The Learning Behaviour of Students Using E-Learning Under COVID-19 Condition

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ABSTRACT
The present study assesses the efficacy of online education in the context of the COVID-19 outbreak, scrutinizes its merits and demerits, pinpoints encountered challenges, and presents targeted solutions. We used the survey in this study. Totally 312 questionnaires were collected. The findings indicate that learners expect online instruction to entail greater interactivity, socialization, personalization, and enhanced technology usability. Although online education provides certain advantages, such as flexibility and cost-effectiveness, it also engenders certain drawbacks such as inadequate opportunities for face-to-face interaction and feedback, high technical requirements, susceptibility to cheating, and insufficient monitoring and feedback. Future investigations could expand the sample size and generalize the findings to real-world contexts.

INTRODUCTION
The present survey endeavors to conduct a comprehensive inquiry into the current landscape and determinants of virtual teaching for students enrolled in college during the recent pandemic outbreak. A holistic evaluation of the impact of such circumstances on e-learning shall be executed through scrutinizing the online learning experiences of college students, which shall ultimately enable us to provide practical and evidence-based recommendations and solutions to further enhance the quality of online education. This study aspires to identify and examine the variables that are closely associated with online learning outcomes, thereby enabling us to furnish educators and policymakers with sturdy and effective pedagogical guidelines and strategies. The principal objectives of this research encompass exploring the attitudes and perspectives of college students regarding online education, analyzing the various pros and cons of online learning for college students, investigating the challenges and roadblocks faced by college students in their online educational pursuits, scrutinizing the factors influencing the learning outcomes of college students undertaking online courses, and relaying tailor-made proposals and measures to bolster the efficacy of online teaching. The research will encompass, though not be confined to, current and graduating scholars as research subjects, universities across the nation as research settings, and the in-depth study of virtual teaching of college students during the pandemic as the core research theme.

THE STUDY
During the period of COVID-19 prevention and control, universities implemented extensive online teaching in order to ensure the quality and progress of education, in response to the initiative of the Ministry of Education. Presently, research on online learning among college students is exhibiting a growing trend year after year. Researchers focus on various areas including the advantages and disadvantages of online learning, factors impacting the effectiveness of online learning, and the future direction of online learning. In particular, one area of research explores the opportunities and challenges that online learning presents for college students. The characteristics of online learning for college students have become the impetus for reform in teaching models during the information age (Haleem et al., 2022). Wut and Xu (2021) advocate for college students to embrace both virtual and real-world online learning, along with providing relevant institutional support and emphasizing classroom interaction. A study examining online learning data from 200 students in a private higher education institution in the Philippines discovered that the primary challenge of online learning is the lack of a conducive learning atmosphere and reduced interaction between teachers and students, resulting in decreased learning efficiency (Barrot et al., 2021). The challenges of online education stem from limited learning experiences due to changes in teaching interaction patterns and inaccurate teaching evaluations caused by the detachment of teacher-student relationships (TURAN et al., 2022). In a survey on online English education conducted in Wuhan, China, Zou et al. found that inadequate self-discipline is strongly associated with poor performance in online courses (Zou et al., 2021). Apart from exploring the opportunities and challenges of online learning, empirical research on college students' online learning experiences remains significant. Hergüner et al. assert that the new digital divide is a critical factor impacting online learning, and adjusting attitudes towards online learning and proactive preparation are crucial in reducing and eliminating this divide (Hergüner et al., 2021). According to the findings

of Moffat et al., the adoption of role switching scripts can promote deep learning among college students during online asynchronous discussions (Moffat et al., 2021). In a study conducted by DiPasquale and Hunter, they compared the influence of in-depth teaching interactions and superficial teaching interactions on deep online learning and determined that the former holds greater significance (DiPasquale & Hunter, 2022). Additionally, some scholars propose that gamified teaching evaluations hold potential to enhance online learning performance (Nieto-Escamez & Roldán-Tapia, 2021). The research results of Díaz-Noguera et al. revealed that factors influencing college students' online learning include teachers' instructional methods, students' autonomy in learning, the platforms used, and technical facilities (Díaz-Noguera et al., 2022). In a two-year study on online learning experiences and influencing factors among students at Near East University in Cyprus, Senol et al. discovered that while most college students recognize the advantages of online education, the instability of network environments and technical issues exert the strongest impact (Senol et al., 2021). Other studies emphasize the significance of social presence as a key determinant of online learning quality, and stress the importance of designing "student-centered" courses while considering individual differences (student voices) in the learning process.

On the basis of previous studies, this research tries to find out the influence of related factors on college students' e-learning from the perspective of internal (age, gender)and external(learning stage) factors.

DEVELOPMENT OF HYPOTHESIS

This investigation presents an analytical framework concerning e-learning among college students, which is grounded in behavioral science theory. The study aims to investigate the effect of online learning behavior on both learning quality and progress. The research finds that teacher-student interaction is an essential element in improving learning outcomes, as evidenced by Gopal et al.'s (2021) findings. Based on literature and practical experience, this paper proposes the following research hypotheses:

Hypothesis 1: There are differences in the views of men and women on online transactions.
Hypothesis 2: Different age groups of students have different views on online.
Hypothesis 3: There are differences in the views of different student types on online education.

A. Variables

1. Dependent variable

The dependent variable used in this study is students' identification with online education, which is divided into identification with the advantages of online education and identification with the shortcomings of online education. For each question, we provide 5 levels: 1 Strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 Strongly agree. This study conducts a statistical analysis of students' views on online education.

2. Key explanatory variables

In this study, the influencing factors of college students' online education are the key explanatory variables. The variables are mainly internal factors and external factors of atmosphere. Among them, the study attributes the interactivity and adaptability of online courses to internal influencing factors, while Internet speed and whether online education is interfered by physical environment are considered as external factors.

3. Control variables

The control variables in this paper are mainly demographic characteristic variables, including gender, age, major, Internet access tools, online learning duration, school type, etc. Among them, the majors include liberal arts and science. Internet access includes online learning devices such as mobile phones, tablets and laptops. Online learning time refers to the number of hours of online learning per day.

FINDINGS

We have conducted a preliminary analysis of the survey population and found that the scope of our research covers all young student populations, providing some assurance for the reliability of the survey results. Through our detailed analysis above, we have also gained a general understanding of the conclusions of this survey. In the future, we will conduct a detailed analysis of this survey through more detailed indicators, and ultimately come to a reliable conclusion.

A. Population and Sample

A total of 312 questionnaires were collected in this survey. Among them, 308 were filled in through wechat links, accounting for 98.72 percent, while the other two came from web links and two from mobile phone submissions. As for the Background data of respondents are shown below.
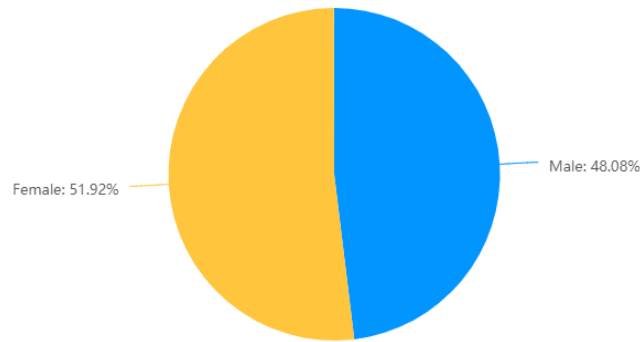
Gender

Figure1. Pie Chart of Respondents' Gender

From the above figure, it can be seen that the proportion of men and women in the surveyed population is relatively flat, which also indicates that this survey has a good gender balance.
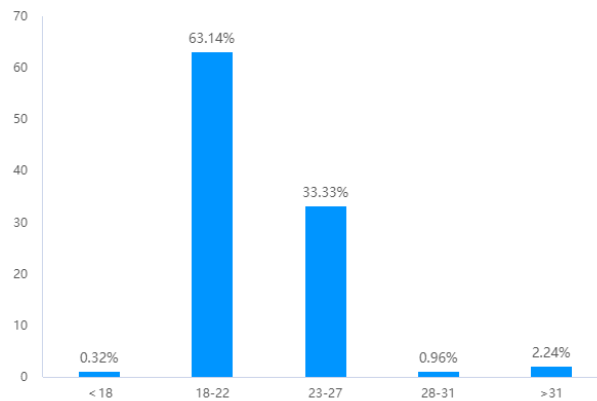
Age

Figure2. Bar Chart of Respondents' Age

From the histogram above, we can see that the surveyed population is mainly concentrated in their twenties, which is due to the fact that our research mainly focuses on the student population in school. This proportion is beneficial for the survey results to more accurately reflect the relevant situation of students in school.
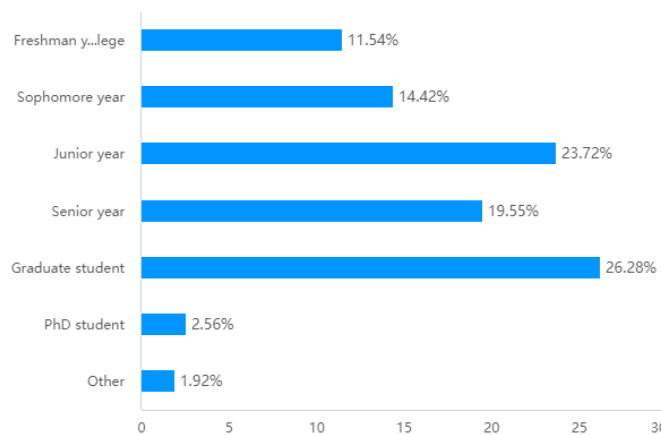
Learning stage

Figure3. Pie Chart of Respondents' Learning stage

From the horizontal graph above, we can see that this experiment covers almost all academic stages. Through this survey, we can make a more universal evaluation of the overall students.
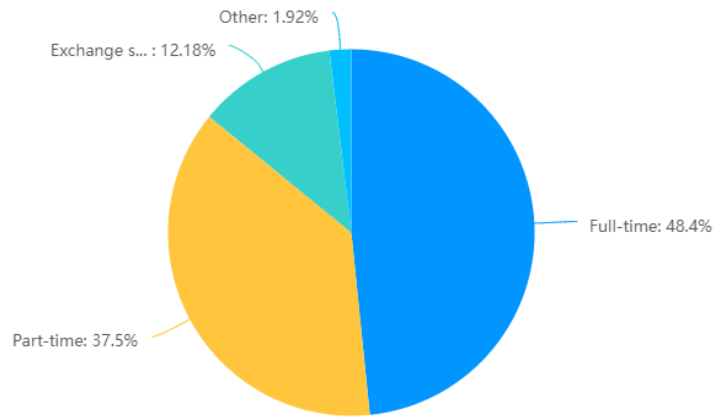
Learning Mode

Figure4. Pie Chart of Respondents' Learning mode

From the pie chart above, we can see that the survey covers full-time and part-time students, and we can also have good general adaptability in this regard.

HYPOTHESIS TESTING

The study is to observe learning behaviour of students using e-learning under COVID-19 condition. By analyzing the collected data from the questionnaires, different results were found based on the research model and tested by the Statistical Package for Social Sciences software (SPSS). The analysis methods included Independent Sample T-test and One-way ANOVA.

A. Independent Samples T-test

Table1. Independent Samples T-test

No.	Gender(M±SD)		t	p
	Male(n=150)	Female (n=162)		
21	3.913±1.123	3.938±1.107	-0.197	0.844
22	3.820±1.141	3.858±1.147	-0.293	0.77
23	4.007±1.114	3.938±1.224	0.515	0.607
24	4.060±1.094	3.951±1.168	0.852	0.395
25	3.833±1.212	3.765±1.156	0.507	0.613
26	3.953±1.119	3.975±1.075	-0.177	0.86
27	4.087±1.141	3.988±1.120	0.773	0.44
28	3.713±1.183	3.821±1.097	-0.834	0.405
29	3.927±1.153	3.870±1.126	0.436	0.663

Item	Male (mean±SD)	Female (mean±SD)	t	Sig.
210	3.620±1.213	3.500±1.257	0.857	0.392
211	3.893±1.112	3.895±1.112	-0.014	0.989
212	3.480±1.325	3.488±1.296	-0.052	0.959
213	3.407±1.316	3.457±1.291	-0.339	0.734
214	3.620±1.174	3.840±1.086	-1.716	0.087
215	3.740±1.155	3.889±1.092	-1.17	0.243
31	2.740±1.318	2.778±1.370	-0.248	0.804
32	2.687±1.216	2.630±1.304	0.399	0.69
33	2.653±1.361	2.586±1.284	0.447	0.655
34	2.780±1.399	2.840±1.378	-0.378	0.706
35	2.427±1.239	2.463±1.175	-0.266	0.791
36	2.447±1.207	2.426±1.168	0.154	0.878
37	2.793±1.333	2.580±1.294	1.433	0.153
38	2.500±1.230	2.593±1.278	-0.651	0.516
39	2.667±1.283	2.716±1.340	-0.332	0.74
310	2.507±1.203	2.562±1.256	-0.395	0.693
41	2.660±1.284	2.759±1.323	-0.672	0.502
42	2.427±1.271	2.321±1.101	0.782	0.435
43	2.347±1.215	2.253±1.160	0.696	0.487
44	2.293±1.251	2.253±1.155	0.296	0.768
45	2.687±1.301	2.685±1.278	0.01	0.992

From the above table, it can be seen that the significance values of the Levene test are almost all greater than 0.05. This means that we can assume that there are differences between men and women regarding the same issue, so we used the values in the "Equal variances not assumed " row. Therefore, the significance value under the "mean equality t-test" is greater than 0.05. Therefore, based on past experience, this indicates that there is a gender difference in the perception of online education.

The digital disparity between genders has been extensively studied in academic circles, wherein investigations have indicated variances in device availability, information acquisition, and effectiveness of use between males and females. Although the divide in opportunities for internet usage has reduced, discrepancies remain in the frequency, comfort, and proficiency of computer usage. Research demonstrates that males exhibit higher levels of comfort and intensity in internet usage compared to females, and they also harbor more positive attitudes towards computers. Furthermore, gender influences the purpose and approach to computer usage, with women displaying a preference for communication and learning, while men tend to favor entertainment and online gaming.

Based on the above results, the hypothesis H1: there are differences in students' perceptions of online education among different gender groups.

Based on the above results, the hypothesis H2: there are differences in students' perceptions of online education among different age groups.

Based on the above results, the hypothesis H3: there are differences in students' perceptions of online education among student types.

B. One-way ANOVA
ANOVA tests for mean differences between independent groups, with post-hoc tests used to identify which groups differ significantly. Results are presented in a multiple comparisons table. A significance level of 0.05 or less indicates significant differences.

Table2. One-way ANOVA

No.	Gender(M±SD)		F	p
	Male (n=150)	Female (n=162)		
21	3.913±1.123	3.938±1.107	0.039	0.844
22	3.820±1.141	3.858±1.147	0.086	0.77
23	4.007±1.114	3.938±1.224	0.265	0.607
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29	3.927±1.153	3.870±1.126	0.19	0.663
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32	2.687±1.216	2.630±1.304	0.159	0.69
33	2.653±1.361	2.586±1.284	0.2	0.655
34	2.780±1.399	2.840±1.378	0.143	0.706
35	2.427±1.239	2.463±1.175	0.071	0.791
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43	2.347±1.215	2.253±1.160	0.484	0.487
44	2.293±1.251	2.253±1.155	0.087	0.768
45	2.687±1.301	2.685±1.278	0	0.992

1. Comparison of Students' results between Ages

Table 2 showed that the significance level under ANOVA was 0.001 (F=1.297, $p<0.05$). This indicated that the age groups had significant difference in perceived ease of use of online education. Hence, Post-hoc tests confirmed significant variation. The hypothesis H2,Older students have lower Perceived Ease of Use on online education than younger students, is supported.

2. Comparison of Students'answers between gender

Table 2 showed that the significance level under ANOVA was 0.007 (F=1.662, $p<0.05$). This indicated that the age groups had significant difference in perceived ease of use of online education. Hence, from the table , Post-hoc tests confirmed significant variation. H1 hypothesis supported.

DISCUSSION AND CONCLUSION

In conclusion, this study has conducted a thorough analysis of the pros and cons of online education, considering different factors like gender, age, and academic background. The findings indicate that online education can be beneficial for learners who are self-motivated and independent, but it may not be suitable for everyone. To enhance the learning experience, the study recommends several measures, including the provision of more interactive and social features, personalized learning paths, and practical opportunities. However, it is important to note that this study has limitations, such as a small sample size and restricted data set. Future research should broaden the scope of analysis, increase the sample size, explore alternative methods for data analysis, incorporate machine learning techniques, and apply the findings to real-life situations.

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