

COVID-19 and Chinese Oversea Students' Perceived Learning Experiences

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Abstract

The purpose of the study is to investigate the difference of students' perceived learning experience before and after the coronavirus disease 2019 (COVID-19) and the degree of demographics and specific factors that appeared during the COVID-19 pandemic. Samples from this study consisted of 143 participants from Chinese undergraduate and graduate students enrolled in U.S. universities during Spring 2020. Students' perceived learning experiences were measured by adopting The Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS), which measured self-direction in learning based on the Personal Responsibility Orientation Model. However, no relationship between demographics and learning experience was found. The results suggested that the perceived learning experience was significantly worse after COVID-19 than before. Future researches with a larger sample size and more rigorous questioning are required to validate the findings of this study.

Keywords

COVID-19, academic performance, online learning, self-direction in learning, self-directed learning, college students, distance education, student demographics.

1. Introduction

A sudden outbreak of COVID-19 has been a worldwide pandemic since the end of 2019 and has caused a variety of inconvenience and learning barriers for people, especially students. Over the past few decades, online learning has considerably become prevalent. Especially for 2020, the outbreak of COVID-19 expedites the inroad of online learning. Universities have been blocked down consistently and proclaimed to provide courses remotely. For example, the University of California, Los Angeles, announced transitioning to online courses on March 10, 2020. Students were forced to take online courses and study online. Traditional face-to-face teaching was suspended while online education became widely adopted. Therefore the quality of online learning during COVID-19 needed to be addressed.

2. Literature Review

Some recent reports have indicated that some different learning performance may occur after COVID-19. Kuhfeld investigated around 50,000 American elementary school students based on previous studies and summer study tendencies, to reveal that students would improve in math after COVID-19 [1]. The results are encouraging but do not consider the current COVID-19

variables and further health concerns that students face this summer. Compared to primary school students, the present study would focus on the correlation of COVID-19 factors with Chinese undergraduate students and graduate students in the US, with their academic performance being the first to be affected. International students experienced sudden closures of schools, and dormitories had to change their accommodations and began confinements; therefore, their perceived learning experiences can change as a result of these variables. This study aims to investigate the changes in students' perceived learning experience and identify demographic factors that may potentially influence this process.

Age has been long perceived as a factor related to online learning performance. One study using a decision tree-based approach has suggested that age is positively correlated with learning outcomes [2]. However, this contradicts the findings from previous studies, which indicated no relationship between age and academic performance [3,4]. This inconsistency of results may stem from different measures of age and academic performance. While the study conducted by Colorado and Eberle recruited mainly young participants, the other two included older participants [3,4]. The measure of academic performance also differed, with the study by Rizvi et al. adopted a three-level measure while the other two used grade point measure [2]. The younger generation has also largely embraced the idea of using digital devices to study, which may affect their performance. Besides age, gender has also been considered as a related factor. While one study concluded that female students performed better than male students, in Yukselturk and Bulut 's (2009) [5] study, there was no difference in the tendency in motivational beliefs and self-regulated learning components between female students and male students [4]. A possible explanation of this contradiction is that the development of online learning software and platforms allowed a more diverse population to benefit from online learning. While online learning becomes more prevalent due to its flexibility and convenience, the improvement of online learning outcomes becomes imperative.

Considering these demographic factors, such as age and gender, a main hypothesis is proposed that Chinese international students in the U.S. perceive worse learning experiences in online format after the COVID-19 outbreak compared to traditional face-to-face instructions followed by two sub-hypotheses.

1. Students' perceived Learner Characteristics Component would remain the same.
2. Students' perceived Teaching Learning Transaction Component would increase after the COVID-19 outbreak.

This study's purpose was to report on the views of Chinese undergraduate and graduate students' perceived learning experience on the effects of COVID-19. The exigent headway of online learning is in considerable demand. The significance of this research is as a contribution to the literature on COVID-19 concerning educational studies, especially on online learning.

3. Method

3.1. Participants

Participants included 143 college students, who were Chinese overseas undergraduate and graduate students enrolled in American universities in Spring 2020. There are 42.66% freshmen, 25.87% sophomores, 13.29% juniors, and 17.48% seniors and beyond. Of the students, 52 (36.36%) identified themselves as male, 90 (62.94%) identified as female and one preferred not to answer.

Participants signed the consent form before the survey and they received random monetary compensation after finishing the survey. This study protocol was approved by the ethics committee of the CIS association.

3.2. Procedures

A self-report survey was developed to measure the perceived learning experiences before and after the COVID-19 outbreak and COVID-related factors. Self-reported data is sometimes considered limited in research, but its validity may depend on the type of data collected [3]. Since participants' inner perception cannot be observed directly from the outcomes, self-report measurement is one of the few methods suitable for measuring participants' internal perception as compared to its limitation in measuring the direct result. In this study, the impact of COVID-19 on students' learning experiences was sought to be understood, including learning motivation and initiative. Considering the characteristics of experience are internal and proprietary, the students' self-evaluations of online teaching, self-learning experiences, and perceived learning outcomes during the pandemic were adopted as the measurement. It is reasonable to believe that the self-reported evaluations of perceptions are more precise than outcomes-oriented motivational measures (for example, students' GPAs), which can be under-reported or over-reported to produce inaccurate data.

All participants are recruited online via WeChat and email from July 1st, 2020, to July 10th, 2020. The questionnaire was posted on the Wenjuanxing website, which generated QR codes and links for distribution. Firstly, participants provided background information, including gender, grade, majors, forms of online classes, and also responded to some questions related to their emergency measures in the event of a COVID-19 outbreak, such as whether to return to China and where to live. The second part of the questionnaire is a list of questions about participants' perceived quality of learning, perceived learning outcomes, and overall learning experiences. The third and fifth parts are The PRO-SDLS scale respectively, about participants' learning experience before and after the COVID-19 outbreak. The fourth part of the questionnaire is the middle page for resting and helping trigger memories of perceived learning experiences before the outbreak, which was placed between two PRO-SDLS scales. The full questionnaire has 65 items and would take approximately 10-15 minutes to complete:

1. Background questions (items 1-10);
2. Perceptions of COVID-19 difficulties (items 11-13);
3. PRO-SDLS scale 1 for perceived learning experiences after the outbreak of COVID-19 (items 14-39);
4. The middle page for resting and helping trigger memories of perceived learning experiences prior to COVID-19;
5. PRO-SDLS scale 2 for perceived learning experiences before the outbreak of COVID-19 (items 40-65);

3.3. Measures

3.3.1. Demographic

Except for necessary background information and demographic questions, like age, gender, year in college, the current study investigated specific situations that Chinese oversea students faced during the pandemic. For international students, their academics and lives' critical impact would begin when colleges announced campuses shut down (When did your college shut down the campus and turn courses online?). The study also considered the dilemma most international students were facing, flying back home or staying in the U.S. (Did you choose to stay in the USA after the school closed and take online classes during that time?), and provided a wide array of possible situations for students staying in the U.S., including staying in a school dormitory, renting by oneself, renting with roommates, etc. and for students flying back to China, staying at own home, relative's home, hotel, etc.

3.3.2. Perceptions of COVID-19 Difficulties

Participants were provided with three sentences describing situations and experiences during the COVID-19 outbreak and asked to rate how they had felt that way during the pandemic, using a 5-items scale ranging from 1 (strongly disagree) to 5 (strongly agree). The study has been tested with different versions of the survey wording on pilot test participants until all questions can be understood and responses can be reported uniformly and accurately. The wording to measure the quality of COVID-19 online education is described as follow:

1. I felt worse taking online classes during COVID-19 than I felt about my courses before the transition to virtual classes.
2. I think the quality of online instruction was worse than that of my classes before the lockdown.

To measure how much knowledge students learned in the pandemic compared to instructions before, participants would respond to the following question:

3. I think I learned more knowledge from COVID-19 online instruction than from my classes before the lockdown.

3.3.3. Perceived Learning Experiences

In this study, self-directedness would be measured with the Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS), developed by Stockdale and Brockett [7]. This measurement was built on the personal-responsibility-oriented modal, which defined self-directedness as the characteristics of both the learning process and the learner traits [8]. This model suggests that adopting a new online learning environment or a new teaching approach can potentially influence students' self-directedness [9,10]. With this in mind, it is reasonable to postulate changes that may occur in students' levels of self-directedness in the COVID-19 pandemic.

The PRO-SDLS is a five-point Likert scale that contains 25 test items that represent the values of strongly disagree, disagree, sometimes, agree, and strongly agree, and was found to be a highly reliable instrument in the selected sample of graduate and undergraduate education students [7]. Further, researchers also hypothesized that the change in the overall level of self-directedness could be primarily attributed to the changes in the learning process rather than learner traits. A total of 195 students completed the PRO-SDLS with a resulting coefficient α of .91 [7].

The scale consists of two categories, Teaching Learning Transaction Component (Initiative and Control factors) and Learner Characteristics Component (Self-efficacy and Motivation factors). Brockett and Hiemstra define the Teaching-Learning Transaction (TLT) component as a "process in which a learner assumes primary responsibility for planning, implementing, and evaluating the learning process. An education agent or resource often plays a facilitating role in the process" (p. 24) [8]. Therefore, the TLT component scale project would evaluate the active control and initiative in the study planning, completion, pace, and evaluation of the studying progress. As for Learner Characteristics (LC) Component, Brockett and Hiemstra defined it as "an individual's beliefs and attitudes that predispose one toward taking primary responsibility for their learning" (p. 29), and "a learner's desire or preference for assuming responsibility for learning" (p. 24) [8]. LC embraces learners' independent learning motivation, self-perceived learning efficiency and self-guidance for learning as its cardinal components. These components focus on students' inner tendency to learn, so LC is less affected by external factors than TLT. Examples of each component and factor are listed below:

Learning Transaction Component:

Initiative - "I frequently do extra work in a course just because I am interested."

Control - "I usually struggle in classes if the professor allows me to set my own timetable for work completion."

Learner Characteristics Component:

Self-efficacy - "I am very convinced I have the ability to take the personal control of my learning."

Motivation - "I don't see any connection between the work I do for my courses and my personal goals and interests."

In order to clarify the certain circumstance either before COVID-19 or after COVID-19, the adjustments of adding phrases "before the COVID-19 outbreak" and "in COVID-19 instructions" are made on the original PRO-SDLS scale in every single item to item to reduce the confusion and improve the accuracy of the responses.

4. Statistical Results

4.1. Reliability Analysis

Reliability analysis was conducted to examine the reliability of the adjusted PRO-SDLS. Cronbach's alphas for the scales were .82 and .91, which indicated that the adjusted scales were highly reliable [11].

4.2. Descriptive Statistics

Except for seven unreported data, most students took 16-18 credits in the Spring 2020 semester (48.95%). Twenty-six students (18.18%) reported taking 13-15 credits; seventeen students (11.89%) reported taking 19-21 credits; sixteen students (11.19%) reported taking less and equal to 12 credits. Only 4.9% of the participants took more than 22 credits. Except for four missing data, most students experienced campus shutdown in mid-March (3/11-3/20) (60.14%). In early March (3/1-3/10), 11.89% of the students reported their campus shut down, and in late March, 19.58% of the participants reported the same issue. Only 5.59% of the participants' colleges shut down their campuses after March. After campuses closed, most students stayed in the U.S. (n=75), while some went back to China immediately (n=48) with a few returned halfway through the semester (n=4) and some at the end (n=15). For those who stayed in the U.S., sixteen respondents stayed in school dormitories, seventeen respondents rented by oneself, twenty-seven respondents rented with roommates, twenty respondents stayed at home, and twelve respondents stayed with a friend/classmate/relative. For those who returned to China, the overwhelming majority (n=59) stayed at home.

Among 142 participants, the following variables (Table 1) were assessed: total score of the perceived learning experiences before COVID (M= 86.4, SD= 9.37), total score of the perceived learning experiences after COVID (M= 77.5 , SD= 10.6), TLT_Before (M= 41.5, SD= 4.89), TLT_After (M= 37.1, SD= 6.00), LC_Before (M= 45.0 , SD= 5.82) and LC_After (M= 40.4, SD= 5.99).

4.3. Repeated Measure ANOVA

To examine whether perceived learning experiences score increase after the COVID-19 outbreak, a series of repeated measures ANOVA were conducted (Table 1). The analyses revealed significant differences from before the COVID-19 outbreak to after the outbreak. More specifically, there was a significant effect of time on perceived learning experiences, $F(1,141) = 76.881$, $p < .001$ (Figure 1). A generalized eta squared of 0.137 indicated a medium effect size [12]. This result suggests that the leading hypothesis is supported. There is no interaction observed in the graph, so both the Teaching Learning Transaction (TLT) component and Learner Characteristics (LC) component decreased from before to after. Thus, the two sub-

hypotheses regarding TLT and LC are both not supported. The difference in component scores mainly underlies the difference in numbers of items between the two components.

Table 1. Component Scores from the Adjusted PRO-SDLS

	TLT_B	TLT_A	LC_B	LC_A
N	142	2	142	142
Missing	1	1	1	1
Mean	41.5	37.1	45.0	40.4
Standard deviation	4.89	6.00	5.82	5.99
Minimum	29	16	32	22
Maximum	56	54	59	59

Table 2. Repeated Measures ANOVA on Time and Components

	Sum of Squares	df	1Mean Square	F	p	η^2G
Time	2911.61	1	2911.61	76.881	<.001	0.137
Residual	5339.89	141	37.87			
Components	1663.35	1	1663.35	81.346	<.001	0.083
Residual	2883.15	141	20.45			
Time*Components	2.82	1	2.82	0.316	0.575	0.000
Residuals	1257.68	141	8.92			

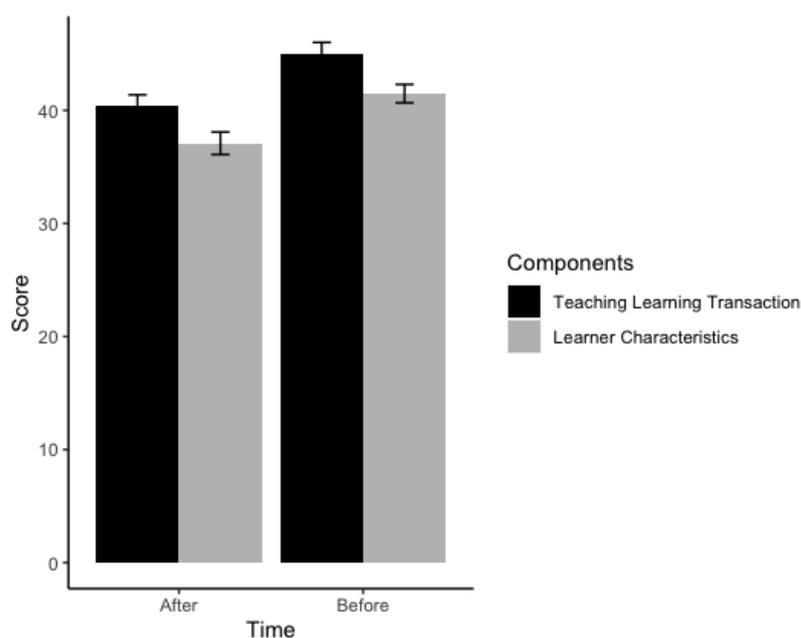


Figure 1. Measured Mean Score of Each Component in Different Settings

Current analyses revealed no significant associations between change in self-directed learning experience and demographics factors (year in colleges: $F(1,139) = 0.434, p = 0.646$; place of residence: $F(3,138) = 0.607, p = 0.612$; credits taken: $F(2,133) = 1.08, p = 0.341$; gender: $F(1,139) = 0.0189, p = 0.891$; time campus shut down: $F(4,137) = 1.71, p = 0.150$), implying the study failed to discover any other factor that is related to the self-directed learning experience. Further analysis showed that there were no differences in specific items (Initiative, Control, Motivation, Self-efficacy).

4.4. Linear Regression

A linear regression model was constructed to predict the change in component scores. Two new variables were created for this purpose. Difference score was the difference between the total scores of the PRO-SDLS before and after COVID; Level of distraction was constructed based on the answers of previous questions regarding living environment ('Where did you live most of the time after the school closed'; 'After returning to China, your main place of residence is'). Results of this analysis were rather disappointing. The model fit poorly and no reliable predictor could be found (Table 3). However, one variable nearly reached the criteria of a predictor variable, namely the variable concerning the time of campus closing, $F(3, 121) = 2.586, p = 0.056$. On closer inspection, one may discover that a significant difference lies between two conditions, specifically those whose campus closed between March 1st and March 10th and those whose campus closed after March ($p = 0.008$) (Figure 2).

Table 3. A Simple Linear Regression Model on Difference Score

	Sum of Squares	df	Mean Square	F	p
Year in college (Spring 2020)	49.15	2	24.57	0.1681	0.845
When did your college shut down campus and turn courses online?	1134.24	3	378.08	2.5868	0.056
Level of distraction	6.12	2	3.06	0.0210	0.979
Gender	35.82	1	35.82	0.2451	0.621
Did you choose to stay in the USA after the school closed	41.77	1	41.77	0.2858	0.594
How many credits did you gain in Spring 2020?	319.68	2	159.84	1.0936	0.338
Residuals	17684.89	121	146.16		

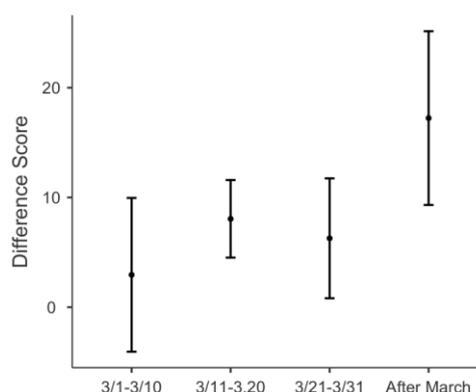


Figure 2. Difference Scores on the Question “When did Your College Shut down Campus?”

5. Discussion and Limitation

Results indicated a reduction in perceived learning in Chinese international college students from American universities after the lockdown. However, neither gender, year in college, nor the shutdown time of school moderated or mediated the association. Note that this present study did not balance gender, year in college, or shutdown time in the sample. Thus, this study was of limited scientific rigour; results should be interpreted with caution.

The present research had several strengths. Researchers were all blind to both the demographics of the subjects and the responses to the questions. A large sample size increased the reliability of the results. As one of the first studies on COVID-19 and learning experience, this study provides insight into Chinese international students' study status in America during COVID-19.

There are a few limitations that should be noted. First, all questions in the survey require subjects to recall things from the past; bias regarding reminiscing should be contemplated in analyzing results from this study. As the study applied PRO-SDLS to measure students' learning experience both before and after the lockdown, two limitations in relation to this five-point Likert scale that contains 25 test items were limited precursor studies that used PRO-SDLS and a narrow range of application—PRO-SDLS should be limited to a particular segment of learners: those who are participating in a higher education course. Therefore, there was still doubt in terms of the validity of PRO-SDLS, albeit the study assured its reliability in reliability analysis. Additionally, these findings should be interpreted with caution as neither gender nor year in college was balanced. This study was unable to address if COVID-19 caused an overall decrease in the perceived learning experience due to no control available, although data indicated a reduction in learning. The subjects were not blind in light of the purpose of the research, as instructors provided them with a thorough introduction to our goal on the consent form. It was likely that their awareness of the goal of this study influenced their choices on the survey. Finally, each step of the research was taken charge of by only one researcher, and this study did not have a reviewer for each step; thus, each step had the potential to be mistaken.

For future studies on COVID-19 and learning experience, research is supposed to address intersectionality. The present study predicted that race and educational background would moderate the association between COVID-19 and learning experience. This research expects future studies to study people across races, ages, and educational backgrounds. Since the sample was highly gender binary, and the study could not find much research on LGBTQ+ communities, there is an urgent need for studies on COVID-19 and learning experience with outgroup members of the gender binary system. Third, both subjective and objective measurements, should be applied in examining learning experience, as this study thinks that objective methods, including grades on transcripts, would be more reliable than responses on PRO-SDLS. Finally, this study expects future studies to use a more balanced sample in terms of gender, year in college, and major, which were factors that were not balanced in the study. Longitudinal studies that track down school learning tendencies are also deficient. Studies with an experimental design are also needed to turn associations into causations.

6. Conclusion

In the present study, the perceived learning experience of Chinese oversea students in COVID-19 is investigated using questionnaires with an adjusted Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS). Repeated measure ANOVA was conducted to examine the effect of COVID-19 and other variables, including demographics on students' perceived learning experience. Linear regression models failed to identify any predictor of score difference. The main hypothesis that students' perceived learning experience becomes

worse after COVID-19 outbreak was supported by the results while sub-hypotheses regarding the difference in component scores were rejected.

The findings indicated that the sudden transition of teaching methods did have a detrimental effect on learning experience, which called for attention from both teachers and students. Training programs regarding online learning skills would be beneficial. Despite all its limitations, this study provides researchers with basic understanding on the learning experience of a special group of students in the midst of a pandemic. Future research with larger sample size and experimental design is needed.

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