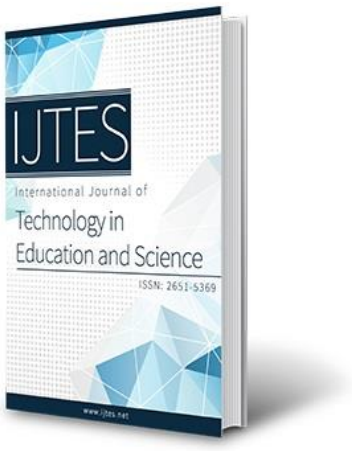

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Synchronous Zoom Classroom Learning and Face-to-Face Classroom Learning: Undergraduates' Perceptions

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Abstract

This study aimed to explore the undergraduates' attitudes and perceptions towards the use of synchronous zoom classroom for learning, and the effect of individual differences on the perceptions of zoom learning. Data were collected via online structured questionnaire from a total of 379 undergraduate students, who utilized a hybrid mode for learning, at purposively selected two state universities. The findings explored that undergraduates did not overwhelmingly support or oppose the utilization of zoom platform for learning. Multi-group analysis revealed that: male undergraduates were more receptive to use zoom classroom for learning, and perceived more beneficial aspects associated with zoom classroom compared to female undergraduates; further, undergraduates in the final academic year had the preference for zoom learning whereas those in the first academic year did not show a definite inclination either in favour or against the use of zoom for learning; moreover, significant differences were observed over the preferences on learning through both zoom and face-to-face regarding theoretical and mathematical subjects where learning of theoretical subject was supported by zoom and learning of mathematical subject were not showed a definite inclination either in favour or against the use of zoom. These findings clearly demonstrate that there is a possibility to take forward the teaching and learning through a hybrid mode which integrates both online mode and traditional face-to-face mode. This research provides insights for educational policy makers and university administrators to incorporate a hybrid learning mode for effective learning and solution for the highly demanded physical infrastructure facilities in the universities.

Introduction

The outbreak of COVID-19 pandemic brought a significant impact on teaching, learning and assessment at universities and other higher educational institutions all over the world. This pandemic crisis forced all the higher educational institutions to shift from the traditional face-to-face classroom (FTF) mode to virtual mode of learning, teaching, and assessment to provide uninterrupted education. The virtual mode of learning is an approach that relates to learning experiences in synchronous or asynchronous environments using different devices includes smartphones, laptops, and tablets with internet access. In these environments, students can be anywhere to learn and interact with instructors and other students whereas traditional learning requires a physical location for

students and educators to meet (Basilaia et al., 2020; Mohamad, Muhammed, & Rameez, 2022). Zoom virtual classroom became the primary mode of classrooms for synchronous online learning at universities worldwide.

Virtual classroom powered by zoom, a video conferencing technology that provides an online environment, in which students and instructors can collaborate in real time. Audio, video, images, and a range of interactive tools can be used to replicate a face-to-face classroom interaction. Zoom provides a platform for instructors and students to meet online synchronously via a personal computer, laptop, or cell phone with or without using video. Instructors can set up zoom meetings to conduct online classes, as well as record these sessions for later access by students. Zoom users can set up zoom meetings to conduct online meetings, record sessions for later access, collaborate on projects, and share or annotate on one another's screens, all with one easy-to-use platform (Archibald et al., 2019).

According to Serhan (2020), zoom application is a web-based collaborative video conferencing tool that provides quality audio, video, and screen sharing, which makes it great for virtual conferences, online lectures, online meetings, and webinars. In addition, the various features of zoom such as, virtual whiteboard with annotation facility, breakout rooms to create small collaborative group work, and chat to facilitate class discussions, create more interactive learning environments. The body of literature reported many pros and cons regarding synchronous zoom classroom learning perceived by students. Technological problems such as unavailability of electricity and unstable internet connections, the lack of a sense of belonging and of social encounters and relationships with peers, and the home study environment which may provide lack of space and more distractions are the main disadvantages, while the main advantages of zoom classroom learning are flexibility, information accessibility, learning at one's own place and cost effectiveness. (Stoian et al., 2022). The study by Mohamad, Muhammed, & Rameez (2022) highlighted that zoom lectures are less effective due to network difficulties that negatively affect learning.

The Sri Lankan state universities adopted mostly the Synchronous Zoom classroom as a virtual platform to continue uninterrupted and interactive academic activities (teaching, learning and assessment) during the pandemic time. However, following the pandemic, many state universities in Sri Lanka tend to undergo with a hybrid mode of teaching, offering a combination of face-to-face and synchronous zoom classroom teaching by integrating traditional and virtual learning, due to the high increase in undergraduate enrolment and the economic crisis that hinder the expansion of essential infrastructure, particularly the construction of additional facilities to accommodate larger number of student population, as well as the limitations in acquiring sufficient human resources. Even though universities have understood the benefits of virtual or hybrid mode of teaching and learning from their perspective, undergraduates' perceptions regarding this context are paramount.

According to Paudel (2021), students showed willingness to take online courses after the post-pandemic. Moreover, Horvath et al. (2022) had the same view where students, who consider online platforms efficient and cannot imagine their learning experience otherwise. On the other hand, there are students who did not like the online experience and would not like to continue it after the pandemic (Stoian et al., 2022). Therefore, it is important to understand why there are equivalent views among students for accepting zoom learning and

traditional face-to-face learning.

Further, the research studies conducted by Wang, Huang, & Quek (2018) and Mohamad, Muhammed, & Rameez (2022) argued that though students liked the flexibility and convenience of attending lessons via zoom at remote sites, the students' participation through Zoom was low compared to traditional face-to-face classes. In addition, Jeongju, Hae-Deok, & Ah Jeong (2019) highlighted that a higher dropout rate is a major problem in online learning. Therefore, it is essential to understand why students are reluctant to attend zoom classes in higher education institutions to foster an effective teaching and learning environment. Furthermore, in the Sri Lankan context, the studies that explores the undergraduates' attitudes and perceptions towards the use of Zoom for online learning based on individual differences including gender, type of course units, and academic year is very hard to find in the literature (Mohamad, Muhammed, & Rameez, 2022).

These scenarios prompt to investigate the possibility of the continuation of online teaching and learning methods after the Covid-19 pandemic. Success depends on how the undergraduates perceive the virtual/zoom on their future learning. In this context understanding students' attitudes and perceptions towards the use of zoom for online learning are essential to be addressed here for shaping the future of education in Sri Lanka.

A comprehensive review of the research studies by Frisby, & Martin (2010), Nagro et al. (2016), Azhari, & Usman (2021), Al-Okaily et al. (2020), Linjawi, & Alfadda (2018), Lee, & Choi (2011), Amrullah, & Nanzah (2022), Hollister et al. (2022), and Gherhes et al. (2021) revealed that attitude towards using online learning platforms, effectiveness of online platform on learning, and engagement with online platforms while learning were significantly associated with the behavioural intention to use online learning platforms. Where, an individual's attitude towards the use of online learning mode refers to the degree to which a person has a positive or negative feeling towards the use of online learning mode (Kaplan K J, 1972); effects of online mode on learning refers to the degree to which a person believes that using a particular online mode for learning would enhance his/her job performance, thus, achieving educational and learning goals (Serhan, 2020); online learning engagement refers to the degree of active participation, interaction, and involvement of students in an educational setting conducted via online learning mode (Jeongju, Hae-Deok, & Ah Jeong, 2019).

Accordingly, this study considers the above three constructs to be significant factors to explore the undergraduates' attitudes and perceptions towards using synchronous zoom classroom for learning. In addition, this study compares receptiveness of synchronous zoom classroom over traditional face-to-face classroom (FTF), and the beneficial aspects of synchronous zoom classroom over traditional face-to-face classroom (FTF) to identify the preferred learning modality.

Therefore, the present study aims to bridge the gap by scrutinizing undergraduates' perspectives towards synchronous zoom classroom learning and teaching. To be specific, it raises the following research questions:

1. What are the perceptions of undergraduates in terms of:
    a. Attitudes toward using synchronous zoom classroom for learning?

   b. Effectiveness of using synchronous zoom classroom on learning?
   c. Synchronous zoom classroom engagement?
2. To what extent do undergraduates prefer synchronous zoom Classroom for learning to traditional face-to-face (FTF) classroom for learning?
3. To what extent do undergraduates perceive the beneficial aspects of zoom classroom over face-to-face classroom?
4. How do individual differences including gender, type of courses, and academic year impact the undergraduates' attitudes and perceptions toward the use of synchronous zoom classroom for learning?

Method

A cross-sectional descriptive study was carried out using a quantitative approach. The data for this study was collected using a structured questionnaire which was developed based on the studies by Serhan (2020), Nasser (2019), Jeongju, Hae-Deok, & Ah Jeong (2019), and Hulya, & Tuce (2021). The questionnaire had three sections. The first section was designed with three constructs that include 14 items measuring attitudes towards the use of zoom classroom for teaching and learning (five items), effectiveness of using zoom classroom for teaching and learning (three items), and engagement in learning with zoom classroom teaching (six items).

The second section incorporated 10 items with two constructs named receptiveness of zoom classroom and beneficial aspects of zoom classroom which are used to compare zoom Classroom teaching and learning over traditional classroom teaching and learning. Receptiveness of zoom classroom that was conceptualized with six items measuring the preference for mode of course delivery. Beneficial aspects of zoom conceptualized with five items measuring the benefits of Zoom classroom over traditional face-to-face classroom. All these 25 items were measured using a five-point Likert-type items ranging 1 (strongly disagree) to 5 (strongly agree). The third section measured demographic profiles pertained to the information about research participants' gender, ethnicity, degree programme, course unit, and academic year using fixed nominal scales.

The research participants comprised first, and final academic year undergraduate students at purposively selected state universities in Sri Lanka and following the degree programmes BBA, BCom, and BSc. Further, the research participants used both synchronous zoom classroom and traditional face-to-face classroom as learning modalities to learn the course units named Mathematical Methods in Computing (MC) offered under BSc, Business Mathematics (BM) offered under BBA and BCom, and Strategic Management (SM) under BBA in the academic year 2020/2021(September 2022 to February 2023). The first half of the semester was dedicated to synchronous zoom classroom for teaching and learning and the next half for traditional face-to-face classroom. A total of 379 undergraduates voluntarily responded the questionnaire distributed via online at the end of the semester.

The IBM SPSS Statistics 27 was used to process and analyse the data. The descriptive analysis includes percentage, mean (M), and standard deviation (SD) was performed to explore the nature of the attitude towards the use of zoom, the level of effectiveness of using zoom for learning, the level of zoom classroom engagement,

the level of receptiveness of zoom learning over face-to-face learning, and the level of perceived beneficial aspects of zoom learning over face-to-face learning. The decision of the perceived levels of the above attributes (constructs) was determined using the decision criteria adopted from Hair, Black, Babin, Anderson, & Tatham (2006) (see Table 1)

Table 1. Decision Criteria

Mean value	**Decision**
Between 1 and 2.49 ($1 \leq M \leq 2.49$)	Low level/ Negative/ Prefer FTF
Between 2.5 and 3.5 ($2.5 \leq M \leq 3.5$)	Moderate level/ Neutral
Between 3.51 and 5 ($3.51 \leq M \leq 5$)	High level/ Positive/ Prefer zoom

The decision derived from the descriptive analysis was generalized using the 95% confidence interval (CI) of mean. The independent samples t-test, and the analysis of variance were performed to identify the individual differences.

Results and Discussion

Demographic Characteristics

Of the 379 undergraduates who completed the online questionnaire, 40.9% were males and 59.1% were females. A larger number of respondents (67%) from the Sinhala language speaking community. More than four-fifths (86.3%) of the participants were the first - year undergraduates. Majority of the respondents (55.4%) followed Business Mathematics Course. Comparatively, there was a higher response rate (39.8%) from the students enrolled for BBA degree programme (see Table 2).

Assessment of Reliability

Reliability of all survey items evaluating undergraduates' attitudes and perceptions towards the use of zoom for learning was assessed by the measure Cronbach's alpha (CA). Table 3 indicates the overall CA value for all 25 survey items was 0.968. The CA values were also calculated for the constructs attitudes toward zoom learning (5 items), effectiveness of zoom learning (3 items), zoom classroom engagement (6 items), receptiveness of zoom learning compared to FTF learning (6 items), and benefits of zoom classroom engagement over face-to-face classroom (5 items). As shown in Table 3, the reliability of the overall survey items and its four constructs exceeded the threshold value of 0.70 as recommended by Hair *et al*. (2019). It confirms all the survey items, and the constructs had a higher level of reliability regarding internal consistency.

Table 2. Demographic Profiles

Characteristics	**Attribute**	**N**	**Percent**
Gender	Female	224	59.1
	Male	155	40.9
	Total	379	100

Characteristics	Attribute	N	Percent
Degree Programme	BBA	151	39.8
	BCom	111	29.3
	BSc	117	30.9
	Total	379	100
Course Units	Mathematical Methods in Computing (MC)	117	30.9
	Business Mathematics (BM)	210	55.4
	Strategic Management (SM)	52	13.7
	Total	379	100
Academic Year	First Year	327	86.3
	Final Year	52	13.7
	Total	379	100
Ethnicity	Sinhalese	254	67.0
	Tamils	125	33.0
	Total	379	100

Table 3. Reliability

Constructs	Cronbach's Alpha (CA)	No. of Items
Overall	**0.968**	**25**
Attitude	0.917	05
Effectiveness	0.901	03
Engagement	0.923	06
Receptiveness	0.843	06
Beneficial aspects	0.832	05

Undergraduates' Perceptions towards the Use of Zoom Classroom for Learning

The perceptions towards the zoom classroom learning towards synchronous zoom classroom learning are explored using the descriptive statistics includes percentage, mean (M), and standard deviation (SD) and the 95% confidence interval (CI) for the mean.

Undergraduates' Attitudes towards the Use of Zoom for Learning

Table 4 shows the undergraduates' attitudes towards the use of zoom in learning. The mean of the respondents' perceived scores ranged from 1 to 5, with a mean (M) of 3.21 and standard deviation (SD) of 0.95. 36.4% of undergraduates in the sample supported for zoom learning, while 22.4% not supported. According to table 4, half of the undergraduates (47.5%) in the sample agreed learning with zoom is comfortable and more than one-third of undergraduates (37%) revealed that they would like to learn other courses with zoom. In the survey items focused on attitude towards the use of zoom (Q1 – Q5), around 40% of the undergraduates supported in several aspects. The mean values along with the standard deviations summarized in the tables 4 and 5 shows that, on

average, the undergraduates' attitude towards the use of zoom for learning was neither supportive nor not supportive. Based on the 95% confidence interval of mean reported in table 4, it can be concluded with 95% confidence that the undergraduates did not exhibit a strong tendency towards supporting or not supporting the use of zoom for learning.

Table 4. Undergraduates' Attitude towards the Use of Zoom

Perception	**Frequency (%)**	**Range**	**M (SD)**	**95%CI**
Supported ($M > 3.5$)	138 (36.4)	$1 - 5$	3.21 (0.95)	(2.20, 3.50)
Neutral ($2.5 \leq M \leq 3.5$)	156 (41.2)			
Not Supported (($M < 2.5$)	85 (22.4)			

Table 5. Undergraduates' Perceptions Related to Survey Items Focusing Attitude

Survey Items: Attitude towards the use of zoom for learning	**DA (%)**	**A (%)**	**Mean (SD)**
Q1: Learning with zoom is enjoyable	23.7	42.5	3.26 (1.08)
Q2: Using zoom for learning is comfortable	24.0	47.5	3.36 (1.10)
Q3: Learning is more interesting with zoom	36.2	35.9	3.00 (1.10)
Q4: I like using zoom for learning	24.6	41.4	3.27 (1.10)
Q5: I would like to learn other courses with zoom	30.9	37.0	3.14 (1.11)

Undergraduates' Perceptions toward the Effects of Zoom on Their Learning

In a total 379 undergraduates, 40.1% (152) of the undergraduates perceived that learning through zoom had a positive effect on their learning during the class activities, while 20.6% (78) perceived as a negative effect on their learning (see Table 6).

Table 6. Undergraduates' Perceptions of Effects of Zoom

Perception	**Frequency (%)**	**Range**	**M (SD)**	**95%CI**
Positive ($M > 3.5$)	152 (40.1)	(1 -- 5)	3.27 (0.98)	(3.04, 3.50)
Neutral ($2.5 \leq M \leq 3.5$)	149 (39.3)			
Negative (($M < 2.5$)	78 (20.6)			

Regarding undergraduates' perceptions of the items measuring the effects of zoom on their learning (Q6 – Q8), 42.6% agreed zoom improved their learning during the class time, and 36.7% agreed zoom helped in developing their confidence in the subject. Further, the mean and standard deviation values shown in the Table 6 and 7, indicated that, on average, undergraduates in the sample perceived that the use of zoom on their learning had neither positive effect nor negative effect. Further, according to the 95% CI shown in Table 6, it can be concluded with 95% confidence that undergraduates' perceived impact of zoom on their learning activities is at moderate level.

Table 7. Undergraduates' Perceptions of Survey Items Focus Effects of Zoom on Learning

Survey Items: Effects of zoom on learning during the class time	DA (%)	A (%)	Mean (SD)
Q6: Zoom improves learning in the class	26.2	42.6	3.24 (1.10)
Q7: Zoom helps learn the subject in the class	19.8	49.5	3.39 (1.04)
Q8: Zoom helps develop confidence in the subject	27.3	36.7	3.16 (1.07)

Undergraduates' Perceptions of Zoom Classroom Engagement

The results summarized in table 8 shows that, 30.1% of the undergraduates' zoom classroom engagement was at high level, while 24.8% undergraduates' engagement was at low level. According to table 9, half of the undergraduates (49.9%) disagreed that their interaction with colleagues increased, while 44.1% agreed that zoom classroom learning helped them participate in the class that enhanced learning. Further, the mean, standard deviation values, and 95% CI reported in the Table 8 and 9, suggested that on average, undergraduates' zoom classroom engagement is at moderate level.

Table 8. Undergraduates' Perceptions of Zoom Classroom Engagement

Perception	Frequency (%)	Range	M (SD)	95% CI
High ($M > 3.5$)	114 (30.1)	$1-5$	3.07 (0.91)	(2.64, 3.50)
Moderate ($2.5 \leq M \leq 3.5$)	171 (45.1)			
Low (($M < 2.5$)	94 (24.8)			

Table 9. Undergraduates' Perceptions of Survey Items Focus Zoom Classroom Engagement

Survey Items: Zoom classroom engagement	DA (%)	A (%)	Mean (SD)
Q9: Zoom helps participate the class in a way that enhance learning	20.1	44.1	3.32 (1.01)
Q10: Zoom motivates actively participate in class activities	31.9	36.4	3.09 (1.12)
Q11: Zoom makes easier to more engaged in class activities	27.3	42.6	3.22 (1.11)
Q12: Zoom increases interaction with lecturer	29.6	36.0	3.09 (1.05)
Q13: Zoom increases interaction with colleagues	49.9	24.4	2.64 (1.10)
Q14: Zoom motivates to seek help from lecturer and colleagues	30.2	36.9	3.08 (1.08)

Receptiveness of Zoom Classroom over Face-to-Face (FTF) Classroom

Regarding the preference for zoom classroom instructions over traditional face-to-face (FTF) classroom instructions, 29% of the undergraduates preferred FTF classroom instructions while 21.9% preferred zoom classroom instructions (see Table 10). According to Table 11, over half of the undergraduates (59.4%) perceived that they would do better if the instructions were in FTF setting rather than zoom platform. Further, the mean value of 3.68 confirmed that undergraduates preferred FTF to zoom platform for better performance.

Table 10. Undergraduates' Perceptions of Receptiveness of Zoom over FTF

Perception	**Frequency (%)**	**Range**	**M (SD)**	**95% CI**
Prefer Zoom ($M > 3.5$)	83 (21.9)	$1-5$	2.90 (0.82)	(2.30, 3.50)
Neutral ($2.5 \leq M \leq 3.5$)	186 (49.1)			
Prefer FTF (($M < 2.5$)	110 (29.0)			

However, the overall mean value of 2.90 with the standard deviation of 0.82 and the 95% CI reported in the Table 10 indicated the overall receptiveness of zoom classroom instruction is at neutral level. It suggested that undergraduates are prefer to both mode of instructions, without a strong favor toward one or the other.

Table 11. Undergraduates' Perceptions of Items Focus Receptiveness of Zoom over FTF

Survey Items: Receptiveness of zoom learning over FTF learning	**DA (%)**	**A (%)**	**Mean (SD)**
Q15: Activities during zoom motivates to learn more than FTF	36.7	36.4	3.00 (1.10)
Q16: Participation is more in zoom than FTF	33.5	37.5	3.11 (1.16)
Q17: Attention to the class task during zoom session is greater than FTF	36.6	35.3	3.03 (1.17)
Q18: Easier participation in group activities with zoom session than FTF	38.8	32.4	2.96 (1.14)
Q19: Quality of education is more in zoom learning than FTF	34.4	29.7	2.97 (1.01)
Q20: Believe I would do better if it was taught in FTF class without zoom	10.6	59.4	3.68 (0.95)

Beneficial Aspects of Zoom Classroom over Face-to-Face (FTF) Classroom

Regarding the benefits of the use of zoom classroom over the use of face-to-face (FTF) classroom, 40.6% of the undergraduates perceived that zoom classroom learning is beneficial than FTF classroom learning in terms of flexibility, communication, and usage of digital resources (Table 12 and 13).

Table 12. Undergraduates' Perceptions of Benefits of Zoom over FTF

Perception	**Frequency (%)**	**Range**	**M (SD)**	**95% CI**
Zoom is beneficial ($M > 3.5$)	153 (40.6)	$1-5$	3.35 (0.76)	(3.20, 3.50)
Neutral ($2.5 \leq M \leq 3.5$)	183 (48.3)			
FTF is beneficial (($M < 2.5$)	43 (11.1)			

According to Table 13, 55.9% undergraduates agreed that zoom was flexible in terms of comfort, schedule, and location than FTF, 57.1% agreed zoom learning was more comfortable for written communication than FTF (57.1%), and 66.6% agreed that zoom used more digital resources than FTF. However, the overall mean value of 3.35 with the standard deviation of 0.76, and the 95% CI reported in the Table 12 demonstrated that undergraduates do not perceive one mode of learning platform having more benefits than the other.

Table 13. Undergraduates' Perceptions of Items Focus Benefits of Zoom over FTF

Survey Items: Beneficial aspects of zoom over FTF	DA (%)	A (%)	Mean (SD)
Q21: Zoom is flexible in terms of comfort, schedule, and location than FTF	13.8	55.9	3.58 (0.94)
Q22: Zoom is easier for interaction between staff and students than FTF	38.5	31.1	2.94 (1.09)
Q23: Zoom is easier for interaction between students than FTF	36.0	32.3	2.98 (1.06)
Q24: More comfortable for written communication in zoom than FTF	14.1	57.1	3.54 (0.96)
Q25: Zoom learning make more usage of digital resources than FTF	8.5	66.6	3.71 (0.88)

Individual Differences

A multi-group analysis of individual differences was performed using independent samples t-test and one way ANOVA to identify the effects of individual differences on undergraduates' attitudes and perceptions toward the use of synchronous zoom classroom for learning. Mean (M), standard deviation (SD), and p – value was used to evaluate the effects of individual differences.

According to the results, obtained from independent samples t-test, reported in Table 14, significant gender differences were only found on receptiveness of zoom over FTF, and benefits of zoom over FTF indicating that males' ratings of receptiveness of zoom over FTF (M = 3.02, SD = 0.80) is higher than females' rating (M = 2.82, SD = 0.83) and males' ratings of benefits of zoom over FTF (M = 3.45, SD = 0.76) is higher than females' rating (M = 3.28, SD = 0.76). The observed significant differences highlight that, on average, male undergraduates are more receptive to use zoom classroom for learning compared to female undergraduates in the surveyed context. Moreover, male undergraduates, on average, perceive more beneficial aspects associated with zoom classroom compared to female undergraduates in the surveyed context.

The results of independent samples t-test reported in Table 15 indicted that significant differences exist between undergraduates from various academic years on all constructs. Undergraduates from final academic year have higher ratings in all constructs than the undergraduates from the first academic year. Further. the mean values of all the constructs except the construct receptiveness of zoom over FTF were greater than 3.5 indicating that final year undergraduates have a willingness to use zoom classroom for learning while first year undergraduates' mean values suggesting first year undergraduates neither strongly embrace nor strongly reject the idea of utilizing zoom as a platform for learning.

Table 14. Differences between the Undergraduates' Perceptions towards Zoom Learning by Gender

Constructs	Female: M (SD)	Male: M (SD)	p -- value
Attitude towards zoom learning	3.14 (0.95)	3.31 (0.95)	.07
Effects of zoom on learning	3.22 (1.00)	3.33 (0.95)	.30
Zoom classroom engagement	3.00 (0.93)	3.17 (0.89)	.08
Receptiveness of zoom over FTF	2.82 (0.83)	3.02 (0.80)	.02
Benefits of zoom over FTF	3.28 (0.76)	3.45 (0.76)	.03

Table 15. Differences between the Undergraduates' Perceptions towards Zoom by Academic Year

Constructs	**First year: M (SD)**	**Final year: M (SD)**	**p -- value**
Attitude towards zoom learning	3.15 (0.96)	3.57 (0.84)	.00
Effects of zoom on learning	3.21 (1.00)	3.56 (0.87)	.02
Zoom classroom engagement	2.99 (0.92)	3.57 (0.74)	< .001
Receptiveness of zoom over FTF	2.84 (0.84)	3.27 (0.58)	< .001
Benefits of zoom over FTF	3.29 (0.77)	3.67 (0.64)	< .001

The results from the ANOVA reported in Table 16 indicates significant differences exist among undergraduates from different course units on all constructs except the construct, effects of zoom learning. The average ratings of the constructs for the course unit strategic management (SM), highlights that the undergraduates who enrolled for SM have more willingness to use zoom classroom for learning the course compared to the undergraduates who enrolled for the courses both Mathematical Methods in Computing (MC) and Business Mathematics (BM).

Table 16. Differences between the Undergraduates' Perceptions towards Zoom by Course Units

Constructs	**MC**	**BM**	**SM**	**p -- value**
	M (SD)	**M (SD)**	**M (SD)**	
Attitude towards zoom learning	3.11 (0.93)	3.27 (0.97)	3.57 (0.84)	.01
Effects of zoom on learning	3.22 (0.97)	3.22 (1.00)	3.56 (0.87)	.07
Zoom classroom engagement	2.90 (0.87)	3.04 (0.94)	3.57 (0.74)	< .001
Receptiveness of zoom over FTF	2.86 (0.86)	2.83 (0.82)	3.27 (0.58)	.00
Benefits of zoom over FTF	3.32 (0.79)	3.28 (0.76)	3.67 (0.65)	.00

Conclusion

This study was conducted to investigate undergraduates' attitudes and perceptions toward the use of synchronous zoom classroom for learning by incorporating the constructs: attitude towards the use of zoom for learning, impact of the use of zoom on learning, zoom classroom engagement, receptiveness of zoom over FTF, and beneficial aspects of zoom over FTF. In addition, the constructs were examined to identify the individual differences among undergraduates and to evaluate the effect of these differences on shaping undergraduates' perceptions and decisions to continue hybrid mode of learning.

The results of the study suggest that overall, undergraduates did not overwhelmingly support or oppose the utilization of zoom platform for learning. However, in a total of 379 undergraduates, 36.4% of undergraduates had a positive attitude towards the use of zoom whereas 22.4% had a negative attitude; 40.1% of the undergraduates perceived zoom had a positive effect on their learning while 20.6% perceived zoom had a negative effect on their learning; 30.1% of the undergraduates' zoom classroom engagement is at a high level whereas 24.8% of the undergraduates' engagement is at a low level; 21.9% of the undergraduates prefer zoom classroom instruction whereas 29% prefer face-to-face classroom instruction; and 40.6% of the undergraduates perceived

zoom classroom learning was beneficial while 11.1% perceived face-to-face classroom learning was beneficial.

In the context of multi-group analysis, significant gender differences observed on receptiveness of zoom over FTF, and benefits of zoom over FTF, where male undergraduates were more receptive to zoom instruction, and perceived more beneficial aspects of zoom than female undergraduates. Further, undergraduates in the final academic year revealed the preference for zoom learning whereas those in the first academic year did not show a definite inclination either in favour or against the use of zoom for learning, and the undergraduates preferred zoom mode learning for theoretical subject whereas undergraduates did not show a definite inclination either in favour or against the use of zoom for learning mathematics courses.

Recommendations

These findings clearly demonstrates that there is a possibility to take forward the teaching and learning through a hybrid mode which integrates both online mode and traditional face-to-face mode. In addition, as individual differences play a significant role in understanding undergraduates' attitudes and preferences toward online based learning, it is imperative to consider these individual differences into account when planning and implementing a hybrid learning mode. To ensure the more generalizability of the findings, further studies should be conducted by taking a larger sample of undergraduates from several universities. The sample should incorporate participants from all academic years and a diverse array of courses, including practical, technical, and theoretical subjects. This approach will provide a more comprehensive understanding about attitudes and perceptions towards the use of online platform for learning across a wider demographic, thereby contributing to a more robust and widely applicable set of conclusions.

References

Al-Okaily, M., Alqudah, H., Matar, A., Lutfi, A., & Taamneh, A. (2020). Dataset on the acceptance of e-learning system among universities students under the COVID-19 pandemic conditions. *Data in Brief*, 32, 106176.

Amrullah, A., & Nanzah, Z. (2022). Student-student interaction in an online learning during the covid-19 pandemic. *J. Appl. Stud. Lang*., 6, 37-45.

Archibald, M.M., Ambagtsheer, R.C., Casey, M.G., & Lawless, M. (2019). Using Zoom videoconferencing for qualitative data collection: perceptions and experiences of researchers and participants. *International Journal of Qualitative Methods*, 18.

Azhari, M.S., & Usman, O. (2021). Interest determination of Zoom use with a TAM approach in the implementation of SFH in the middle of pandemic. *Available at: SSRN* 3768719

Basilaia, G., Dgebuadze, M., Kantaria, M., & Chokhonelidze, G. (2020). Replacing the classic learning form at universities as an immediate response to the COVID-19 virus infection in Georgia. *International Journal for Research in Applied Science and Engineering Technology*, 8(3), 101-108.

Frisby, B.N.; & Martin, M.M. (2010). Instructor–student and student–student rapport in the classroom. *Commun. Educ*, 59, 146-164.

Gherhes,, V., Simon, S., & Para, I. (2021). Analysing students' reasons for keeping their webcams on or off during online classes. *Sustainability*, 13, 3203.

Hair, J. F., Black, B., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis*: Upper saddle river, NJ: Pearson Prentice Hall.

Hair, J.F., Risher, J.J., Sarstedt, M., & Ringle, C.M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24.

Hollister, B., Nair, P., Hill-Lindsay, S., & Chukoskie, L. (2022). Engagement in Online Learning: Student Attitudes and Behavior during COVID-19. *Front. Educ*, 7, 851019.

Horváth, D., Ásványi, K., Cosovan, A., Csordás, T., Faludi, J., Galla, D., & Simay, A.E. (2022). Online only: Future outlooks of post-pandemic education based on student experiences of the virtual university. *Soc. Econ*, 44, 2–21.

Hulya, T., & Tuce, O K. (2021). Conceptualizing benefits of zoom for online foreign language education during the Covid-19 pandemic. *7th International Mardin Artuklu Scientific Research Conference*.

Jeoongju , L., Hae-Deok, S., & Ah Jeong, H. (2019). Exploring Factors, and Indicators for Measuring Students' Sustainable Engagement in e-Learning. *Sustainability*, 11, 985

Kaplan KJ. (1972). On the ambivalence-indifference problem in attitude theory and measurement: A suggested modification of the semantic differential technique. *Psychological bulletin*, 77(5):361. doi: 10.1037/h0032590

Linjawi, A.I., & Alfadda, L.S. (2018), Students' perception, attitudes, and readiness toward online learning in dental education in Saudi Arabia: a Cohort study. *Advances in Medical Education and Practice*, 9, 855-863.

Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. *Educ. Technol. Res. Dev*, 59, 593–618

Mohamed Riyath, M.I., Muhammed Rijah, U.L. & Rameez, A (2022). Students' attitudes on the use of Zoom in higher educational institutes of Sri Lanka, *Asian Association of Open Universities Journal*, 17(1), 37-52. https://doi.org/10.1108/AAOUJ-11-2021-0130.

Nasser M. Sabah (2019). Motivation factors and barriers to the continuous use of blended learning approach using Moodle: students' perceptions and individual differences, *Behaviour & Information Technology*, DOI: 10.1080/0144929X.2019.1623323

Nagro, S. A., Hooks, S. D., Fraser, D. W., & Cornelius, K. E. (2016). Whole-group response strategies to promote student engagement in inclusive classrooms. *Teaching Exceptional Children*, 48(5), 243-249.

Oktaviani, S. (2021). Online lectures using Zoom application for undergraduate students during covid-19 pandemic period. *Risenologi*, 6(1), 31-36.

Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *Int. J. Stud. Educ*, 3, 70–85.

Serhan, D. (2020). Transitioning from face-to-face to remote learning: Students' attitudes and perceptions of using Zoom during Covid-19 pandemic. *International Journal of Technology in Education and Science (IJTES)*, 4(4), 335-342.

Stoian, C.E., F˘arcas, iu, M.A., Dragomir, G.-M., & Gherhes, V (2022). Transition from Online to Face-to-Face Education after COVID-19: The Benefits of Online Education from Students' Perspective.

Sustainability, 14, 12812.

Wang, Q., Huang, C., & Quek, C. L. (2018). Students' perspectives on the design and implementation of a blended synchronous learning environment. *Australasian Journal of Educational Technology*, 34(1). https://doi.org/10.14742/ajet.3404

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