Comparing Online Learning Experiences Between University Students With and Without Special Educational Needs During COVID-19

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Abstract
The aim of this study is to examine the online learning experiences of university students with Special Educational Needs (SEN), and how their experiences might differ from their typically developing peers. Fifty typically developing students (mean age = 22; 29 females) and 31 students with SEN (mean age = 22; 15 females) from a local university in Singapore participated in an online survey. Both groups reported significant increase in the proportion of online learning after the outbreak of COVID-19 pandemic. Both groups reported being moderately positive about their online learning experiences, with no significant difference between the groups (either before or after the outbreak). For both groups, Learning Activity Management System (LAMS), pre-recorded lectures, online finals/quizzes, live lectures, online assignments, and online tutorials were the common online learning formats. Laptop/desktop was the primary device used, and Zoom was the most preferred online learning software. The SEN group reported higher usage of technical accommodations. Accessibility was the top advantage of online learning reported by typically developing students while for students with SEN, it was flexibility. Lower social interaction was the top challenge encountered for both groups. These findings would be useful in making online learning more inclusive for everyone in university.

Keywords: Online Learning, Special Educational Needs, University Students

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Introduction

According to the World Health Organization (WHO), Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus (WHO, n.d.). Before the COVID-19 outbreak, the existence of online learning could be observed in relation to blended learning environments. These environments made use of both online learning and traditional face-to-face learning, maximizing the benefits brought about by each mode of learning (Vernadakis et al., 2012). During the first half of 2020, with the exponential rise in COVID-19 infection rates, many universities turned to online learning and adopted the use of video conferencing tools and digital platforms as substitutes for traditional in-class face-to-face education (Li & Lalani, 2020). Online learning is defined as the students' learning experiences in synchronous or asynchronous environments made possible by technology (Singh & Thurman, 2019). The use of video conferencing tools, online quizzes, and digital platforms are some of the methods used to facilitate online learning (Greener, 2021). Online learning facilitates the students' interactions with their instructors and peers, which is not restricted by the students' location at a point in time (Singh & Thurman, 2019). Other names for online learning include but may not be limited to web-based learning and e-learning (Maddison et al., 2017).

Distinguishing between online learning and some other closely related terms (e.g., remote learning, distance learning) is needed. Just like online learning, remote learning offers students some flexibility in terms of time and location (Biedroń et al., 2021). However, there is a slight difference between online learning and remote learning. For online learning, students and their instructors could be in the same classroom using digital materials, while remote learning would take place remotely without face-to-face contact with the instructor and their peers. Since the outbreak of the COVID-19 pandemic, remote learning has gained increasing popularity. Distance learning and remote learning are sometimes used interchangeably. Both enable learners to learn regardless of their locations (Moore et al., 2011). Unlike remote learning, distance learning usually happens asynchronously, and the learner is mainly responsible for his or her own learning (Greener, 2021). When compared with online learning, the commonality between online learning and distance learning is that learning materials are provided through digital channels (Greener, 2021). When ranking the three types of learning based on interactivity, distance learning generally involves the least interactivity while online learning would be ranked top (Greener, 2021).

With online learning becoming a pandemic reality, it would be useful to gain insights into university students' experiences with online learning. Existing studies have suggested that online learning has several advantages, such as accessibility, flexibility, and personalized learning offered (Adnan & Anwar, 2020; Dhawan, 2020; Koksal, 2020; Nambiar, 2020). At the same time, the shortcomings of online learning have also been further amplified, such as reduced social interaction with others (Adnan & Anwar, 2020; Dhawan, 2020; Nambiar, 2020; Son et al., 2020). These could be attributed to the restrictions and quarantine measures during the COVID-19 outbreak and the shift towards online learning was necessary to lower transmission risks. However, given that families and friends were the main sources of coping with stress and anxiety during the pandemic, this unprecedented period of separation has implications for the mental health of college students (Son et al., 2020). Other drawbacks of online learning included the fast pace of online classes (Nambiar, 2020), lack of motivation to participate in online classes (Adnan & Anwar, 2020; Nambiar, 2020; Son et al., 2020), physical and mental stress that have arisen due to online learning (Nambiar, 2020; Son et al., 2020), the overwhelming number of classes one has in a day (Nambiar, 2020), as well as the

lack of accountability, and distractions from social media, internet, and video games (Son et al., 2020).

As for students with Special Educational Needs (SEN), existing studies on online learning have been more geared towards K-12 students (Burdette et al., 2013; Kimmons & Smith, 2019). Burdette et al. (2013) noted that some states in the United States found it challenging to provide accommodations for students with SEN during online learning. This view was echoed by Kimmons and Smith (2019) whereby accessibility was a concern for students with SEN, especially since the lack of alternative text on images was prevalent for K-12 school websites, where the purpose of an alternative text is to make images accessible for users with visual impairment and without it, users might miss out on critical information.

Since there is limited documentation on the online learning experiences of university students with SEN, it remains unclear how well university students with SEN have been coping with this change. As such, this study aims to design an online survey to understand university students' experiences with online learning, with the focus on comparing the experiences reported by university students with SEN and those of typical development at Nanyang Technological University (NTU), Singapore. For this study, we define university students with SEN as having one or more of the following conditions: physical disabilities, sensory impairments (e.g., hearing impairment and vision impairment), diagnoses related to social or behavioural difficulties (e.g., autism spectrum disorder [ASD], attention deficit hyperactivity disorder [ADHD]), or learning disabilities (e.g., dyslexia). The rationale behind this definition was to be consistent with the conditions listed by NTU's Accessible Education Unit (AEU). This is because AEU assists NTU students with SEN by providing them with access to support services that would aid their learning. So, given that this study was focused on their online learning experiences, it would be appropriate to consider the conditions listed by the AEU.

Specifically, this study seeks to investigate the following seven research questions:
1. Was there any significant difference in the proportion of online learning versus face-to-face learning experienced in university before and after the COVID-19 outbreak for the two groups of students?
   1.1 Was there any significant difference in the proportion of online learning versus face-to-face learning experienced in university *before* the COVID-19 outbreak between the two groups of students?
   1.2 Was there any significant difference in the proportion of online learning versus face-to-face learning experienced in university *after* the COVID-19 outbreak between the two groups of students?
   1.3 Was there any significant difference in the proportion of online learning versus face-to-face learning experienced in university *before* and *after* the COVID-19 outbreak for the typically developing group?
   1.4 Was there any significant difference in the proportion of online learning versus face-to-face learning experienced in university *before* and *after* the COVID-19 outbreak for the SEN group?
2. Did the overall experiences with online learning differ between university students with SEN and those of typical development before and after the COVID-19 outbreak?
   2.1 Did the overall experiences with online learning differ *before* the COVID-19 outbreak between the two groups?
   2.2 Did the overall experience with online learning differ *after* the COVID-19 outbreak between the two groups?

2.3 Did the overall experience with online learning differ *before* and *after* the COVID-19 outbreak for the typically developing group?

2.4 Did the overall experience with online learning differ *before* and *after* the COVID-19 outbreak for the SEN group?

3. What were the most common online learning formats experienced by each group, respectively?
4. What was the device that was most often used for online learning for each group, respectively?
5. What technical accommodations were reported by each group, respectively?
6. What was the preferred online learning software or platform reported by each group, respectively?
7. What were the key advantages and challenges reported by each group, respectively?

Method

Ethical approval was obtained from NTU IRB prior to the implementation of this study. Participants' consent was required and obtained before their participation in the online survey. Parental consent was required for students who were at least 18 years old but below 21 years old. After parental consent was obtained, these students would then be directed to the survey questions.

Participants

In order to participate in this study, participants had to be current Full-Time NTU undergraduates. Fifty typically developing students (mean age = 22, SD = 1.4; 29 females) and 31 students with SEN (mean age = 22, SD = 2.3; 15 females) participated in the study.

Research Design

This study adopted a survey design. Data collection was conducted via an online survey delivered by Qualtrics. A convenience sampling approach was utilised.

Survey

The survey consisted of seventeen items (refer to Appendix). There were two screening items about whether they were current Full-Time NTU undergraduate, and if they had any diagnosed SEN (including physical, behavioural, learning difficulties). In addition, five demographics-related questions (i.e., year of study, age, gender, their school, and ethnicity) were asked. In terms of content-related questions, there were ten items. Firstly, participants were asked to compare the proportion of online learning versus traditional face-to-face learning they have experienced in university, as well as rate their overall online learning experiences in university before and after the COVID-19 outbreak (January 2020). Next, the online learning formats experienced in university, the primary type of device used for online learning in university, and whether there was any use of technical accommodations during online learning were asked. Participants were also asked to rank their preferences for different key online learning software or platform. Following that, they were also asked to rank the key advantages of online learning. Lastly, both groups of students were asked to rate the frequency of the key challenges experienced during online learning in university on a 100-point rating scale.

A quota of 50 participants was set up for each group of students in Qualtrics. Based on their responses to the screening item regarding whether they had SEN, they would be assigned to the respective group by the quota set in Qualtrics. This helped us to track the number of participants for each group and participants would be automatically redirected to the end of the survey after each quota was filled.

Procedures

Upon the IRB approval, we posted the recruitment information onto social media platforms for circulation and dissemination. Additionally, we sent the recruitment information to NTU's AEU for circulation and dissemination to students with SEN. University students who were interested in participating proceeded to click on the link and access the survey. The whole survey took no longer than 15 minutes and each participant was required to complete the survey only once at their own time and convenience.

Data Analysis

Descriptive analysis was conducted for all items. A *t*-test was conducted to see if there was a significant difference in terms of age between the two groups. A chi-square test was conducted to see if there was a significant difference in terms of gender composition between the groups. *t*-tests were also done for questions regarding the proportion of online learning versus traditional face-to-face learning experienced in university before and after the COVID-19 outbreak, their overall online learning experiences before and after the COVID-19 outbreak, and the frequency of the respective challenges they have experienced in university during online learning.

Results

Participants' Profile

A total of 81 participants took part in the study. As shown in Table 1, for the typically developing group, females made up 58% of the participants (n = 29); while for the SEN group, there was an equal representation of males and females (n = 15 respectively). A chi-square test of gender between the two groups showed no significant difference ($\chi2 = .64$, $p = .43$). Most of the participants were aged 20-25 years with the mean age of 22 years old for both groups, with no significant difference ($t = -.49$, $p = .63$). For both groups, most of the participants were Chinese (90% and 87%, respectively), with no Malay participants. Participants in the typically developing group were roughly equally distributed across their years of study, while most participants in the SEN group were Year 1 or Year 2 students (n = 22; 71%). The typically developing group was mainly from the School of Social Sciences (SSS) (n = 12; 24%), Nanyang Business School (NBS) (n = 9; 18%), and the School of Humanities (SOH) (n = 8; 16%); while for the SEN group, it was mainly from the School of Humanities (SOH) (n = 7; 22.6%), Nanyang Business School (NBS) (n = 5; 16.1%), School of Mechanical & Aerospace Engineering (MAE) (n = 4; 12.9%), and School of Physical & Mathematical Sciences (SPMS) (n = 4; 12.9%). For the SEN group, the breakdowns of the diagnosis were: ADHD (n = 12), ASD (n = 3), behavioural (n = 1), dyslexia (n = 4), dyspraxia (n = 1), hearing impairment (n = 7), physical impairment (n = 2), and visual impairment (n = 1).

	Typically Developing Group (n = 50)	SEN Group (n = 31)
Table 1: Participants' Demographic Characteristics by Groups		
Gender		
Male	20 (40%)	15 (48.4%)
Female	29 (58%)	15 (48.4%)
Prefer not to say	1 (2%)	1 (3.2%)
Age	Mean = 22 (1.4) Range: 20-25	Mean = 22 (2.3) Range: 19-28
Ethnicity		
Chinese	45 (90%)	27 (87%)
Malay	0 (0%)	0 (0%)
Indian	3 (6%)	2 (6.5%)
Others[a]	2 (4%)	2 (6.5%)
Year of Study		
Year 1	13 (26%)	11 (35.5%)
Year 2	12 (24%)	11 (35.5%)
Year 3	12 (24%)	4 (12.9%)
Year 4	13 (26%)	5 (16.1%)
School (including double major, double degree etc excluding minors)[b]		
School of Art, Design & Media (ADM)	1 (2%)	0 (0%)
The Asian School of the Environment (ASE)	0 (0%)	1 (3.2%)
School of Civil & Environmental Engineering (CEE)	3 (6%)	1 (3.2%)
School of Electrical & Electronic Engineering (EEE)	5 (10%)	2 (6.5%)
Lee Kong Chian School of Medicine	1 (2%)	1 (3.2%)
School of Mechanical & Aerospace Engineering (MAE)	5 (10%)	4 (12.9%)
School of Materials Science & Engineering (MSE)	1 (2%)	0 (0%)
Nanyang Business School (NBS)	9 (18%)	5 (16.1%)
National Institute of Education (NIE)	0 (0%)	1 (3.2%)
School of Biological Sciences (SBS)	2 (4%)	1 (3.2%)
School of Chemical & Biomedical Engineering (SCBE)	0 (0%)	0 (0%)

School of Computer Science & Engineering (SCSE)	1 (2%)	3 (9.7%)
School of Humanities (SOH)	8 (16%)	7 (22.6%)
School of Physical & Mathematical Sciences (SPMS)	3 (6%)	4 (12.9%)
School of Social Sciences (SSS)	12 (24%)	2 (6.5%)
Wee Kim Wee School of Communication & Information (WKWSCI)	2 (4%)	0 (0%)

Note. [a]The two other reported ethnicity for typically developing students were Boyanese and Eurasian while for the SEN group, they were Burmese and Pakistani. [b]Percentage may not add up to 100% as participants were allowed to select multiple options for this question.

Experiences of Online Learning Before and After the COVID-19 Outbreak in Singapore

For participants in their first or second year of study who entered the university during the COVID-19 outbreak, they were not asked about the proportion of online learning versus traditional face-to-face learning they have experienced in university and their overall online learning experiences in university before the outbreak. As such, only 25 typically developing students and eight students with SEN answered the questions related to the proportion of online learning versus traditional face-to-face learning they have experienced in university and their overall online learning experiences in university before the outbreak. Specifically, the typically developing group reported an average proportion of online learning of 27% before the COVID-19 outbreak while the SEN group reported an average proportion of online learning of 15.4% before the outbreak, with no significant difference ($t = 1.39$, $p = .18$). The average proportion of online learning reported by the two groups went up to 66.9% and 70.6%, respectively after the COVID-19 outbreak. Further t-test results showed a statistically significant difference in terms of the proportion of online learning versus traditional face-to-face learning experienced in university before and after the COVID-19 outbreak, for the typically developing group, $t = - 6.69$, $p < .001$, with a Cohen's d of 1.72, and for the SEN group, $t = -7.65$, $p < .001$, with a Cohen's d of 3.22. Since Cohen's d of 0.20, 0.50, and 0.80 are conventionally interpreted as a small, medium, and large effect size, respectively (Cohen, 1988), the increase in the proportion of online learning after the outbreak seemed to be essentially large as reported by both groups.

On a 100-point rating scale, before the outbreak both groups' experiences with online learning were moderately positive (see Table 2), with an average rating of 62.8 by the typically developing group and an average rating of 57 by the SEN group, with no significant difference, $t = .64$, $p = .53$. After the outbreak, the average rating of online learning experiences decreased to 57.9 for the typically developing group. In contrast, it rose to 58.5 for the SEN group, still moderately positive for both groups and no significant difference between the two groups, $t = -.11$, $p = .91$. Notably, there was no significant difference in the overall experiences with online learning in university before and after the COVID-19 outbreak, for both the typically developing group, $t = .84$, $p = .41$, and for the SEN group, $t = -.17$, $p = .87$.

Table 2: Comparison of the Proportion of Online Learning and Overall Online Learning Experiences Between the Two Groups Before and After the COVID-19 Outbreak

Questions	Typically Developing Group	SEN Group	Independent samples t-test
What proportion of online learning vs. traditional face-to-face learning have you experienced in university <u>before</u> the COVID-19 outbreak (Jan 2020)?	Mean = 27 (25.5) (n = 25)	Mean = 15.4 (17.3) (n = 8)	t = 1.39 p = .18
Overall, how would you rate your experiences with online learning in university <u>before</u> the COVID-19 outbreak (Jan 2020)?	Mean = 62.8 (25) (n = 25)	Mean = 57 (19.9) (n = 8)	t = .64 p = .53
What proportion of online learning vs. traditional face-to-face learning have you experienced in university <u>after</u> the COVID-19 outbreak (Jan 2020)?	Mean = 66.9 (20.5) (n = 50)	Mean = 70.6 (17) (n = 31)	t = -.87 p = .39
Overall, how would you rate your experiences with online learning in university <u>after</u> the COVID-19 outbreak (Jan 2020)?	Mean = 57.9 (19.9) (n = 50)	Mean = 58.5 (23.7) (n = 31)	t = -.11 p = .91

Experiences of Online Learning: Formats, Primary Device, Technical Accommodations, and Preferred Software or Platform

As shown in Table 3, Learning Activity Management System (LAMS) (used to facilitate online collaborative learning activities), pre-recorded lectures, online finals/quizzes, live lectures, online assignments, and online tutorials were endorsed frequently by both groups. A range of 82% to 94% for the typically developing group, and a range of 80.6% to 96.8% for the SEN group reported having experienced these online learning formats.

Another similar point between the two groups was that laptop/desktop was the primary device used for online learning (n = 48 and n = 28, respectively). As for the use of technical accommodation during online learning, they were more likely to be utilized by the SEN group (n = 14), mainly through subtitles (n = 6), captions (n = 2), and larger font size (n = 2). Other technical accommodations reported by the SEN group were transcripts, headphones, speakers, and video speed changers.

Table 3: Students' Experiences of Online Learning: Online Learning Formats, Primary Device Used, and Technical Accommodation Used

Questions	Typically Developing Group (n = 50)	SEN Group (n = 31)
What type(s) of online learning in university have you experienced thus far?[c]		
Learning Activity Management System (LAMS)	47 (94%)	30 (96.8%)
Live Lectures	43 (86%)	27 (87.1%)
Online Assignments	43 (86%)	30 (96.8%)
Online Finals / Quizzes	44 (88%)	25 (80.6%)
Online Seminars	25 (50%)	17 (54.8%)
Online Tutorials	41 (82%)	30 (96.8%)
Pre-recorded Lectures	45 (90%)	30 (96.8%)
Webinars	12 (24%)	11 (35.5%)
Others[d]	0 (0%)	1 (3.2%)
What is the primary type of device do you use for online learning in university?		
Laptop / Desktop	48 (96%)	28 (90.3%)
Smartphone	0 (0%)	1 (3.2%)
Tablet / iPad	2 (4%)	2 (6.5%)
Do you use any technical accommodations (e.g., subtitles, special headphone, big font size, etc.) to support your online learning?		
No	45 (90%)	17 (54.8%)
Yes (participants were asked to specify)[e]	5 (10%)	14 (45.2%)

Note. [c]Percentage may not add up to 100% as participants were allowed to select multiple options for this question. [d]Blackboard Collaborate was indicated by one participant from the SEN group. [e]For typically developing group, technical accommodations included subtitles (n = 3), transcripts (n = 1), earphones (n = 1), and video speed changer (n = 1). For the SEN group, technical accommodations included subtitles (n = 6), captions (n = 2), larger font size (n = 2), transcripts (n = 1), headphones (n = 1), speaker (n = 1) and video speed changer (n = 1). Percentage may not add up to 100% as the participants were allowed to specify multiple answers for this question.

As seen in Table 4, when asked to rank their preferred online learning software or platform among Blackboard/Blackboard Collaborate, Microsoft Teams, and Zoom, Zoom was the preferred online learning software for both groups of students (typically developing group: n = 32; SEN group: n = 19).

Table 4: Students' Preference for The Following Online Learning Software / Platform
(where 1 was the most preferred by students)

Question	Typically Developing Group (n = 50)			SEN Group (n = 31)		
Please rank your preferences for the following online learning software / platform, where 1 is the most preferred software / platform.						
	1	2	3	1	2	3
Blackboard/Blackboard Collaborate	n = 9 (18%)	n = 19 (38%)	n = 22 (44%)	n = 8 (25.8%)	n = 11 (35.5%)	n = 12 (38.7%)
Microsoft Teams	n = 9 (18%)	n = 20 (40%)	n = 21 (42%)	n = 4 (12.9%)	n = 13 (41.9%)	n = 14 (45.2%)
Zoom	n = 32 (64%)	n = 11 (22%)	n = 7 (14%)	n = 19 (61.3%)	n = 7 (22.6%)	n = 5 (16.1%)

Experiences of Online Learning: Advantages and Challenges

As seen from Table 5, when asked to rank the key advantages of online learning, accessibility was the top advantage of online learning endorsed by typically developing students (n = 21; 42%), followed by flexibility (n = 20; 40%), and personalized learning experience (n = 9; 18%). For students with SEN, the top advantage of online learning endorsed was flexibility (n = 16; 51.6%), followed by accessibility (n = 11; 35.5%), and personalized learning experience (n = 4; 12.9%).

Table 5: Students' Ranking for the Advantages of Online Learning
(where 1 was the most important advantage of online learning)

Question	Typically Developing Group (n = 50)			SEN Group (n = 31)		
Please rank the following advantages of online learning, where 1 is the most important advantage of online learning.						
Accessibility	1	2	3	1	2	3
	n = 21 (42%)	n = 20 (40%)	n = 9 (18%)	n = 11 (35.5%)	n = 9 (29%)	n = 11 (35.5%)
Flexibility	n = 20 (40%)	n = 25 (50%)	n = 5 (10%)	n = 16 (51.6%)	n = 13 (41.9%)	n = 2 (6.5%)
Personalized Learning Experience	n = 9 (18%)	n = 5 (10%)	n = 36 (72%)	n = 4 (12.9%)	n = 9 (29%)	n = 18 (58.1%)

From Table 6, we can see that lower social interaction was the top challenge encountered for both groups of students (an average rating of 66.3 for the typically developing group and an average rating of 68.3 for the SEN group). Following this was increased distraction/less engagement (an average rating of 61.4 for the typically developing group and an average rating of 61.7 for the SEN group), and difficulty in asking questions (an average rating of 39.8 for the typically developing group and an average rating of 38.9 for the SEN group) for both groups during online learning. In addition, no significant differences in the ratings of each challenge were found between the two groups. For typically developing students, other challenges included comprehension issues (n = 1) and worsening eyesight (n = 1). For students with SEN, other challenges were anxiety (n = 1), struggling to keep up with the content (n = 1), burnout (n = 1), difficulty in understanding the content (n = 1), and inferior teaching quality (n = 2).

Table 6: The Frequency of Each Challenge Encountered by Students During Online Learning

Question	Typically Developing Group	SEN Group	Independent sample t-test
Below are some challenges students may face during online learning in university AFTER the COVID-19 outbreak. Please rate how frequent you have experienced each challenge thus far where 0=Never and 100=All the time			
Accessibility Issues	Mean = 20.7 (17.4) (n = 49)	Mean = 29.6 (22.6) (n = 29)	t = -1.79 p = .08
Difficulty in asking questions	Mean = 39.8 (28.7) (n = 49)	Mean = 38.9 (31.7) (n = 30)	t = .12 p = .91
Increased Distraction/Less Engagement	Mean = 61.4 (26.4) (n = 50)	Mean = 61.7 (33) (n = 31)	t = -.05 p = .96
Lower Social Interaction	Mean = 66.3 (22.8) (n = 50)	Mean = 68.3 (31.7) (n = 31)	t = -.29 p = .77
Technical Issues	Mean = 31.4 (25.7) (n = 48)	Mean = 32.3 (25.9) (n = 31)	t = -.15 p = .88
Others[f]	n = 2 (4%)	n = 6 (19.4%)	-

Note. [f]For typically developing students, other challenges included comprehension issues (n = 1) and worsening of eyesight (n = 1). For students with SEN, other challenges were anxiety (n = 1), struggling to keep up with the content (n = 1), burnout (n = 1), difficulty in understanding the content (n = 1), and inferior teaching quality (n = 2).

Discussion

This study was a preliminary endeavour to investigate the online learning experiences of typically developing university students and university students with SEN in one university in Singapore. With the data collected from this study, we found no significant difference between the two groups in terms of their ratings of online learning experiences before the COVID-19 outbreak, as well as after the outbreak. However, they both reported a significant increase in the proportion of online learning after the COVID-19 outbreak compared to before the outbreak. In other words, although the proportion of online learning versus traditional face-to-face learning experienced in university has increased for both groups, the overall ratings for their online learning experiences did not change drastically after the COVID-19 outbreak compared to before the outbreak. During the COVID-19 outbreak, online learning has become even more prominent such that it has become a panacea as suggested in a descriptive study by Dhawan (2020). On a positive note, from our study, students felt that the increased proportion of online learning experienced after the outbreak

was relatively comparable to what they had received before the outbreak. The significant increase in the proportion of online learning at least did not seem to have an extreme impact on their ratings of online learning. Some reasons for this could be due to the familiarity of online learning as a learning mode and how online learning enabled them to continue learning and achieve their academic goals even during the height of the unprecedented pandemic.

In terms of more specific experiences about online learning, Learning Activity Management System (LAMS), pre-recorded lectures, online finals/quizzes, live lectures, online assignments, and online tutorials were the most common online learning formats experienced by both groups. This was consistent with the report by Li and Lalani (2020) that many universities relied on video conferencing tools and platforms so that education could remain undisrupted during the pandemic.

As for the most often used device for online learning for both groups, it was laptop/desktop. Zoom was the preferred online learning software for both groups. Additionally, the SEN group was more likely to use technical accommodations during online learning. This highlights the importance of technical accommodations for this group which could influence their online learning experiences.

Finally, accessibility was the top advantage of online learning for typically developing students while for students with SEN, it was flexibility. One possibility could be due to the time flexibility being offered by online learning whereby students with SEN were able to learn at a comfortable pace to suit their learning needs. The personalized learning experience has the least number of students endorsing it as the top advantage of online learning. It might be due to the difficulties encountered when designing online learning materials to cater to a wide range of needs and preferences. As such, this might be a potential area that is lacking in online learning. Lower social interaction was the top challenge encountered for both groups of students. These advantages and challenges faced by our participants were consistent with those stated in previous studies (e.g., Adnan & Anwar, 2020; Dhawan, 2020; Koksal, 2020; Nambiar, 2020; Son et al., 2020).

Limitations and Future Research Directions

While our study seeks to address the gaps in previous studies conducted on online learning by expanding the scope to the online learning experiences of university students with SEN, our sample size for the SEN group was limited. This was especially so for questions related to before the COVID-19 outbreak where the sample size for SEN was smaller and hence, this should be considered when interpreting our data. Therefore, future studies could include a larger, more diverse sample that is representative of different ethnicities, schools, and years of study in university. In addition, it is possible to collect the survey data at different periods to investigate the changes in the students' online learning experiences across time. All of these can provide insights into the online learning experiences of the two groups of students and ensure their learning needs are adequately addressed even during online learning.

Conclusion

In conclusion, this study was conducted to better understand the online learning experience of typically developing students and students with SEN through an online survey. By doing so, we hope that the insights gained will be useful for universities and other higher education institutions in terms of assessing the type of online learning support that the respective groups

of students require. With this, online learning could be more inclusive and meaningful in university settings and the higher education sector.

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