

The effect of conceptions of learning and prior online course experiences on students' choice of learning spaces for synchronous online learning during COVID-19

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During COVID-19, universities are reconfiguring learning environments and increasing flexibility in course offerings. Teachers have found synchronous hybrid teaching challenging with many students preferring online to in-person classroom attendance. Understanding students' decision-making as to where, when and how they choose to learn will be critical in informing the design of learning spaces and courses. This survey-based study of 369 undergraduates across disciplines explored the relationships between students' backgrounds and psychological factors (self-efficacy for online learning, conceptions of learning, perceptions of previous online course experiences) and student choices of learning spaces for synchronous online learning. While pre-pandemic studies in Western contexts identified non-traditional student characteristics as major factors associated with students' choices of learning spaces (i.e., learning online at home), this Hong Kong study found significant associations between undergraduates' choices, their origin and the disciplines. Logistic regression indicated those who preferred stimulating education and cooperative learning or perceived their previous online course experiences as having clearer goals had greater odds of attending classes synchronously online on campus from locations different from the scheduled teaching spaces. Qualitative analysis suggests personality, self-regulation and the university's social and organisational structures as factors to consider in future studies of student choices of learning spaces.

Implications for practice or policy:

- Higher education providers may need to diversify course designs to cater to undergraduates' different hybrid learning preferences and expectations in the post-pandemic return to campus.
- The first step for online course teachers is to help their students to build a higher level of self-efficacy for online learning.
- Course teachers can motivate students to take courses online by clarifying their course goals and standards.

Keywords: synchronous online learning, learning space, learning environments, conceptions of learning, course modality, higher education, quantitative

Introduction

Technology-enabled synchronous online learning

Pre-COVID-19 undergraduate courses within a single programme were increasingly being offered across a range of flexible designs from fully or partially online learning (OL) to in-person or hybrid learning across a range of flipped or blended approaches (S. M. Bridges et al., 2020; Fisher et al., 2021; Raes et al., 2020). The COVID-19 pandemic further accelerated the adoption of educational technologies in higher education as campus-based universities were abruptly forced to join their distance education colleagues and shift to fully online teaching in both synchronous and asynchronous modes (Çakiroğlu et al., 2022). While a pre-pandemic meta-analysis reported no significant difference in student satisfaction between synchronous online learning (SOL), asynchronous OL, and face-to-face learning (Ebner & Gegenfurtner, 2019), others identified unexpected variations in student learning in the OL environment not previously encountered in traditional face-to-face learning environments (Prosser & Trigwell, 1999; Trigwell & Prosser, 2020; Tsai, 2009). These pre-pandemic studies have indicated that the learning opportunities

provided by online modalities seem to have aroused different experiences among students who have different conceptions and preferences of learning. Pertinent to the current Zoom era, Ellis et al. (2006) found that, for some students, the learning opportunities provided by the OL were more enjoyable in cases where they could express themselves through writing rather than talking face to face.

Established in the educational literature is that student choices of learning strategies are often affected by presage factors such as their characteristics (e.g., background factors, abilities, self-efficacy, conceptions) and the academic context (e.g., teaching methods, learning environment) as well as process factors such as their perceptions of the learning experiences (e.g., assessment, good teaching) (Trigwell & Prosser, 2020). Such studies have underpinned quality assurance and enhancement of teaching and learning in higher education globally (Zeng et al., 2021). The pandemic-era growth of online and hybrid course modalities has prompted studies on whether such a model could explain students' learning experience in an OL environment. An early study by Ellis (2016) seems to support the applicability of the model to an OL environment. It shows the variation in students' approaches to learning and perceptions of OL are correlated with differences in the quality of the student learning experience, which is, in turn, correlated with students' achievement. As researchers have reported, universities around the world are taking forward some e-learning practices they had used during COVID and providing more learning environment options for students in the longer term (Abdrasheva et al., 2022; Gil et al., 2022). One other rational question to ask is, what affects student choices of learning spaces? Such a study will support an understanding of the characteristics and expectations of undergraduates as they chose where to go to learn most effectively.

With the emerging trend of including OL as a course modality for learning, there has been a new stream of studies investigating what affects student choices of course modality as one of the dimensions of the learning environment (e.g., K. Clayton et al., 2010; O'Neill et al., 2021). However, little research has examined student choices of physical learning spaces for SOL in higher education (Lamb et al., 2022). As an important part of the instructional design, the physical learning space is a key component of the learning environment, which defines the social and cognitive features of the learning environment (Psyché et al., 2019). The few studies that have investigated student choices of course modalities have been critiqued as being typically small-scale, focusing on single disciplines and not having considered latent psychological factors sufficiently (McPartlan et al., 2021; O'Neill et al., 2021). In addition to this, few such studies have been carried out in Asian contexts. This is important as undergraduate students in the Asian context are predominantly characterised by what researchers define as traditional students, that is, under 25, having a high school diploma and without full-time employment (Chung, Turnbull, & Chur-Hansen, 2017; National Center for Education Statistics, 2002; Wladis, Hachey, & Conway et al., 2015). For example, according to the University Grant Committee in Hong Kong (2023), 97.4% and 97.1% of the undergraduate students in Hong Kong universities are traditional students according to these criteria in 2021 and 2022 respectively. In previous studies on student choice of course modality, a considerable number of identified factors related to students' backgrounds factors as non-traditional students (e.g., being parents, married, older or full-time employed). Of additional interest is learning space as one dimension of the learning environment for OL. This paper, therefore, examined undergraduate students' choices of learning spaces for SOL during the COVID-19 pandemic in an Asian context by testing the associations between student choices and the presage factors (student characteristics) as well as the process factors (their perceptions of their OL experience).

The impact of student characteristics, learning experiences and emotions on their choices of course modality

The reported university student characteristics that have effects on student choices of course modality include age, gender, ethnicity, marital status, family or work commitment, discipline and self-efficacy for OL (e.g., Brown, 2012; Chen et al., 2010; K. Clayton et al., 2010; Jaggars, 2015; Ladyshevsky & Taplin, 2013; McPartlan et al., 2021; Millson & Wilemon, 2008; Ortagus, 2017; Wladis et al., 2015). From there, it would seem that the choice of online course modality relates more closely to the characteristics of non-traditional students (e.g., being parents, married, older or full-timely employed) who had to attend to other commitments in life and so need more convenience in accessing courses (e.g., saving travel time,

the flexibility of schedule, balancing between work and family obligations) (e.g., T. Braun, 2008; Brown, 2012; Harris & Martin, 2012; Kuzma et al., 2015).

Findings regarding differences across gender and ethnicity groups have been inconclusive (Yukselturk & Bulut, 2009). The registration rates of online courses among minorities were found higher in some studies (e.g., Chen et al., 2010) and lower in other studies (e.g., Jaggars, 2015; Ortagus, 2017). Some studies (e.g., Sullivan, 2001) found that more male than female students tended to like the in-person interaction of the traditional classroom while other studies (e.g., Taplin & Jegede, 2001) identified higher tendencies among females than males to seek in-person support of others or collaborate with others. Regarding disciplinary differences, while researchers argued students from some disciplines may find online studying more appealing than others, they also pointed out that the existing studies often miss including a range of disciplines (O'Neill et al., 2021). McPartlan et al.'s (2021) study found students from science, technology, engineering and mathematics (STEM) disciplines cited their desire for interactions with professors and peers most commonly as the reasons for their choice of in-person learning.

Apart from these demographic factors, educational researchers have found student choices of course modalities might also be affected by some psychological factors. Educational research from a student learning perspective has seen a growing shift from the cognitive aspects of student learning (e.g., prior knowledge, perceptions of context, learning strategies and outcomes) to the role of students' emotions in learning (e.g., motivation for learning and self-efficacy) (Trigwell & Prosser, 2020). As a personal psychological characteristic, students' self-efficacy in the area of OL was found to be associated with a greater possibility of taking future courses online (e.g., Artino, 2010; K. Clayton et al., 2010). Student perceptions of the learning experience (e.g., good teaching) were found positively associated with their motivation (Motivated Strategies for Learning Questionnaire; Pintrich et al., 1993) and self-efficacy (Trigwell & Prosser, 2020). In their recent study on student choice of course modality, O'Neill et al. (2021) explored the impact of students' motivation strategies for learning on their choice of course modalities. Between the students who chose to learn online and in person, they found no significant differences between the groups regarding their self-regulation but significant differences in their tendency to seek help and peer learning.

Following Eccles et al.'s (1983) expectancy-value theory of motivation, McPartlan et al. (2021) measured four values (utility value, interest value, attainment value and cost value) students may attach to the courses they selected and their associations with student choices of course modalities. They found no significant difference in any of these dimensions among the students. However, their qualitative data showed that interactions with peers and teachers were the most frequently mentioned reasons for choosing in-person learning. K. Clayton et al.'s (2010) earlier study found students' perceived match between teachers' instructional designs and their preferred learning styles was the most frequently cited reason for student choices of course modalities. These findings indicate the possible impact of students' conceptions of learning (i.e., students' views and beliefs about learning, teaching and related phenomena), especially their views about interactions with peers and teachers on their choices of course modalities.

Apart from the above-mentioned student characteristics that might affect their choices of course modalities, previous studies have also indicated a potential correlation between students' perceptions of their prior online experience and their choices. (e.g., T. Braun, 2008; Harris & Martin, 2012; Kleisus et al., 1997; Kowalski et al., 2014; Nguyen & Zhang, 2011; Ruffalo, 2016; Thomerson & Smith, 1996; Tseng et al., 2022). Students who have more prior OL experience and felt more satisfied were more likely to choose online courses or courses with online components again (e.g., Artino, 2010; T. Braun, 2008; K. E. Clayton et al., 2018; Cullum, 2016; Nguyen & Zhang, 2011; Tseng & Walsh, 2016). Given the potential individual and contextual influences on students' choice of learning space reported in the above studies, it is cogent to examine the particular COVID-19 context of this higher education study in Asia.

The context

The COVID-19 pandemic caused a rapid shift from on-campus course delivery to emergency remote teaching (Hodges et al., 2020) in higher education all over the world in early 2020. Policy decisions were made in shorter timeframes than in the living memories of most academics. Indeed, in conversations with United Kingdom colleagues, they reported returning to the archives for World War II transcripts to establish possible precedents on how graduations were accomplished in unforeseen disruptions. As Hong Kong universities adjusted to an improving public health situation with a lull in waves of infections, planning during the summer of 2020 was directed towards a gradual return to face-to-face delivery in Semester 1 of the 2020–2021 academic year. Colleagues were encouraged to conduct classes in scheduled rooms and to deliver hybrid or dual-mode instruction following government and campus hygiene policies as did academics across the globe (Detyna et al., 2022; Jandrić et al., 2022). Some students in clinical and lab-based programmes were required to follow faculty guidelines on attendance, but otherwise, the semester was launched as hybrid with most undergraduates able to choose whether to join their classes synchronously through OL or face-to-face classroom learning. While undergraduates' major attendance patterns identified in the previous studies indicated a binary between either studying online outside campus or face-to-face in the classroom (McPartlan et al., 2021; O'Neill et al., 2021), one phenomenon we observed locally and reported by academic teachers during this period were new changes in attendance patterns. Some students were joining their classes online in real-time while physically on campus or outside the campus in self-selected venues rather than attending the session in person. Indeed, students were observed taking the mobile option to its fullest definition walking across the university campus with laptop open and earpods connected to listen to a Zoom class in transit between physical locations. The issue of student choice of learning space for OL, online on campus or in private accommodation, during this particular semester, became a focus of this research.

The present study

As noted above, higher education research on student choice of learning environments has, to date, mainly focused on their choices of course modalities. They have been criticised as very limited, focusing too much on demographic variables and failing to include latent psychological constructs or not conceptualising the constructs properly and assessing them with established psychological measurements (McPartlan et al., 2021; O'Neill et al., 2021). Many have provided only pre-determined responses (e.g., flexibility, travel time) for participants to select from for the measurement of motivations (O'Neill et al., 2021). Studies that included conceptualisations and measurements of psychological factors (i.e., motivation) resulted in only partial support for the associations between motivation and student choice. Meanwhile, qualitative data in these studies indicate students' value of peer interactions was a major drive for choosing learning environments that support cooperation with peers. Such findings point to the necessity of including a factor that has never been included in previous studies on student choices of learning environments – students' conceptions of learning.

Further to these criticisms, there is also a notable lack of such studies in Asian contexts and on student choices of learning space as one dimension of the learning environment for SOL. Our study aimed to address these issues. In our context, the student choices involve whether they choose to take the classes online in private accommodation or on campus. Following the review of the research literature above, this study examined whether student choices of learning space for SOL are affected by the presage factors such as their own characteristics (e.g., demographic variables, self-efficacy for OL and conceptions of learning) and process factors (e.g., perception of their online course experience). Under the circumstance of the COVID-19 pandemic and in higher education, our research questions (RQ) were:

- RQ1: To what extent did student choices of learning space for SOL associate with undergraduates' demographic variables?
- RQ2: To what extent did the students differ in their self-efficacy for OL, their conceptions of learning and the perceptions of their online course experience?

- RQ3: To what extent did student choices of learning space for SOL correlate with their self-efficacy for OL, their conceptions of learning and the perceptions of their online course experience?
- RQ4: What were the other possible reasons influencing their choices of learning space for SOL?

Methods

A survey study solicited the views of undergraduate students across one university campus in the Hong Kong Special Administrative Region of China. Ethical approval was obtained before the survey. Data were collected between January and March 2021 through online and paper-based surveys.

Instruments

Section one of the questionnaire asked about students' demographic information (e.g., gender, faculty, years of study, place of origin). Section two collected information about student choices of learning spaces. Section three invited students to rate their self-efficacy for OL using the items developed by Liaw and Huang (2013) (e.g., "I feel confident operating e-learning functions"). Two more items relevant to our research context were added to the scale (e.g., "I feel confident interacting with teachers and peers through e-learning systems"). Section four measured students' conceptions of learning using the instrument from the Inventory of Learning Styles developed by Vermunt and Donche (2017) measuring construction of knowledge, intake of knowledge, use of knowledge, stimulating education and cooperative learning (e.g., "I prefer to do assignments together with other students"). Section five measured students' online course experience in the previous semester using the Course Experience Questionnaire validated in Hong Kong (Webster et al., 2009) measuring active learning, feedback, good teaching, clear goal and assessment (e.g., "I had a clear idea of where I am going and what was expected of me"). Sections two to five asked students to indicate on a 5-point Likert scale the extent to which they agreed with the statements. Section six invited students' open-ended responses to elaborate in writing why they came to campus to attend classes online.

Participants

The study received 369 completed responses. Among the participants, there were 61.2% female ($n = 226$), 37.7% male ($n = 139$) and 1.16% non-binary ($n = 4$) (Table 1). There were slightly more participants studying in their first year ($n = 125$, 33.9%) and more evenly distributed participants in the other years of study (Year 2: $n = 87$, 23.6%; Year 3: $n = 85$, 23.0%; Year 4 and above: $n = 72$, 19.5%). The majority of the participants were Hong Kong local students (64.8%, $n = 239$). There were 19.2% ($n = 71$) from Mainland China and 15.7% ($n = 59$) from international locations. A little more than half ($n = 194$, 52.6%) were from non-STEM disciplines and 45.8% ($n = 169$) were from STEM disciplines. Five (1.4%) were studying for double majors across disciplines. Compared with the overall undergraduate population at this university (Communications and Public Affairs Office – The University of Hong Kong, 2023), the proportions of participants in each category are approximately the same as the composition in gender (female: 54.2%; male: 45.8%), origin (HK local: 74.7%; Mainland: 10.9%; International: 12.6%) and disciplines (non-STEM: 50.6%; STEM: 49.4%), with slightly more female, non-local and non-STEM participants.

Analysis

After testing the reliability and validity of the instruments as well as calculating the frequencies of participants' choices of learning spaces in different demographic groups, chi-square tests were conducted to test the associations between demographic variables and student choices of learning spaces for RQ1 (Agresti, 2013). A statistically significant χ^2 value indicated that the two groups were different from each other on a given measure (Corder & Foreman, 2014). As the distributions of participants' ratings on self-efficacy for OL, sub-dimensions of conceptions of learning and online course experiences did not satisfy the normal distribution, nonparametric tests were conducted to explore the group difference for RQ2. For RQ3, as the dependent variable is binary, a logistic regression analysis was performed to explore the

relative importance of the variables included in this survey for participants' choices of learning spaces. SPSS version 24 and Amos 24 were employed for these analyses. For RQ4, analysis of the qualitative responses to open-ended questions followed V. Braun and Clarke's (2006) six-phase process supporting reflexive thematic analysis.

Results

Both the Course Experience Questionnaire and the Inventory of Learning Styles have been used in the Hong Kong context before and proved to have good reliability and validity (e.g., Law & Meyer, 2010, 2011; Vermunt & Donche, 2017; Webster et al., 2009). This study also confirmed satisfactory reliabilities on conventional research-based criteria (self-efficacy for OL: $\alpha = .896$; construction of knowledge: $\alpha = .697$; intake of knowledge: $\alpha = .724$; use of knowledge: $\alpha = .796$; stimulating education: $\alpha = .796$; cooperative learning: $\alpha = .854$; active learning: $\alpha = .859$; feedback: $\alpha = .869$; good teaching: $\alpha = .772$; clear goal: $\alpha = .867$; assessment: $\alpha = .824$) (Nunnally, 1978; Robinson et al., 1991) as well as satisfactory factorial structures of the instruments (chi-square = 1833.833, $\chi^2/df = 1.879$, $P = .000$, CFI = .900, RMSEA = .049).

RQ1: To what extent did student choices of learning space for SOL associate with students' demographic variables?

More than two-thirds of the participants chose OL in private accommodation ($n = 253$, 68.6%) and 31.4% ($n = 116$) chose OL on campus. The spaces they studied online on campus included the university Learning Commons, cafés on campus, libraries, and open spaces both on the campus and in residential colleges. Two demographic variables showed statistically significant associations with their choices of learning space (Table 1). More STEM participants ($n = 68$, 40.2% of all STEM participants, adjusted residual = 3.7; $\chi^2 = 13.895$, $p < .001$) and non-locals ($\chi^2 = 86.343$, $p < 0.001$; Mainland non-locals: $n = 40$, 56.3% of all Mainland non-locals, adjusted residual = 5.0; international non-locals: $n = 40$, 67.8% of all international non-locals, adjusted residual = 6.6) studied online on campus when compared with their counterparts.

Table 1
Demographic information and association with participants' choices of the learning spaces for SOL

Demographic variables	Choice of learning space			χ^2 (p value)
	SOL in private accommodation (% within the subgroup, adjusted residual)	SOL on campus (% within the subgroup, adjusted residual)	Subtotal (% of total)	
Gender ^a				3.450 (0.063)
Male	88 (63.3%, -1.9)	51 (36.7%, 1.9)	139 (37.7%)	
Female	164 (72.6%, 1.9)	62 (27.4%, -1.9)	226 (61.2%)	
Non-binary	1 (25.0%)	3 (75.0%)	4 (1.1%)	
Year of study				4.112 (.250)
Year 1	82 (65.6%, -.9)	43 (34.4%, .9)	125 (33.9%)	
Year 2	55 (63.2%, -1.2)	32 (36.8%, 1.2)	87 (23.6%)	
Year 3	61 (71.8%, .7)	24 (28.2%, -.7)	85 (23.0%)	
Year 4 or above	55 (76.4%, 1.6)	17 (23.6%, -1.6)	72 (19.5%)	
Origin				86.343 (<.001)
Hong Kong local	203 (84.9%, 9.2)	36 (15.1%, -9.2)	239 (64.8%)	
Non-local (Mainland China)	31 (43.7%, -5.0)	40 (56.3%, 5.0)	71 (19.2%)	
Non-local (International)	19 (32.2%, -6.6)	40 (67.8%, 6.6)	59 (15.7%)	
Disciplines ^b				13.895 (<.001)
Non-STEM	151 (77.8%, 3.7)	43 (22.2%, -3.7)	194 (52.6%)	
STEM	101 (59.8%, -3.7)	68 (40.2%, 3.7)	169 (45.8%)	
Cross-disciplines	1 (20.0%)	4 (80.0%)	5 (1.4%)	
Missing			1 (0.3%)	
Subtotal	253 (68.6%)	116 (31.4%)	369 (100%)	

Note. ^aThe sample size of participants who chose "non-binary" for gender was too small ($n = 4$) to carry out the analyses. The analyses, therefore, did not include this category.

^bThe sample size of participants who chose "multi-disciplines" for disciplines was too small ($n = 5$) to carry out the analyses. The analyses, therefore, did not include this category.

RQ2: To what extent did the students differ in their self-efficacy for OL, their conceptions of learning, and the perceptions of their online course experience?

Some significant differences in self-efficacy, conceptions of learning and prior online course experience were identified across groups (see Table 2). Between the participants who chose different learning spaces, the participants who chose OL in private accommodation rated their self-efficacy for OL significantly higher (median = 4.000, $p < .05$) than those who chose OL on campus (median = 3.833). Between the gender groups, there was no significance. Among the groups with different origins, the result indicates a significant difference in their ratings on self-efficacy for OL ($p < .001$) and stimulating education ($p < .01$). Further pair comparisons indicate significant median differences for stimulating education between Mainland Chinese ($p < .001$, median = 4.000) and Hong Kong local participants (median = 3.800) as well as between Mainland Chinese ($p < .05$, median = 4.000) and international participants (median = 3.800). However, no significant median difference among different groups of origin was found for self-efficacy for OL. Between the disciplinary groups, the non-STEM participants rated cooperative learning significantly lower (median = 3.000, $p < .01$) than the STEM participants (median = 3.400). However, they rated active learning (median = 3.667, $p < .05$) and feedback (median = 3.250, $p < .05$) significantly higher than the STEM participants (active learning: median = 3.333, feedback: median = 3.000).

Table 2
 Comparison of participants' self-efficacy for OL, conceptions of learning, and perceptions of their prior online course experiences across different groups

		Choice of learning space			Gender ^a			Origin			Discipline ^b			
		SOL in private accommodation	SOL on campus	<i>p</i> value	Male	Female	<i>p</i> value	Local	Non-local Mainland	Non-local international	<i>p</i> value	Non-STEM	STEM	<i>p</i> value
Self-efficacy for OL	Mean	3.837	3.641	.043	3.725	3.812	.926	3.852	3.662	3.619	.000 ²	3.825	3.704	.972
	Median	4.000	3.833		3.833	3.833		4.000	3.833	3.833		3.833	3.833	
Construction of knowledge	Mean	3.764	3.822	.678	3.817	3.761	.233	3.763	3.834	3.810	.358	3.772	3.778	.799
	Median	3.800	3.800		3.800	3.800		3.800	3.800	3.800		3.807	3.807	
Intake of knowledge	Mean	3.890	3.829	.693	3.827	3.901	.999	3.895	3.876	3.780	.835	3.833	3.918	.830
	Median	4.000	4.000		4.000	4.000		4.000	4.000	3.800		4.000	4.000	
Use of knowledge	Mean	3.786	3.829	.585	3.826	3.788	.465	3.813	3.766	3.814	.588	3.750	3.852	.479
	Median	3.800	3.800		3.800	3.800		3.800	3.800	3.800		3.800	3.800	
Stimulating education	Mean	3.716	3.890	.140	3.787	3.764	.710	3.683	4.054	3.786	.006 ³	3.772	3.759	.724
	Median	3.800	3.800		3.800	3.800		3.800	4.000	3.800		3.800	3.800	
Cooperative learning	Mean	3.084	3.312	.060	3.258	3.074	.061	3.117	3.217	3.193	.603	3.005	3.307	.004
	Median	3.200	3.400		3.400	3.000		3.200	3.000	3.200		3.000	3.400	
Active learning	Mean	3.461	3.290	.086	3.350	3.444	.312	3.466	3.347	3.249	.062	3.457	3.331	.012
	Median	3.667	3.333		3.333	3.667		3.667	3.333	3.333		3.667	3.333	
Feedback	Mean	3.227	3.136	.953	3.219	3.196	.926	3.245	3.319	3.089	.419	3.264	3.105	.034
	Median	3.250	3.250		3.250	3.250		3.250	3.250	3.250		3.250	3.000	
Good teaching	Mean	3.437	3.341	.947	3.4500	3.396	.439	3.418	3.423	3.398	.832	3.461	3.328	.051
	Median	3.500	3.500		3.500	3.500		3.500	3.500	3.500		3.500	3.500	
Clear goal	Mean	3.229	3.302	.923	3.344	3.210	.111	3.222	3.377	3.284	.907	3.273	3.204	.066
	Median	3.250	3.250		3.500	3.250		3.250	3.250	3.250		3.500	3.250	
Assessment	Mean	3.605	3.526	.704	3.564	3.611	.781	3.594	3.596	3.554	.413	3.589	3.562	.546
	Median	3.667	3.667		3.667	3.667		3.667	3.667	3.667		3.667	3.667	

Note. ^aThe sample size of participants who chose “non-binary” for gender was too small ($n = 4$) to carry out the comparison. The analyses, therefore, did not include this category.

^bThe sample size of participants who chose “multi-disciplines” for discipline was too small ($n = 8$) to carry out the comparison. The analyses, therefore, did not include this category.

RQ3: To what extent did student choices of learning spaces for SOL correlate with their self-efficacy for OL, their conceptions of learning and the perceptions of their online course experience?

Based on the Events Per Variable criterion (Peduzzi et al., 1996) and the sample size obtained in this study, it is more appropriate to include up to 11 predictors in the logistic regression. As the association between student choices of learning spaces and the demographic variables have been explored in this study, logistic regression was conducted with the 11 psychological variables only (self-efficacy for OL, five variables from conceptions of learning and five variables from perceptions of prior online course experience) on the likelihood that participants would choose SOL on campus or in private accommodation. The test on the full model against a constant was statistically significant, $\chi^2(11, N = 369) = 29.264, p < .01$, indicating that these variables reliably distinguished between participants who chose OL in private accommodation or on campus (Table 3). The model correctly classified 71.3% of cases (the cut value is 0.50). The Hosmer and Lemeshow test yielded a nonsignificant ($p = 0.64$) $\chi^2(8, N = 369)$ of 6.091, indicating that the model was a good fit to the data. The results revealed that the odds of coming to campus to study online while a class was simultaneously underway in another campus location were greater for those who preferred stimulating education ($B = .541, \text{Exp}(B) = 1.717, p < .05$) or cooperative learning for learning ($B = .337, \text{Exp}(B) = 1.401, p < .05$) or perceived their prior online course experience having clearer goals ($B = .660, \text{Exp}(B) = 1.935, p < .01$).

Table 3
Logistic regression of participants' choices of learning spaces (OL in private accommodation – reference group)

Variables	B	SE	Wald chi- square	df	Sig.	Odds ratio	95% CI	
							Lower	Upper
<i>Self-efficacy for OL</i>	-.286	.172	2.751	1	.097	.751	.536	1.053
<i>Conception of learning</i>								
Construction of knowledge	.132	.271	.238	1	.626	1.141	.670	1.943
Use of knowledge	-.010	.223	.002	1	.966	.990	.639	1.534
Intake of knowledge	-.328	.223	2.175	1	.140	.720	.465	1.114
Stimulating education	.541	.241	5.049	1	.025	1.717	1.071	2.752
Co-operative learning	.337	.151	4.962	1	.026	1.401	1.041	1.885
<i>Prior OL course experience</i>								
Active learning	-.169	.203	.694	1	.405	.844	.566	1.258
Feedback	-.285	.243	1.381	1	.240	.752	.467	1.210
Good teaching	-.186	.215	.749	1	.387	.830	.545	1.265
Clear goal	.660	.234	7.981	1	.005	1.935	1.224	3.059
Assessment for understanding	-.181	.235	.596	1	.440	.834	.527	1.322

RQ4: What were the other possible reasons influencing their choices of learning spaces for SOL?

The survey received 130 responses to the open-ended question asking them to indicate the main reasons that they come to campus to attend classes online. After adopting V. Braun and Clarke's (2006, 2012) six-phase process supporting reflexive thematic analysis, we identified two major themes through an inductive, iterative and recursive approach: students' personal learning preferences and non-personal factors. Further sub-themes illustrate the nuanced nature of student reflections on their choices of where to learn.

Personal learning preference

Participants referred most frequently to their personal learning preferences as the reasons for them to study online on campus with four sub-themes identified: perception of learning modalities, personal preference for social interaction, perceptions of the university campus as an educational environment, boredom.

Perceptions of learning modalities involve participants' beliefs about which learning modality is more effective for them personally. When making the decision, most participants compared SOL in private accommodation with SOL on campus and perceived SOL on campus as more motivating and helpful for self-regulation. They mentioned "cannot focus in my home" (non-local International/Yr 3/STEM/Female) or have "more motivation to attend the online class when coming to campus" (HK local/Yr 4/non-STEM/Female). They studied on campus: "to regulate myself" (HK local/Yr 1/non-STEM/Male) or "want to force myself to focus on the class/study" (non-local Mainland/Yr 1/non-STEM/Female). A few participants made their choices by comparing SOL with face-to-face classroom learning. For example, one participant said:

I may use Zoom to attend classes even if I am on campus. Doing so is because in some classrooms (especially huge ones, like the [XX] Hall). It is not easy to see the screen and listen to teacher clearly. And using Zoom I can acquire a better learning experience. (non-local Mainland/Yr 2/STEM/Male)

Personal preference for social interaction involves two opposite preferences which led to the same choice, that is, SOL on campus. Some participants mentioned SOL on campus in one's chosen venue as a way to stay on campus while at the same time not having to face the teachers or peers directly. One example of such responses was "f2f tutorials were intimidating" (HK local/Yr 1/non-STEM/Female). This seemed to be related to students' preferences for social interactions. As one such student said, "I may have social anxiety, which causes me to skip a lot of face-to-face classes" (HK local/Yr 3/STEM/Female).

In the middle of this semester, some teachers reported very small numbers of students physically joining courses in classrooms. Students in this study reported the same observations, and this seems to be the other reason why some students shifted to SOL on campus as "no friend is going with me" (non-local Mainland/Yr 3/non-STEM/Female) and "the lecture hall is very empty" (HK local/Yr 3/STEM/Female). At such times, students felt the "awkwardness of facing profs alone" (non-local Mainland/Yr 2/non-STEM/Female) and felt an added performance pressure in emptier lecture rooms: "Found less people on site in the lecture room. So much demand on those on site" (non-local International/Yr 4/non-STEM/Female). In contrast to those deliberately avoiding social interaction were students who opted for the same choice (i.e., SOL on campus) but wished for more socialisation with peers (e.g., "I want to meet friends and study together to prevent social isolation" – non-local Mainland/Yr 3/non-STEM/Female, "see friends in person" – HK local/Yr 3/non-STEM/Female).

Perception of the university campus as a better learning space involves reported perceptions that university campuses have better infrastructure compared with their homes as "the equipment here (computers, electric power supply, printers, desks, chairs) made my learning easier" (non-local Mainland/Yr 3/non-STEM/Female) and "the Wi-fi connection at home is not stable and costly. The environment in the library is quieter" (HK local/Yr 3/non-STEM/Female). Such perceptions are understandable given the broader literature on the digital divide and cramped living conditions in the Hong Kong context with a very low average living space for the majority of the population (Brito, 2020; Rosé et al., 2017). The campus Learning Commons and libraries, in contrast, are more spacious, designed for both quiet and collaborative study, and are well-equipped with reliable internet service.

This sub-theme also involves students' perception that campus experience is an essential part of their university experience as it "offers real university experience" (HK local/Yr 1/non-STEM/Female) as well as a sense of reassurance in the turbulence of the COVID-19 pandemic as being on campus was perceived as "giving ... a sense of more normal university life" (HK local/Yr 1/STEM/Female). Indeed, many Hong Kong

and Mainland students prioritised the university campus for its learning climate (e.g., “The atmosphere of study is better” – HK local/Yr 5/non-STEM/Male; “A proper atmosphere is critical for study, and learning at home is not as good as learning in university” – non-local Mainland/Yr 2/non-STEM/Male).

The boredom of staying in one place to study was another sub-theme that arose from some. Participants indicated that they chose SOL on campus for “a change in scenery” (non-local International/Yr 2/non-STEM/Male) as some of them got “bored studying at home” (non-local International/Yr 2/STEM/Female) and preferred the physical activity of “switching learning environments” (HK local/Yr 3/STEM/Female).

Non-personal factors

The other major theme relating to students’ choices or shifts in the choices involved non-personal factors. Despite university safety protocols, many took a public health perspective, choosing or shifting to SOL on campus to “keep social distance during the pandemic situation” (HK local/Yr 3/STEM/Female). Overall, however, the most frequently mentioned sub-theme under this category was convenience, involving the logistic convenience of attending when students had other plans on campus or had courses offered face-to-face on the same day (e.g., “Because after the online class, I have f2f class on campus” – HK local/Yr 2/non-STEM/Female; “Doing group projects or borrowing books from library” – HK local/Yr 1/STEM/Female). Others saw the convenience of SOL in not only reducing home-to-campus travel but, interestingly, in terms of on-campus movement transitioning between classes with “No need to rush to lecture hall between lectures” (HK local/Yr 1/STEM/Male). Interestingly in terms of the first-year transition and orientation to the physical campus layout, a first-year STEM student new to the campus shared how she viewed SOL as a reassuring plan B or a temporary contingency plan if she “can’t find the classroom and no time to find it” (non-local International/Yr 1/STEM/Female).

The second sub-theme was course requirements. This included SOL on campus when a course was provided in online modality only (e.g., “because no face-to-face option provided” – HK local/Yr 3/non-STEM/Male). It was also related to the demand of the learning tasks in a course such as a group work where they “had to discuss with other students for a project on campus” (non-local Mainland/Yr 5/non-STEM/Female) or a specific teacher’s course policy for in-person students, “the teacher doesn’t allow using tablets in the face-to-face classroom, which is inconvenient” (HK local/Yr 1/non-STEM/Female).

Overall, in the open-ended responses, when comparing SOL at home and taking a course in-person, students were seen to be actively weighing their options. Online on campus was a more balanced option considering a range of competing factors, as a student said, “Don't want to face the teacher and classmate in person. It made me feel shy. The virus is another reason in order to avoid people interaction. But same time home is not a good place for attending classes” (HK local/Yr 4/non-STEM/Female). The open-ended responses have further untangled some of the complexities of student decision-making processes in selecting where to study during a hybrid period when a campus was open. In what follows we discuss these in light of the results of the quantitative analysis.

Discussion

To date, there have been few studies on students’ choice of learning space for OL. The closest has been students’ choice of modality, among which, the participants involved were mostly non-traditional students as they were the major groups who chose online modality. Such studies have not involved sufficiently multiple disciplines and latent psychological factors in one study. This study adds valuable empirical evidence and findings to the existing literature on students’ choice of learning environment by involving majorly traditional undergraduate students from a much wider range of disciplines and including many more latent psychological factors with well-established measurements. Based on the literature review, the research questions of this study tested the extent to which student choices of learning space for SOL were associated with students’ demographic and psychological factors such as discipline, gender, year of study, origin, students’ self-efficacy for OL, their conceptions of learning and the perceptions of their prior online course experience. In addition to these, it was also of this study’s interest to find out through open-ended questions other possible reasons influencing students’ choices of learning spaces for

SOL. The factors that were reported to be influential among non-traditional students (e.g., balancing between work and family obligations) in previous studies on students' choices of modality were not mentioned by the participants in this study while other presage factors such as demographic (origin and disciplines) and personal psychological factors (self-efficacy for OL, conceptions of learning) and the process factors (perceptions of online course experience) included in this study showed significant correlations with student choices of learning environments. It provides important implications that previous studies missed identifying.

In terms of demographic factors, this study indicated that, under the pandemic, it seemed typically a local student who studied towards a non-STEM undergraduate degree had a higher chance to choose private accommodation for online study. A non-local student who studied for a STEM undergraduate degree might have a higher possibility to study online on campus. There is no mention in the literature of students' origin as a factor that might play a part in students' choice of modality. However, it is not entirely surprising to reveal in this study that non-local students were more likely to study online on campus when referring to the push-pull model that explains the flow of international students (Altbach, 2004; Altbach et al., 2010). Their push-pull model has been a major framework for understanding student mobility. It postulates that students' choice to study overseas is a result of a series of pull and push factors. Non-local students' expectations of the academic environment in the host institutions were among the major pull factors driving students to study abroad (Beech, 2019; Cubillo et al., 2006; Lee, 2017). Among the push factors, the desire to develop a better understanding of the hosting society has also been an important factor (Altbach, 2004; Mazzarol & Soutar, 2002). Both indicate non-local students' high expectations of immersing experiences with the university campus, its academic environment, and the society, as Beech (2019, p. 93) put it, a "qualitatively different experience" in the hosting institutions or city. The fact that non-local students in this study would like to stay on campus more when many courses were provided in online mode only might be due to their expectation of a "qualitatively different experience" as well. This finding suggests that it might be important to open the campus to students even during the pandemic so that students with expectations of an on-campus experience can still have access to it, especially non-local students.

Regarding the other demographic factor, disciplines, researchers have argued that OL might be welcomed in some particular disciplines, as discussed in the Introduction section. However, it has not indicated in which particular disciplines OL is more likely to be welcomed. So far, studies have failed to include multiple disciplines in one study to enable a comparison across disciplines (O'Neill et al., 2021). McPartlan et al.'s (2021) study involving a few sub-categories from the STEM domain supported this assumption to some extent. They found while student choice of course modality might be related to their desire for peer interaction, their desire for peer interaction might be related to assignments that required group work involved in STEM disciplines. The inclusion of a much wider range of disciplines in our study addresses further this research gap and supported further the possible relationship between assignments in a course and students' choice of course modality. In our study, the STEM students rated cooperative learning higher and had a higher proportion of students choosing SOL on campus than their non-STEM counterparts, indicating the association between disciplines and student choice. In the meantime, students from both STEM and non-STEM groups in our study mentioned learning tasks or assignments involving peer interactions and cooperative learning in qualitative data as the reason they stayed on campus for OL. The regression analysis also identified cooperative learning as a significant predictor of students' choice of OL on campus. These results seem to indicate the possible relations between learning activities/assignments and students' choices regardless of students' disciplinary backgrounds. Literature discussing the differences between disciplines has found STEM or harder disciplines have more linear and structured contents and the non-STEM and softer disciplines have more open and reiterative contents (Biglan, 1973; Neumann et al., 2002; Trautwein et al., 2015). In relation to such features, the content-centred direct teaching and team projects aiming at problem-solving or application of knowledge seem common in STEM or harder disciplines. In non-STEM and softer disciplines, constructive dialogues, learning discourse and reflection are more commonly seen. Both disciplinary clusters, therefore, would involve learning tasks or assignments that will foster peer interactions and cooperative learning. Therefore, we would like to argue based on the findings from this study that the impact of cooperative

learning and the nature of learning tasks or assignments involved (whether it involves peer interaction) on student choice might be more important than the difference between disciplines. At least two implications can be drawn from this result. First, for researchers, to find out whether there is a difference across disciplines in students' choices of learning space, future studies may want to purposefully include in one study multiple disciplines as well as courses that have varied demands on peer interactions in learning tasks or assignments to compare their impact on students' choices. Second, teachers who are required to provide different course modalities (online and in-person) could consider purposefully including or increasing the learning tasks or assignments that require peer interactions and collaborations if they want to attract more students to come to campus or to attend a course in an in-person mode.

In terms of the impact of psychological factors, the quantitative data support the possible impact of the psychological factors included in this study on student choices of learning spaces. Specifically, the results indicate that higher self-efficacy for OL may increase the possibility for a traditional undergraduate in Asia to study online in private accommodation. Students are more likely to take SOL on campus if they prefer cooperative learning, consider the goals and expectations being communicated clearly in their previous online course experience or hold the belief that learning activities are the tasks of students and teachers should continuously stimulate students to use these activities. The qualitative data support the quantitative findings and provide extra information that was not measured in the survey. They suggest other factors that might affect students' choice as well, such as students' perceptions of learning modalities which were possibly derived from their previous online experience, their preferences for social interaction and expectations of university education. Taking together, the quantitative and qualitative results suggest the importance of designing learning spaces for an enhanced hybrid learning climate that focuses on the social presence of peers and teachers. As Gruppen et al. (2019, p. 969) pointed out, in the context of health professions education, learning environments are "living systems" where there are interactions across psychosocial (personal, social, organizational) dimensions. Similarly, taking a post-digital perspective on digital technologies and learning spaces in higher education, Lamb et al. (2022, pp. 1–2) argued for a process that is mutually reshaping: "When students and teachers gather for a class, they are present in multiple spaces where the digital, material, biological and social are intrinsically connected and co-determining". How we consider these new interactional processes in designing synchronous hybrid learning spaces becomes a new challenge for university campuses and course designers.

The findings of our study also provide other useful implications for our practices in the future. First, in weighing location choices against health risks, a considerable number of undergraduate students chose to study online on campus. This may indicate that students do have different beliefs on effective learning and these psychological factors might be foremost in their decision-making even during the COVID-19 pandemic. Flexibility in offering a range of diverse attendance options for students, where safe, during such events may be one lesson for the future. Second, when universities have to limit the course modality to online only, we may want to help students develop higher self-efficacy for OL at the beginning of a course, such as introducing to students how to use the tools/platforms and leaving enough time for students to develop the skills before assigning the learning tasks that need these skills. Last but not least, concerning the findings from the qualitative data that some students chose to study SOL on campus to avoid the awkwardness of facing teachers alone or interacting with students they did not know in classrooms, teachers who teach online may also want to actively help their students build a peer network for their university learning and life. Meanwhile, they may also want to consider establishing a friendlier classroom environment especially when the class size is smaller.

Conclusions and future research

As mentioned earlier, educational researchers had indicated that, to date, the literature on student choices of learning environments is still very limited, especially in Asian contexts and when involving multiple disciplines. Further to this is the lack of systematic studies on the impact of psychological factors on students' choice of learning space. This study addresses these issues by conducting the study in the Hong Kong context, recruiting participants from ten faculties and exploring the impact of multiple psychological factors. Moreover, all previous studies have focused on distinguishing students' choices

between OL and in-person learning. This study expands our understanding of student choice by examining two attendance options for SOL (i.e., in private accommodation or on campus), which have never been explored previously.

This study identified several possible areas for future studies. Apart from the social and organisational factors identified above, another possible direction may be to include personality and self-regulation as factors to understand student choice in future studies. Bhagat et al.'s (2019) study found that learners' extraversion personality traits (i.e., the tendency to be sociable, lively and active) had a negative association with their feeling of community in an online environment. This study discovered that students' choices of learning space were affected by their preferences for interacting with others. Testing the correlation between personality and students' choices of learning spaces would be worthwhile in the future. Regarding self-regulation, many students in this study indicated that they chose SOL on campus to concentrate and have better time management, a clear tendency to regulate their learning. Studies have indicated that students with clear strategies for time management have better performance and are more likely to build confidence in OL and self-regulated learning (Mou, 2023). Self-regulated learning in the OL context has also been found to be positively related to students' academic performance (Yu et al., 2021). Therefore, another possible future study would be to conduct a longitudinal study and add another two factors, learning outcomes and self-regulated learning, to test the impact of student choices of learning spaces and their learning experiences on their learning achievement, self-efficacy in OL and self-regulated learning. Of interest would also be studies testing the impact of the same factors in other universities in the Asian context or when there is no pandemic. Finally, micro-ethnographic, discourse-based studies drawing on recordings of undergraduates' interactions in-situ within and across learning spaces could provide further insights into the social and cognitive processes of student experiences in hybrid teams (S. Bridges, 2023; S. M. Bridges et al., 2020).

Author contributions

Author 1: Conceptualisation, data collection and curation, analysis of quantitative and qualitative data, writing – original draft, revision, editing; **Author 2:** Conceptualisation, data collection, analysis of qualitative data; writing – review and revision.

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