments [26, 37, 38]. In a study, conventional classes were substituted with 40-minute Zoom lectures accommodating up to 100 participants [39]. From the seventy-seven students who shared their perspectives, the vast majority (97%) found value in the online sessions and considered them relevant to their learning requirements. Similarly, 99% expressed contentment with the suitability of the online sessions to their learning level. Consequently, all participants recommended incorporating Zoom lectures as an integral component of the curriculum, emphasizing the importance of maintaining online teaching even post-pandemic.

B. Attitudes towards Zoom

Attitudes toward learning play a significant role in shaping various factors that, in turn, impact students' involvement in the learning process and, consequently, their academic success [15, 16]. Learning attitudes encompass a range of emotions and thoughts, categorized as positive, negative, or neutral, and are believed to encompass emotional, cognitive, and behavioral aspects [40].

Previous work completed by Basaran and Yalman [40] delved into the influence of Zoom sessions on elevating engagement, achievement, and motivation among students at the Lebanese University in Beka. The study assessed students' attitudes toward Zoom sessions using a student questionnaire. The outcomes indicated that Zoom sessions elevated students' academic proficiency and motivation for learning. This has also been explored in prior studies by Archibald *et al.* [13], which investigated the advantages and challenges of Zoom usage to assess its suitability for qualitative and mixed-methods research. This qualitative study revealed that while certain participants encountered

technical issues, a majority described Zoom as a beneficial tool for conducting interviews. Their experience was largely satisfactory, and Zoom received favorable ratings as a superior interviewing medium compared to other videoconferencing platforms. The study also highlighted Zoom's viability for collecting qualitative data due to its cost-effectiveness, simplicity, and user-friendly interface.

Furthermore, prior research conducted a study to assess international students' satisfaction levels with online learning within Chinese higher education institutions [28]. The findings indicated that students were content with the online learning experience.

Even though students who participated in the courses reported technical difficulties like internet connectivity as a challenge in implementing online learning, results generally supported using online learning tools and described it as effective. Additionally, Previous studies have emphasized its significance. As an illustration, Singhal [41] studied medicinal chemistry students and found that the Zoom platform actively engages learners by offering task assignments in a Pharmacology course. The findings showed that students' task scores were not statistically significant when conducted online using Zoom vs. face-to-face meetings. This confirmed the success of the students' prompt adaptation to Zoom meetings. Another qualitative study conducted by Lodder *et al.* [42] revealed some advantages of using Zoom: it raises attendance rates compared to face-to-face sessions. By the same token, participants' attitudes are positive about videoconferencing. On the other hand, some challenges were reported, like clarity of voice, environmental disturbances, and tardy participation. It is worth mentioning that the individuals involved reported that the benefits far outweighed the negatives.

Seminal contributions have been made by Joia and Lorenzo [43] that examined factors that influence Zoom usage and found that content types are one of these factors that sharpen their technical skills. Also, teachers' digital skills when using the platform in the digital environment are significant for a course to achieve its pedagogical objectives successfully.

In the same line, Bawanti *et al.* [3] reported that the Zoom platform impacts performance by promoting independent learning and enhancing the ability and knowledge of students who learn English, especially in speaking skills. Also, Baldock *et al.* [44] conducted a study on 35 students with technical specialties who used Zoom in learning activities and found that students perceived the use of Zoom positively. Hence, attitudes towards the use of Zoom are related to technical skills. Even though many studies reported that Zoom affects learning positively, some studies mentioned the disadvantages of using Zoom among college students, like a study that clarified that teachers were unprepared for Zoom shift, necessitating adopting alternative teaching methods. Moreover, certain users encountered unexpected technical challenges when utilizing the new platform, such as internet connectivity problems and Zoom disruptions incidents. In addition to these challenges, concerns regarding equity and accessibility further compounded the situation. These disadvantages were also experienced at PTUK while using Zoom. Previous studies showed that insufficient preparedness for this usage in the Palestinian territories was evident [15, 44]. Moreover, relatively limited internet service availability in many areas and a lack of online learning ethics make it challenging for students to engage in the educational process fully [45].

Table 1 illustrates the comparison between the previous studies and this current study.

Recent theoretical developments have revealed that introducing the Zoom platform within an organization or educational institution typically entails the creation of a framework of rules and directives to ensure its efficient and secure utilization. Some studies [43, 46, 47] clarified these guidelines as follows: user Access and Authentication Policies, specify the individuals or groups granted access to the Zoom platform, define the requirements for user authentication, including options like single sign-on or two-factor authentication, establish criteria for password complexity and set guidelines for password expiration, and meeting scheduling and hosting criteria.

Table 1. Literature review comparison

Previous studies	Current study
Focuses on advantages and challenges of using zoom	Focuses on attitudes
Study uses mixed and qualitative designs [13]	This study uses a quantitative design
Study employs only percentages with no demographic variables [39]	This study compares different demographic variables
Study sample is limited in specialty [3, 44]	This study's sample is more comprehensive
Study investigates attitudes towards a videoconferencing tool [40]	This study investigated the attitudes towards Zoom specifically

III. Methodology

The participants in this research comprised 321 students randomly selected from Palestine Technical University Kadoorie level of students (PTUK). PTUK is an academic institution established in 1927 in Palestine. These students engaged in virtual coursework from the spring semester of 2020 until mid-March 2021 when a transition to a remote learning setup through Zoom was implemented. Fig. 1 shows the research method flow diagram.

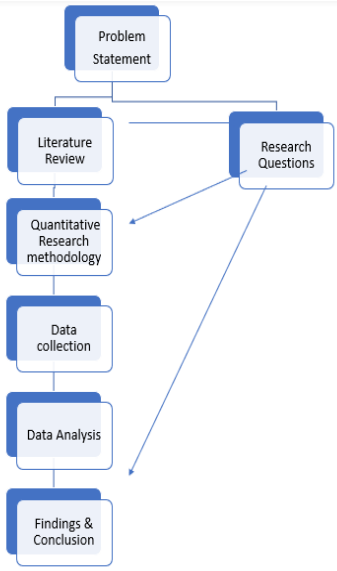

Fig. 1. Research method chart.

A. Research Instrument

Participants completed a 32-item questionnaire using a 5-point Likert scale, commonly employed in surveys. The researchers designed the questionnaire based on a literature review and the study's objectives. The attitudes theory Attitudes clarifies that an attitude includes three components: cognitive, affective, and behavioral intentions. These statements were designed by different studies that investigated attitudes [15, 20, 40, 47]. The scale ranged from 'Strongly Disagree' (1) to 'Strongly Agree' (5). The questionnaire comprised two main sections. The initial section includes demographic data about the students, and the second part focuses on assessing participants' attitudes toward Zoom. This segment utilized 32 expressions or items distributed across three subscales: students' cognitive perspective regarding Zoom's utilization, students' affective standpoint on the advantages and disadvantages associated with Zoom in their learning.

B. Study Population

This study research involved 321 university students as participants. The sample used in this study reflects nearly the entire student population at PTUK, encompassing various aspects such as gender, technical proficiency, college affiliation, and GPA. Moreover, the participants share homogeneity in terms of their native language, which is Arabic. For a comprehensive overview of the participants' demographics, see Table 2.

Table 2. Participants' demographic characterstics

Variable	Category	F	P
Gender	Female	230	71.7
	Male	91	28.3
	Total	321	100
Technical Skills	Excellent	81	25.2
	Very Good	232	72.3
	Good	8	2.5
	Total	321	100
College	Science	248	77.3
	Humanity & Arts	73	22.7
	Total	321	100.0
GPA	Excellent	89	27.7
	Very good	40	12.4
	Good	188	58.5
	Weak	4	1.4
	Total	321	100

C. Instrument Validity and Reliability

The questionnaire designed for this study was confirmed to be valid and reliable. Content validity was assessed through the collaboration of a group of experts. These experts, possessing Ph.D. degrees in teaching methods and educational technology and equipped with relevant knowledge and experience in higher education, constituted the expert panel. The panel evaluated sentences' clarity and appropriateness, ensuring their alignment with the study's measurement objectives. The experts also reviewed the language and phrasing of the statements, offering suggestions to enhance clarity and conciseness. Based on their feedback and insights, necessary adjustments were made by the recommendations of R. Daraghmeh [45] regarding content validity. This approach involves obtaining external assessments of content validity from multiple experts or educators systematically reviewing the questionnaire's relevance to the specified context.

Reliability correlation values for the attitude scale were calculated using Cronbach's coefficient alpha, a statistical method. A minimum alpha value of 0.60 was established as the threshold for questionnaire acceptance.

Table 3 shows that alpha coefficient values for the attitudes scale showed of the three subscales (subscale 1, $\alpha = 0.912$ and subscale 2, $\alpha = 0.861$, subscale 3, $\alpha = 0.742$) exceeded the minimum 0.60 alpha value. The overall correlation alpha value for all subscales ($\alpha = 0.878$) exceeded the 0.60 value.

Table 3. Reliability of consturcts

No. of Items	Cronbach's Alpha
17	0.912
10	0.861
6	0.742
Overall	0.878

IV. Result and Discussion

In this section results and discussion is presented. Findings related to the questions of this study are clarified. To address the first question-whether statistically significant distinctions exist (at $\alpha = 0.05$) in the attitudes of PTUK students toward utilizing Zoom based on factors such as gender, technical skills, college, and GPA. The researcher calculated the means and standard deviations associated with the independent variables, as depicted in Table 4.

Table 4. Means and standard deviation of attitudes according to demographic variables

Variable	Category	M	SD
Gender	Male	3.41	0.595
	Female	3.36	0.650
	Total	3.40	0.611
Technical Skills	Excellent	3.40	0.667
	Very Good	3.41	0.592
	Good	3.03	0.575
	Total	3.40	0.611
College	Science	3.64	0.521
	Humanity & Arts	3.32	0.617
	Total	3.40	0.611
GPA	Excellent	3.44	0.557
	V. good	3.42	0.799
	Good	3.39	0.566
	Weak	2.57	1.200
	Total	3.40	0.611

Table 4 illustrates the means and standard deviations reflecting students' attitudes towards the utilization of Zoom, classified by independent variables such as gender, technical skills, college, and GPA. The outcomes reveal differences in the computed means based on gender, with a mere 0.05 difference observed. Specifically, the mean for male students is 3.41, with a standard deviation of 0.595 while for female students, the mean is 3.36, accompanied by a standard deviation of 0.650.

Regarding technical skills, variations in means exist between the different levels. The most substantial difference is 0.38, observed between the 'good' (3.03) and 'very good' (3.41) levels, while the slightest difference is noted between 'very good' (3.41) and 'excellent' (3.40).

In terms of college, the mean for students in science colleges (3.64) is higher than that of students in Humanities and Arts (3.32).

Analyzing GPA, the data in Table 4 shows that the 'excellent' GPA category exhibits the highest level of positive attitudes toward Zoom, followed by those with a 'very good' GPA, 'good' GPA, and so forth, with corresponding means of 3.44, 3.43, 3.39, and 2.75, and standard deviations of 0.557, 0.799, 0.566, and 1.20, respectively.

Based on these findings, there are differences in calculated means across the variables of gender, technical skills, college, and GPA among PTUK students are evident. To establish the validity of these distinctions, the researchers conducted independent t-tests.

To assess gender variations in attitudes, an Independent Samples t-test was employed towards Zoom between male and female students. A notable difference in attitudes emerged due to differences in technical skills. Male students (M = 3.33, SD = 1.48) exhibited more favorable attitudes than their female counterparts (M = 3.41, SD = 1.31), with a significant difference established ($t(321) = 7.89$, $p = 0.03$).

To establish the validity of these distinctions, the researchers conducted independent t-tests as shown in Table 5, and found non significant differences in all questionnaire sentences except for the sentence "The lack of technical skills disturbs me while using Zoom".

Table 5 shows that there is a significant difference in the sentence lack of technical skills disturbs me while using Zoom among male and female students $t(321) = -2.151$, $p = 0.032$.

Table 5. Independent t-test of gender for "the lack of technical skills disturbs me while using the Zoom"

Sentence	t	Df	P
The lack of technical skills disturbs me while using zoom	−2.151	321	0.032

Similarly, to assess differences in attitudes for the questionnaire sentences between Applied Sciences and Humanities colleges, independent Samples t-test results with significant differences are shown in Table 6.

Attitudes towards Zoom were significantly distinct for students favoring face-to-face interactions over the Zoom platform, with College of Applied College of Applied Sciences students (M = 4.08, SD = 1.1) and Humanities and Educational Sciences students (M = 3.75) displaying variation ($t(321) = -2.059$, $p = 0.040$).

Moreover, lecture participation was investigated between the two colleges, with College of Applied College of Applied Sciences students (M = 2.72, SD = 1.45) and Humanities and Educational Sciences students (M = 3.26, SD = 1.34) differing in attitudes ($t(321) = -2.805$, $p = 0.005$).

The disparity in attitudes extended to downloading instructional materials between the two colleges od Applied Scienes and Humanities and Educational Sciences yielding a significant result ($t(321) = -3.682$, $p = 0.000$). A lack of technical skills affecting Zoom usage was evident between Applied Sciences and Humanities and Educational Sciences ($t(321) = -2.482$, $p = 0.014$.

Table 6. Independent t-test among colleges

Sentence	T	Df	P
Zoom helps me to participate in lectures by chatting, sharing images and presentations	−2.805	321	0.005
Zoom helps me to download instructional material at my convenience	−3.682	321	0.000
I consider Zoom a good platform for learning	−2.059	321	0.040
The lack of technical skills disturbs me while using zoom	−2.482	321	0.014
I admire using Zoom since it gives me the chance to chat with the instructor and my colleagues.	−3.348	321	0.001
I like the feature of sharing the screen to explain certain concepts.	−2.477	321	0.014
I like discussing and expressing my ideas with the instructor and my colleagues while using Zoom.	−2.401	321	0.017
I like the coordination and organization that Zoom offers like raising hands or like or take a break.	−2.253	321	0.025
Zoom helps me to communicate with my friends worldwide	−2.666	321	0.008
Zoom makes me feel secure	−2.260	321	0.025
Zoom helps to improve self-confidence, especially for shy students	−3.150	321	0.002
I feel disturbed when I cannot make sure my colleagues are still online	−2.967	321	0.003
Sharing Zoom with others might intrude on my privacy.	−4.119	321	0.000
I feel encouraged to use blended learning	−2.855	321	0.005

Furthermore, attitudes diverged significantly to Zoom's impact on self-confidence among shy students between college types of Applied Sciences students and Humanities and Educational Sciences ($t(321) = -3.150$, $p = 0.002$).

This aligns with the findings of Fatani [1], underlining the role of Zoom in fostering social presence and enhancing learner engagement.

To validate differences in technical skills and GPA, the researchers performed an ANOVA analysis, as outlined in Table 7.

Table 7. Analysis of variance for lack of technical skills disturbs me while using Zoom

Subjects	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24.655	2	12.328	5.891	0.003

Table 7 demonstrates a statistically significant disparity in attitudes associated with technical skills, specifically about the negative emotions experienced by students struggling with technical skills while using Zoom, with $\alpha < 0.05 = 0.003$ and $F = 5.891$. No other statistically significant differences were observed for the remaining items within the questionnaire under this independent variable. To pinpoint the specific instances of statistical variation within the technical skills level variable, researchers conducted Post Hoc Tests, employing Tukey's HSD, as depicted in Table 8.

Table 8. Tukey hsd of dependent variable: i feel disturbed because of the lack of technical skills that prohibit me from implementing Zoom

(I) technical skills	(J) technical skills	Mean Difference (I-J)	Standard Error	Significance level	95% Confidence Interval	
					Lower Bound	Upper Bound
3.0	4.0	0.1336	0.5202	0.968	−1.146	1.413
	5.0	0.7654	0.5361	0.362	−0.553	2.084
4.0	3.0	−0.1336	0.5202	0.968	−1.413	1.146
	5.0	0.6318*	0.1867	0.004	0.173	1.091
5.0	3.0	−0.7654	0.5361	0.362	−2.084	0.553
	4.0	−0.6318*	0.1867	0.004	−1.091	−0.173

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

A Tukey HSD post hoc test unveiled a statistically significant distinction in the perception of a lack of technical skills disrupting while using Zoom, with a p-value of 0.004. The comparison revealed a significant difference between students possessing intermediate technical skills (M = 2.23) and those with advanced skills (M = 2.86). Conversely, no significant differences were detected between the novice and advanced groups (p = 0.362) or between the novice and intermediate groups (p = 0.968).

The results of One-way ANOVA analysis demonstrated a statistically significant difference in attitudes based on GPA for the ability to record lectures (F(3, 317) = 6.88, p = 0.000). Subsequent Tukey HSD post hoc analysis unveiled significant distinctions between students with a GPA of 2.00 (M = 2.50, SD = 1.91) and those with a GPA of 5.00 (M = 4.37, SD = 1.02), as well as between students with GPAs of 2 and 3 (M = 4.13, SD = 1.13), and students with a GPA of 4 (M = 3.89, SD = 1.07).

Similarly, another further finding is that a statistically significant difference in attitudes was observed about GPA for the flexibility of revisiting recorded lectures (F(3,317) = 4.781, p = 0.003). The subsequent Tukey HSD post hoc analysis showed significant differences between students with a GPA of 2.00 (M = 2.50, SD = 1.15).

Furthermore, a statistically significant difference was noted in attitudes due to the lack of demonstrating practical skills while using Zoom (F(3, 317) = 6.14, p = 0.019). The Tukey post hoc test unveiled statistically significant differences between students with a GPA of 2.00 (M = 2.50, SD = 1.15) and those with a GPA of 5.00 (M = 4.37, SD = 1.06), as well as between students with GPAs of 2 and 3 (M = 4.13, SD = 1.13).

Extensive results show that a statistically significant difference in attitudes was observed about the lack of practical skills and a focus on theoretical lecturing (F(3,317) = 4.781, p = 0.019). The Tukey HSD post hoc test indicated differences among students with a GPA of 5.00 (M = 4.12, SD = 1.23), between students with a GPA of 2 (M = 2.00, SD = 2.00), and those with a GPA of 3 (M = 4.02, SD = 1.22).

Additionally, the analysis found evidence that a statistically significant difference was observed in attitudes due to unfair assessment (F(3, 317) = 3.37, p = 0.019). Post hoc tests demonstrated differences between students with a GPA (of M = 4.10, SD = 1.23), those with GPAs of 2 (M = 2.75, SD = 2.06), and 3 (M = 4.03, SD = 1.11).

To address the second research question, "What are college students' attitudes toward Zoom at PTUK?" a statistical standard was calculated by the formula employed for item categorization.

The formula employed for item categorization was as follows: (Range of highest scale value-Range of lowest scale value)/number of desired categories = (5−1)/3 = 1.33 (Categories were selected as follows: (1–2.33: Weak (W), 2.34–3.67: Medium (M), and 3.68–5.0: Strong (S) [48]. Table 9 shows means and standard deviation calculations for the attitudes questionnaire.

The outcomes presented in Table 9 indicate an overall mean attitude score of 4.630 among the students, reflecting a strong positive attitude toward utilizing Zoom. It is noteworthy that all items fall within the 'Strong' category. Notably, the highest mean of 4.231 is attributed to item number 4, which pertains to Zoom helps students to download instructional material at convenience.

Item number 11 came next with a mean of 4.153, highlighting the appeal of Zoom's flexibility, particularly the availability of recorded lectures. This sentiment is reinforced by item number 10, with a mean of 4.150, signifying the capability to play and pause recorded lectures.

Additionally, students' endorsement of Zoom was rooted in its user-friendly URL, accompanied by some privacy and security features that contributed to its reputation as a reliable e-learning tool. Furthermore, students emphasized how Zoom enhanced their self-confidence (item number 20, M = 3.830). Conversely, items 6 and 27 ranked lower in terms of mean scores, receiving values of 2.7 and 2.5, respectively.

These items touched upon the challenges posed by technical skill gaps in using Zoom and concerns about certain security and privacy aspects, affecting students' attitudes negatively.

Furthermore, students expressed negative attitudes toward the fairness of assessments (item 30, mean of 4.069, SD = 1.26), with items 31 and 32 (means of 3.81 and 3.19, respectively) corroborating the preference for face-to-face and blended learning over Zoom. Notably, Item 5 shares an identical mean of 3.931 with Item 10.

Findings related to the significant differences in attitudes based on gender show that male students with higher technical competencies hold more positive attitudes towards using Zoom among male students than female students with the same capabilities. This result is in line with Fauville et al. [49], who reported that female students reported greater Zoom fatigue after video-conferencing because they experienced nonverbal mechanisms to a greater extent which made them express negative attitudes. The researcher explained this

difference due to the nature of female students' culture. Female students may feel shy and think about the way they look. On the other hand, this result contradicts with Malkawi *et al*. [50], who reported no statistical significant difference in attitudes between male and female students who use virtual classes.

Table 9. Means and the standard deviation of the questionnaire

No.	Items	Mean	level
1	Zoom helps me to save transportation money	3.685	S
2	Zoom helps me participate in lectures by chatting, sharing images, andpresentations.	3.847	S
3	Zoom helps me to present instructional material easily.	3.910	S
4	Zoom helps me to download instructional material at convenience	4.231	S
5	I consider zooming a good platform for learning	3.931	S
6	The lack of technical skills disturbs me while using zoom	2.710	M
7	I admire using Zoom since it gives me the chance to chat with the instructor and my colleagues.	3.751	S
8	I like the feature of sharing the screen to explain certain concepts.	3.866	S
9	I like discussing and expressing my ideas with the instructor and my colleagues while using Zoom.	3.931	S
10	I like the ability to play the recorded lecture at any time and pause as I proceed if needed.	4.150	S
11	I like the flexibility the zoom offers for recorded Lecture	4.153	S
12	I like the coordination and organization that Zoom offers like raising hands or taking a break.	3.414	M
13	Zoom is an easy-to-use platform that every student can use	3.371	M
14	Zoom is featured by the privacy that it possesses	3.486	M
15	I like the idea of coordinating a Zoom meeting by sharing the URL	3.673	S
16	I like the restrictions Zoom offers by specifyinga password for each URL	3.854	S
17	I like the feature of controlling the sound and the camera as well.	3.601	M
18	Zoom helps me to communicate with my friend worldwide	3.682	M
19	Zoom makes me feel secure	3.150	M
20	Zoom helps to improve self-confidence especially for shy students	3.830	S
21	I prefer to use Zoom more than other platforms.	4.156	S
22	Internet disconnection is the most common thing that disturbs me while using the zoom	3.486	S
23	I feel disturbed because of the expenses that zoom requires like buying a laptop or internet monthly payments	3.766	S
24	The lack of face-to-face interactions is what disturbs me in zoom	4.090	S
25	I miss the social and human interaction while I am using zoom	3.523	M
26	I feel disturbed when I cannot make sure my colleagues still online	3.143	M
27	I feel disturbed because of some zoom features that lack security and privacy.	2.505	M
28	Sharing Zoom with others might intrude on my privacy.	3.960	S
29	Using Zoom is not useful for kinesthetic courses like swimming.	3.988	S
30	Zoom lacks fairness in assessment	4.069	S
31	I prefer face-to-face over zoom	3.862	S
32	I feel disturbed because Zoom is good for lecturing and lacks practical skills	3.826	S
33	I feel encouraged to use blended learning	3.199	M
	(Overall)	4.630	S

Note. S = Strong, M = Medium

Furthermore, a significant difference in attitudes among college specilality could be attributed to the differing requirements of theoretical sharing in Humanities compared to the problem-solving focus of Science and the need for practical illustations of concepts. The Applied Science curriculum needs hands-on activities which Zoom lacks for.

It is worth noting that technical issues or inadequate equipment might hinder certain students from utilizing audio and videos, uploading assignments, or downloading instructional materials. In such cases, encouraging students to employ the text-based chat module for interaction and collaboration to troubleshoot encountered issues could be beneficial [39, 40].

The outcomes of attitudes indicate an overall mean attitude score of 4.36 among the students, reflecting a strong positive attitude toward utilizing Zoom. It is noteworthy that all items fall within the 'Strong' category. Notably, the highest mean of 4.156 is attributed to item number 21, which pertains to a preference for Zoom over other platforms, then came next the appeal of Zoom's flexibility, particularly the availability of recorded lectures. signifying the capability to play and pause recorded lectures, which conquered with Joia's findings which found that Zoom recording as a learning enhancement strategy [43]. This also could be explained as the recording of the classes by Zoom for later consultation and viewing at any time and in any place will promote good access to activities, tasks, and proposed exercises that will allow students to track their learning. Moreover, students' attitudes revealed appreciation for Zoom's facilitation of discussions and idea-sharing among peers and instructors. This finding aligns with the insights of previous studies [1, 19].

Also, results revealed that students were in favor of Zoom because of url that is easy to handle and with some restrictions that characterized the private and secure reliable platform for the e-learning environment during COVID-19.

Additionally, students' attitudes toward Zoom was rooted in its user-friendly URL, accompanied by some privacy and security features that contributed to its reputation as a reliable e-learning tool. This finding is in line with Andrew *et al.* [51], who reported the privacy features of the zoon videoconferencing platform.

At the same time, it was noticed that students show positive attitudes towards zoom as a learning platform since they can discuss and express their ideas with the instructor and their colleagues while using Zoom. This result concurs with the findings of Robert *et al.* [52], who showed that students were able to collaborate and share ideas in a physiology class that implemented Zoom platform. These results seem to realistic

as Zoom features focuses on in-class group work and group presentations.

On the other had negative attitudes towards Zoom as they appeared to prefer face-to-face teaching method and they are disturbed by zoom usage for practical activities. This confirms the previous result [19, 52], that students prefer face-to-face more than the zoom videoconferencing platform. This could be explained due to it might be more difficult for them to pay attention while using Zoom and that technology can be more of a distraction sometimes. Additionally, negative attitudes were found towards Zoom assessment. This contradicts the study [53]. These attitudes may be due to the nature of the Zoom platform which requires internet connectivity. Many students may experience internet loss which will affect the assessment process. Moreover, ethics of online learning are still not well implemented which affects the fairness of the assessment.

The novelty of these results appears in the specialty of the two groups that explored and showed specific attitudes towards Zoom and how they relate to their field of study.

V. Conclusion

This study explored PTUK students' attitudes towards Zoom. The paper affirms that college students showed high and positive attitudes towards Zoom, highlighting its successful implementation and positive impact on learning. Notably, Zoom was viewed as an effective platform for enhancing students' learning experiences and promoting ease of use. The study's unique focus on student attitudes contributes to understanding this transitional period from in-person to online learning, providing valuable insights and emotions experienced by students.

Moreover, the study proposes innovative perspectives on Zoom, emphasizing planning, active learning strategies, and emotional and social support. The implications extend to pedagogical practices, emphasizing the importance of providing enriching learning experiences during crises.

The study suggests novelty in online learning tools, exemplified by platforms like Zoom. Examining student attitudes toward utilizing Zoom in their learning experiences holds considerable importance. It sheds light on crucial aspects of transitioning from traditional face-to-face instruction to online settings, especially in the context of the COVID-19 pandemic in two different faculties compared to previous studies. By giving students a platform to express their thoughts, emotions, insights, and experiences during this transition, the research contributes to understanding their perspectives.

By collecting and analyzing these attitudes, valuable insights can be gleaned to assist educators in creating an effective and successful transitional experience. These insights can potentially inform teaching strategies that facilitate educators' preparedness in effectively utilizing Zoom.

The study's findings reveal that students in Palestine have both positive and negative perceptions of various aspects of online learning environments during the COVID-19 pandemic. Moreover, the study's implications are not limited to a specific discipline or context; rather, they can be applied across different academic fields and settings.

It is important to note that this study is the first of its kind conducted at a national level in Palestine, where there is limited existing literature on the implementation of Zoom. While existing literature highlights positive aspects such as efficient communication, immediate feedback, and multimedia integration, this study introduces additional aspects. These aspects are the significance of thorough planning, active learning strategies, and emotional and social support when implementing Zoom. These findings contribute to the existing body of knowledge by addressing a gap in the literature regarding using Zoom during crises.

This study underscores the importance of universities supporting Zoom implementation, fostering technical skills, and providing adequate infrastructure and technical support. The recommendation to enhance privacy and technical skills through training aligns with the findings. Future studies could explore this topic further, considering long-term monitoring of student experiences. PTUK's attention to these aspects could effectively enhance the Zoom learning experience for students with diverse technical skill levels.

Conflict of Interests

The authors declare no conflict of interest.

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