Online Distance Learning (ODL) Behavior During Covid-19: Socio-economy Perspective of Civil Engineering Undergraduate in A Malaysian Public University

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Abstract: Abrupt switch from face-to-face (F2F) learning to online distance learning (ODL) was implemented in the heights of the Covid-19 pandemic in conjunction with the movement control order (MCO) in Malaysia. The questionnaire survey was conducted primarily to assess the preparedness, participation and needs of student for continuous improvement purpose in a civil engineering program of a Malaysian public university. Cross-tabulation of the survey results uncover rich insights into student background, circumstance and learning behavior. Students' acceptance and adaptability are governed by many factors, amongst others, admission qualification, credit loading, attention received, study-work balance and finances. Socio-economy drawback is a major hindrance to a fraction of students to fully benefit from ODL implementation. Students may be more concern over results and graduation rather than actual understanding. Hence, higher educators have a challenging task to improve on effective online teaching and learning. Equally important is the emotional and psychological support to maintain student motivation and well-being.

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1. Introduction

Covid-2019 pandemic has led to global disruption in student learning with no exception to higher education. With most universities forced to shift to online teaching and laboratory practices, many challenges had arisen such as unequal access to technology and difficulties in adapting to new teaching and learning methods (Isa et al., 2023; Schleicher, 2020).

Two years on, the implementation of online distance learning (ODL) in various parts of the world has brought forth rich experiences. Numerous related papers on ODL have already been published since the beginning of the pandemic. Here, a review of the impact of Covid-19 pandemic on education, the challenges faced by the students and instructors in teaching and delivery aspects and various innovative strategies or approaches used during the pandemic are presented.

Gamage et al. (2020) studied the continuity of university programs and found that the shift to online delivery posed challenges in terms of student engagement, access to technology, and practical training specifically in the laboratory practices. It is suggested that universities can improve the delivery

of online teaching and laboratory practices by implementing innovative teaching methods. Pokhrel and Chhetri (2021) found that the shift towards online and blended learning has led to challenges related to technology, pedagogy, and student engagement in higher education landscape. There is thus pressing needs for high learning institutions to provide adequate support, training, and resources to both lecturers and students to facilitate effective online learning (Harun et al., 2021).

Since the pandemic, various approaches and strategies had been introduced and adopted to assist educators in their teaching, learning and assessments (TLA). Moreover, innovative strategies in using multiple assessment methods is shown to improve student learning outcomes and increased student engagement (Carian et al., 2020) compared to the traditional continuous assessment (Martín-Carrasco et al., (2014), hence improving student learning outcomes and enhance student engagement. In addition, certain TLA methods, such as providing clear instructions and feedback, utilizing digital resources, and incorporating group work, helped to enhance student learning experiences in laboratory courses (Ha et al., 2022). There is need for educators to adapt to the new learning landscape and to consider innovative teaching approaches that can support student learning and engagement (Pokhrel & Chhetri, 2021).

The flexibility of online learning is generally appreciated by the students, and they saw it as an opportunity to develop self-directed learning skills (Harun et al., 2021). Another study on psychomotor domain of engineering students during ODL showed that a hybrid approach improved practical skills and enhanced learning experience despite pandemic limitations and challenges (Isa et al., 2022). The study by Assi and Rashtchi (2022) showed that students are generally resilient and could adapt to the new learning mode, though face-to-face classes are still preferred.

It is important to consider the practical aspects of education in the transition to ODL, especially in fields that require hands-on skills development (Isa et al., 2022). A study by Fatah et al. (2021) on dental education at a Malaysian public university revealed that the pandemic had disrupted the traditional method of teaching and learning, with face-to-face lectures and clinical training being replaced by online classes and virtual simulations. Fatah et al. highlighted the challenges faced by students and

faculty, such as the lack of access to clinical materials and equipment, as well as the need for alternative approaches to clinical assessment. The online delivery of laboratory experiments was found less effective than physical delivery, resulting in students struggling with the lack of hands-on experience in civil engineering laboratory courses (Ha et al., 2022).

Spence et al. (2022) examined the perceptions of future careers for middle-year engineering students and found that students had limited understanding of available career paths, highlighting the need for more career guidance and exploration opportunities. and the overall impact of the pandemic on teaching and learning. In terms of gender, Koc et al. (2022) compared the work-life balance perceptions of civil engineering students and found that female students face more challenges in achieving work-life balance compared to male students. From the psychological perspective, Mizani et al. (2022) found that an internal locus of control was positively associated with student engagement and academic achievement during emergency remote teaching in the Covid-19 pandemic.

Meanwhile, it was found that high levels of stress and mental health issues were experienced by the graduate students due to the demanding nature of their programs, thus requiring institutions to provide mental health support services to them (Bork and Mondisa, 2022; Lathigara et al., 2021).

Kaur et al. (2021) concluded that online mode will remain as supplementary and cannot replace traditional classroom teaching. Piyatamrong et al. (2021) highlighted the disappointment of students with the deprivation of interactions. Students' academic performance was found to deteriorate when they are disengaged and demotivated (Lathisgara et al., 2021).

Overall, the sentiments suggests that online distance learning (ODL) is not a perfect substitute for traditional classroom teaching, as it has its inherent deficiencies, such as the lack of interaction and engagement, which can lead to demotivation and disengagement, and a subsequent decline in academic performance. The findings point to the inherent deficiency in ODL of which there is no anticipated satisfactory solution to date, and the irreplaceable advantages of classroom instruction and engagement. Despite the many innovative online tools available, educators face the uphill battle of effective ODL

delivery and keeping students motivated through the semester.

But there is yet a basic issue – despite the common adoption of technology and near ubiquitous internet penetration rate, socio-economy background of students can be a significant factor affecting the means and mode of online accessibility. In fact, their background also affects how well these students can adjust to changes due to individual circumstantial constraints. Schleicher (2020) had called for a comprehensive and equitable response to address existing inequalities in access to technology in education systems. There is, however, a lack of detailed investigation on socio-economy impact on student readiness for effective ODL.

A qualitative assessment of engineering student experiences and sentiments towards technology-mediated higher education provision during the Covid-19 pandemic found that students faced challenges related to internet connectivity, technological issues, and lack of interaction with peers and instructors (Piyatamrong, Derrick & Nyamapfene, 2021). Harun et al. (2021) found that online learning posed challenges for both students and lecturers, including technical difficulties, limited interaction, and the need for additional support. Similar challenges were faced by the instructors related to technological infrastructure, pedagogical practices, and student engagement (Kashyap et al., 2021).

In Malaysia, the movement control order (MCO) was implemented by the government during the heights of the pandemic to restrict mobility in the effort to curb the spread of the virus. Teaching and learning (T&L) activities were switched online overnight, which caught many educators and students unprepared. The Engineering Accreditation Council of Malaysia under the Board of Engineers Malaysia has promptly provided teaching, learning and assessment guidelines that consider the impact of the pandemic on engineering program delivery to maintain the quality standard (EAC, 2022). At the university, the faculty and the program level, many guidelines and best practices were also published and circulated within weeks to pave the way for the new T&L mode. Nevertheless, many lecturers and students still struggled to adjust and adapt to the new norm.

One of Malaysian largest public university is founded to achieve social transformation of the lesser privileged people group. Its student catchment is characterized by urban poor and the rural community, with many from remote settlements, a unique demography which presents additional challenges to the transition towards virtual teaching and learning due to their accessibility to ODL.

A questionnaire survey was conducted amongst civil engineering students during the early stage of ODL implementation in the university for the purpose of continuous improvement. Based on the survey outcome, the lectures and the program owner were able to jointly identify the area which requires further improvement and to come up with action plan for the subsequent cycle. Notwithstanding the original intention of the survey, the extensive data collected from the survey offers rich insight into the student background, circumstance and their learning behavior. In this paper, the above survey data is mined to uncover some of the implicit information. The observations and deduction provide valuable lesson-learnt and way forward for higher education of the country.

2. Materials and Methods

A. General Framework

The survey was designed by the school of civil engineering with the primary aims to assess the student preparedness, participation and needs for continuous improvement of ODL at the program and course level.

The survey comprises 4 main sections. Section 1 on respondent information covers student gender, place of origin, program enrolled and admission qualification, study mode, academic year (and semester), number of courses and credit hours enrolled. Section 2 on physical learning environment covers student location, device(s) used, network and data access. Section 3 examines the ODL implementation from students' perspective. Section 4 is about the perception and response of students towards ODL.

B. Survey Execution

The questionnaire was prepared using Google Form and was circulated primarily via Whatsapp messaging application to the target students of the university civil engineering programs.

The survey was first conducted in April 2020 when the full-scale ODL was initiated in conjunction with the MCO. The same survey was subsequently repeated at the end of the semester (in Jun 2020), the beginning and the end of the following semester (October 2020 and February 2021, respectively).

C. Questionnaire Analysis

Owing to the large amount of data obtained, the present discussion will focus on the first survey in the main campus only. This includes both undergraduate and postgraduate students but exclude the diploma students from the branch campuses. Furthermore, the changes of student response to the same set of questions over the course of the 2 semesters will be treated in a separate paper.

3. Results

A. Respondent Composition

Table I to III show the respondent distribution by program level, gender, geography and mode of study. The total number of respondents are 1165 for undergraduate (UG) and 142 for postgraduate (PG), which are 63.6% and 46.3% of their respective total student enrolment of the semester. This gives an overall response rate of 61.1%, which is substantial. The percentage of female and male respondent is also representative of the gender ratio of the program student population. It is interesting to note that the 3:2 female to male student ratio in the program has been around for nearly two decades, where the number of qualified male students is consistently lower due to poorer academic performance.

Geographically, Malaysia is made up of Peninsular Malaysia and East Malaysia, which are separated by the South China Sea. Respondents from the Central Peninsular region constitute the largest group (42.8%) which is almost equivalent to the sum of respondents from the East, the West and the South Peninsular regions combined (43.2%). The balance comprises 7.5% from North Peninsular and 6.4% from East Malaysia. Cross examination with Department of Statistics data shows the respondent origin is quite consistent with the year 2020 population distribution. The discrepancy can be attributed to the fact that this university has branch campuses in East Malaysia and North Peninsular which offers a similar civil engineering degree program with student catchment from the respective region. The lower student intake

from these 2 regions is filled-in by students from Central Peninsular nearer the main campus.

Up to 94% of the respondents are in full time (FT) study. Part-time (PT) student respondents are mainly from the PG and there are 2 exchange students who answered the survey.

Table 1 : Distribution of Respondent by Gender and Level of Study

Level of study	Female	Male	Total	%
Undergraduate (UG)	700	465	1165	89.1
Postgraduate (PG)	87	55	142	10.9
Total	**787**	**520**	**1307**	**100**
%	60.2	39.8	100	

Table 2 : Distribution of Respondent by Region

Region (State/ Territory)	% Respondent	% Population*
Central (Selangor, Kuala Lumpur, Putrajaya)	42.8	28.0
East (Kelantan, Terengganu, Pahang)	16.8	14.0
South (Melaka, Johor)	13.9	15.4
West (Perak, Negeri Sembilan)	12.5	11.4
North (Perlis, Kedah, Pulai Pinang)	7.5	12.8
East Malaysia (Sabah, Sarawak, Labuan)	6.4	18.4
Total	**100**	**100**

*based on year 2020 population data

Table 3 : Distribution of Respondent by Mode of Study

Mode of study	Coursework		Research		Total	%
	UG	PG	Master	PhD		
Full time (FT)	1162	36	12	18	1228	94.0
Part time (PT)	1	63	4	9	77	5.9
Exchange student	2	0	0	0	2	0.2
Total	**1165**	**99**	**16**	**27**	**1307**	**100**
%	89.1	7.6	1.2	2.1	100	

B. Academic Background and Loading

Table IV shows close to 60% of the respondents admitted to the UG or PG program are from an in-house diploma or degree qualification, respectively. Admission from local matriculation programs and polytechnics accounts for over one-third of the UG respondents, whereas admission from local degree one-third of the PG respondents. Only a small fraction of less than 5% are from other or foreign qualifications.

Table V shows the current semester of the respondents. The UG program duration is 4-year, 8-semester, where 1.4% of the respondents had not graduated on time. The PG group comprises students enrolled in the 3-semester master-by-coursework program and master-by-research (typically 2 years) or doctorate-research (typically 3 years) students. The respondents are primarily in year 1 or 2, with just over 10% in their fourth year or higher.

Table VI shows most of the UG respondents were enrolled in more than 6 courses (78.8%), with total credit hours primarily in the range of 15 to 21 (total 72.7%). Less than 10% of the respondents were enrolled for more than 21 credit hours.

Table 4 : Distribution of Respondent by Admission Qualification

UG	%	PG	%
In-house diploma	58.5	In-house degree	59.9
Matriculation	26.4	Other local degree	35.2
Polytechnics	10.6	International student	4.9
In-house foundation	1.8		
Other qualifications	1.6		
Other diploma	1.0		
Total	**100**	**Total**	**100**

Table 5 : Distribution of Respondent by Academic Year

Semester	Year	UG		PG	
		% by semester	% by year	% by semester	% by year
1	1	4.5	16.1	26.8	53.5
2		11.6		26.8	
3	2	5.8	36.9	20.4	32.4
4		31.1		12.0	
5	3	5.7	29.1	1.4	3.5
6		23.4		2.1	
7	4	2.7	16.5	10.6*	10.6*
8		13.7			
9	5	1.4*	1.4*		
Total		**100**	**100**	**100**	**100**

*semester and year equal or higher

Table 6 :Distribution of Ug Respondent by Number of Courses and Credit Hours Enrolled

Number of courses	%	Number of credit hour	%
≤3	2.2	≤12	3.3
4	8.2	>12 to 15	13.7
5	9.5	>15 to 18	32.1
≥6	78.8	>18 to 21	40.6
n.a.*	1.2	>21	9.5
		n.a.*	0.7
Total	**100**		**100**

*applicable to research students only - error in UG student response

C. ODL Accessibility

Table VII shows the locality and accommodation of the respondents during the early stage of the ODL implementation. Close to half (48.4%) identify themselves as located in urban area, one-third in sub-urban area and close to one-fifth (18.5%) in rural area. Majority of the students were residing at home (86.8%). The 9.9% in rented room is slightly higher than the percentage of PT and exchange students combined, of which the former might not have returned to their homes due to work reason. Meanwhile, the 3.2% stranded in campus dormitories were mainly those who did not manage to return home following the short notice prior to the MCO enforcement - likely due to transportation ticket availability or price.

Most of the respondents had at least 2 devices (82.5%) for ODL and majority (87.8%) owned the primary device (Table VIII). Notably, however, just over 10% used primary device which was shared by another, likely siblings who used it for the same educational purpose, or even with parents who had to work from home.

The devices used were mainly smartphone (90.5%), followed by laptop (88.2%). Based on student feedback to their course lecturers, while smartphones allow easy connectivity to online classes and learning web pages, it is not ideal or practical for productive learning, especially over long hours. Only a small fraction of respondents used a PC, tablet or other device. The data suggests the diminished popularity of PC and tablet amongst the students: the former likely due to lack of mobility, whereas the latter lack of full functionality.

In terms of internet access, the use of mobile internet (59.4%) was significantly higher than home internet (32.4%) (Table IX). This suggests many homes were not installed with broadband connectivity. The decent coverage of mobile internet

Table 7 : Distribution of Respondent by Location and Accommodation

Location	%	Accommodation	%
Urban	48.4	Home	86.8
Suburban	33.1	Rented room	9.9
Rural	18.5	Campus dormitory	3.2
Total	**100**		**100**

Table 8 : Device Used for ODL

Description	Category	%		
		UG	PG	All
Number of device(s)	1	15.9	30.3	17.4
	2	79.4	64.1	77.7
	>2	4.7	5.6	4.8
Primary Device ownership	Owned	87.6	89.4	87.8
	Shared (private)	12.2	10.6	12.0
	Public	0.2	0.0	0.2
Device type*	PC	4.7	11.3	5.4
	Laptop	88.5	85.9	88.2
	Smartphone	92.5	73.9	90.5
	Tablet	2.9	4.2	3.1
	Others	0.2	0.0	0.2

*respondent can select more than 1 type

Table 9 : Internet and Data Access for ODL

Description	Category	%		
		UG	PG	All
Internet access	Home internet	31.2	42.3	32.4
	Mobile internet @home	60.2	53.5	59.4
	Mobile internet @outdoor	7.3	2.1	6.7
	Shared internet (private)	0.9	2.1	1.0
	Public internet	0.4	0.0	0.4
Data plan	Unlimited data	28.9	42.3	30.4
	Limited data (suffice)	31.7	37.3	32.3
	Limited data (insufficient)	38.7	19.7	36.6
	No data	0.7	0.7	0.7

had thus played a crucial part in the online access for large number of students during this unprecedented ODL season. However, some respondents reportedly need to go outdoor (6.7%) to get better signal strength as corroborated from their feedback to course lecturers. Only very small percentage had to resort to using private internet of others or public internet.

About one-third (30.4%) of the respondents had access to unlimited data plan (home or mobile). Meanwhile, for those with limited data plan, 32.3% claimed to have enough data whereas 36.6% did not have enough data for ODL usage. Note that the local telcos, in response to the government initiative, had provided 1GB daily complimentary data for all data plans during this time. This suggests that the regular usage aside, the 1GB data may not be adequate to support the daily ODL usage - more so if students' individual data plan was shared with family members, especially with younger siblings who may not have a separate data plan.

It should be highlighted that this university is established primarily for the bumiputras of the country especially those from middle- and lower-income families. Many students are known to live on student loan or meagre allowance from the family. Those who had to work whilst studying to support themselves were likely to be affected financially by the MCO. It was thus a concern that the financial situation might be a factor causing distraction to their study, and if not, limited personal budget on data plan for ODL access.

The survey shows that over 40% of respondents considered themselves to be facing financial difficulty (Table X). The percentage is slightly lower at 36.4% for part-timer students of which most already had a job, but slightly higher for respondents from the rural area (46.7%) compared to suburban or urban respondents.

It is interesting to note that the percentage who claim to have financial difficulty reduces with the number of device available and owned. The trend is also consistent with internet access whereby least respondent with home internet had financial issue (25.1%). This is followed by those who rely on mobile internet indoor (47.3%), mobile internet accessing outdoor (58.6%) and shared private internet (61.5%). Nevertheless, none of those who were dependent on public internet only claim to have financial issue, which indicates location-dominant condition rather

Table 10 : Respondents Who Claim to Have Financial Difficulty

		%			%
Program	UG	40.3	Study	FT	41.0
	PG	43.7	mode	PT	36.4
Locality	Rural	46.7	Number	1	53.1
	Suburban	39.1	of	2	39.1
	Urban	39.5	device(s)	>2	22.2
Internet	Home	25.1		Unlimited	30.2
	Mobile	47.3	Data	Suffice	33.9
	Outdoor	58.6	plan	Insufficient	55.3
	Shared	61.5		No data	44.4
	Public	0.0			
Device ownership	Owned	39.3			
	Not owned	50.9			

than financial-dominant condition.

In terms of data plan, 55.3% of those who did not have adequate data claimed to have financial difficulty, followed by 44.4% of those who did not have data (some were location-dominant condition), 33.9% of those with adequate data, and only 30.2% of those with unlimited data.

Overall, the claim of financial difficulty by these respondents is consistent from the triangulation on how they gained access for ODL learning. In this regard, efforts were taken by the university to support the learning of these less well-off students through the gifts of sponsored device and mailed learning materials through local postal service.

D. View of ODL

Table XI shows respondents' perception, implementation, participation, concerns and acceptance of ODL. A Likert scale of 1 to 5 is adopted to represent least to most agree.

In general, the perception towards ODL was low at 2.26, with no significance difference between gender. PG and PT students show higher preference towards ODL at 2.72 and 2.81 respectively. These suggest that students who were likely to be in employment are more inclined towards ODL. In fact, >Y4 UG students who had not graduated on time are also highly positive (3.02) towards ODL.

Meanwhile, both freshies (Y1) and graduating final year (Y4) students were more receptive of ODL than Y2 and Y3 students.

Respondents generally are more aggregable to ODL for lecture-based courses (2.99) but least agreeable to ODL for lab-based and fieldwork-based courses (1.94).

In terms of ODL implementation, monitoring of attendance by course lecturers had the highest score (4.23) due to the strong emphasis to make sure that students do not miss lessons during this period. However, monitoring of attendance was higher than monitoring of learning progress (3.77). The lowest score goes to the issue of time given to complete assigned tasks, suggesting possibly many respondents struggle with the preparation of assignments in softcopy and/or submission online, if not, other distraction during this period as identified later. Note that in conjunction with the full-scale ODL, the course assessment had been adjusted to give higher emphasis on formative assessment in lieu of summative assessment.

Specifically in terms of monitoring of learning process and maintaining good communication, Y2 and Y3 respondents reported lower scores than Y1 and Y4 students. Understandably lecturers tend to give "more" attention to freshies to ensure they are adjusted to higher education learning, and to students in their final year to ensure that they complete the study successfully. The lower attention received by these middle year students has previously been reported by Spence et al. (2022) as a common trend and should be appropriately addressed accordingly.

Female, PG and PT respondents generally gave higher score to the ODL implementation compared to male, UG and FT respondents, respectively. Y1 and Y4 respondents who received relatively more attention ranked the ODL implementation higher than Y2 and Y3 respondents. The same trend applies to the next section on ODL participation, which averaged 3.01.

ODL requires much higher self-disciplined especially for non-synchronous sessions. Even synchronous session can be challenging for individuals seated in front of the device to stay focused and engaged. Respondents' self-assessment on whether they considered themselves to be disciplined (3.10), productive (2.98) and proactive (2.95) exhibits a declining order, averaging at 3 out of 5, which may be satisfactory.

The highest 3 concerns about ODL were results (4.59) and graduation on time (4.33), which come before the issue of actual understanding and learning of course contents (4.31). Concern about final year project (3.49) and industrial training (3.16) were much lower as it applies only to specific group: Y4 (4.55) and Y3 (4.10) students, respectively. Female, UG and FT respondents were more concerned than

Table 10 : Perception, Implementation, Participation, Concerns and Acceptance of ODL

	ALL	F	M	UG	PG	FT	PT	Y1	Y2	Y3	Y4	>Y4
ODL perception												
In my opinion, lecture-based courses are suitable for ODL.	2.99	3.01	2.95	2.90	3.68	2.94	3.77	3.25	2.72	2.83	3.46	3.70
In my opinion, lab-based courses are suitable for ODL.	1.94	1.95	1.91	1.92	2.11	1.93	2.13	2.09	1.78	2.03	1.88	2.75
In my opinion, studio-based courses are suitable for ODL.	2.11	2.07	2.16	2.06	2.51	2.08	2.60	2.33	1.92	2.12	2.15	2.85
In my opinion, fieldwork-based courses are suitable for ODL.	1.94	1.93	1.96	1.90	2.27	1.92	2.30	2.14	1.78	1.94	1.99	2.70
In my opinion, project-based courses are suitable for ODL.	2.22	2.24	2.20	2.16	2.78	2.18	2.86	2.47	2.05	2.14	2.37	2.95
In my opinion, mathematic courses are suitable for ODL.	2.35	2.32	2.39	2.27	2.99	2.29	3.22	2.89	2.12	2.09	2.54	3.15
Average	**2.26**	**2.25**	**2.26**	**2.20**	**2.72**	**2.22**	**2.81**	**2.53**	**2.06**	**2.19**	**2.40**	**3.02**
ODL implementation												
I am clear with the revised LESSON PLAN for the semester.	3.34	3.43	3.22	3.29	3.77	3.32	3.79	3.50	3.09	3.40	3.58	3.85
I am clear with the changes in course ASSESSMENT PLAN.	3.40	3.49	3.27	3.36	3.77	3.38	3.83	3.51	3.16	3.45	3.69	3.90
I receive learning materials in advance from my lecturers.	3.89	3.97	3.76	3.92	3.65	3.89	3.82	3.99	3.71	3.97	4.02	3.80
I am given enough time to complete the tasks assigned.	3.05	3.07	3.01	2.94	3.88	2.99	4.01	3.44	2.67	2.78	3.77	3.90
My lecturers monitor my attendance of ODL.	4.23	4.29	4.13	4.26	3.99	4.23	4.17	4.29	4.13	4.23	4.40	4.10
My lecturers monitor my learning progress.	3.77	3.81	3.70	3.73	4.09	3.75	4.14	3.93	3.60	3.69	4.01	4.35
My lecturer/SV maintain good communication with students.	3.86	3.91	3.78	3.79	4.44	3.83	4.38	4.04	3.63	3.78	4.27	4.45
Average	**3.65**	**3.71**	**3.55**	**3.61**	**3.94**	**3.63**	**4.02**	**3.81**	**3.43**	**3.62**	**3.96**	**4.05**
ODL participation												
I consider myself disciplined during ODL.	3.10	3.14	3.05	3.03	3.70	3.05	3.92	3.29	2.86	3.09	3.41	3.50
I consider myself productive during ODL.	2.98	3.04	2.91	2.92	3.54	2.94	3.69	3.18	2.74	3.01	3.20	3.50
I consider myself proactive during ODL.	2.95	2.98	2.90	2.88	3.49	2.91	3.64	3.14	2.72	2.94	3.22	3.40
Average	**3.01**	**3.05**	**2.95**	**2.94**	**3.58**	**2.97**	**3.75**	**3.20**	**2.77**	**3.01**	**3.28**	**3.47**
ODL concerns												
I am concern about my understanding and learning.	4.31	4.39	4.19	4.34	4.10	4.33	4.12	4.23	4.35	4.36	4.28	3.95
I am concern about my results.	4.59	4.68	4.45	4.61	4.42	4.60	4.47	4.54	4.60	4.65	4.56	4.05
I am concern about graduation on time.	4.33	4.40	4.22	4.33	4.32	4.33	4.30	4.20	4.32	4.37	4.45	4.35
I am concern about my Industrial Training.	3.16	3.20	3.08	3.29	2.08	3.21	2.26	2.87	2.99	4.10	2.44	1.80
I am concern about my project (final year/ dissertation)	3.49	3.47	3.53	3.41	4.15	3.46	4.08	3.33	3.07	3.61	4.55	3.05
Average	**3.98**	**4.03**	**3.89**	**3.99**	**3.82**	**3.99**	**3.84**	**3.84**	**3.87**	**4.22**	**4.06**	**3.44**
ODL acceptance												
I enjoy ODL.	2.55	2.56	2.52	2.43	3.54	2.47	3.81	2.86	2.25	2.33	3.12	3.30
I consider ODL can be effective for student learning.	2.54	2.54	2.53	2.45	3.26	2.48	3.42	2.89	2.30	2.32	2.91	3.45

*1 □least agree to 5 □most agree

their counterpart; Y3 and Y4 respondents were more concerned than Y1 and Y2 respondents.

The score on finding ODL enjoyable (2.55) and considering ODL as effective (2.54) are very close overall and for many sub-groups, with the exception of PG, PT, Y4 and >Y4 respondents. Of these 4 sub-groups, only >Y4 ranked effectiveness higher over enjoyable, i.e. the other 3 groups tend to enjoy ODL, likely due to convenience, but did not find it as effective.

E. Results Cross-tabulation

Table XII shows the various reasons respondents cited against ODL and the cross-tabulation with their financial situation, location and accommodation. Reason 1 to 4 are closely related to student psychology and emotion, whereas reason 5 to 8 are attributed to physical environment and condition.

Higher percentage (44.7%) of those who claimed to be having financial difficulty agreed more with

Table 12 : Cross-tabulation of Reasons Against ODL With Financial Situation, Location and Accommodation (%)

	Financial difficulty		Location			Accommodation		
	Yes	No	Rural	Suburban	Urban	Home	Rental	Dorm
I miss meeting with people.	37.2	35.5	32.2	34.5	38.9	36.5	35.4	31.0
I cannot stay focused.	72.4	73.4	78.5	72.5	49.4	73.9	67.7	64.3
I am depressed.	26.1	18.2	26.4	18.8	21.3	22.1	16.9	16.7
I loss motivation.	54.5	52.1	59.5	53.7	50.2	54.1	50.8	33.3
I do not have a conducive working space.	52.3	35.7	46.3	43.5	40.3	43.4	40.8	21.4
I am frustrated some of the things cannot be done online (e.g. lab).	48.9	38.3	45.9	41.0	42.5	42.0	49.2	38.1
I have too much personal tasks to attend to.	53.2	40.1	48.8	47.5	42.8	46.2	43.8	31.0
I am physically tired.	49.1	38.7	46.3	43.1	41.5	44.4	31.5	38.1
Others	8.6	8.8	7.4	9.0	9.0	8.5	6.2	21.4
Average	**44.7**	**37.9**	**43.5**	**40.4**	**37.3**	**41.2**	**38.0**	**32.8**

Table 13 : Cross-tabulation of Problems in ODL Participation With Device(s) Used and Device Ownership (%)

	Device(s) used					Device ownership	
	PC	Laptop	Phone	Tablet	Others	Yes	No
I find it difficult to follow the lecture in online sessions.	60.7	50.3	58.7	58.6	50.2	54.7	50.8
I find it difficult to understand the learning materials by myself.	67.3	60.8	64.0	66.0	61.5	23.2	60.8
I find it difficult to discuss and ask question.	52.8	47.2	50.0	50.5	34.4	50.0	46.9
There is constant disturbance at home during class sessions.	54.1	49.2	58.7	52.8	47.2	52.4	45.4
I do not have a conducive working space.	52.4	39.6	48.3	46.3	42.5	46.3	37.7
I do not have device(s) that works smoothly.	34.4	15.7	34.3	23.1	19.3	22.5	29.2
The online connection is poor for effective learning.	62.8	41.7	66.9	55.6	40.3	48.9	60.0
I am concern with my data usage.	48.9	25.7	45.5	37.0	29.9	33.8	43.8
Others	7.1	6.3	5.4	5.3	8.1	6.4	9.2
Average	**49.0**	**37.4**	**48.0**	**43.9**	**37.0**	**37.6**	**42.6**

these reasons, especially on having too much personal tasks to attend to (53.2%), frustration (48.9%) and no conducive working space (52.3%).

In general, those in rural area agreed more with these reasons (43.5%), especially on issue of cannot stay focus (78.5%). Meanwhile, respondents from urban area particular missed meeting people (38.9%). Those who stayed at home (41.2%) tend to agree more to the reasons, in contrast to those who stayed in dormitory (32.8%), likely due to forced social isolation from friends. Most obvious is the loss of motivation amongst those who stayed at home (54.1%), who also ranked high reasons such as too many personal tasks (46.2%) and no conducive space (43.4%). Those who stayed in dormitory cited "other reasons" high (21.4%) in comparison, possibly attributed to homesickness during such critical and uncertain time.

Table XIII shows cross-tabulation of problems in ODL participation with device(s) used and device ownership. Problem 1 to 4 are related to the learning process, whereas problem 5 to 8 are related to the learning environment.

The problems are generally ranked higher for those using smartphone (48.0%) than those using laptop (37.4%). Those using PC ranked these problems even higher (49%) but note that the PC ownership is low (Table VIII) and they may be using outdated machines. Those using tablets fared better (43.9%) than those using smartphones possibly due to better device functionality (23.1%). Those who owned the device used also reported lower problems (37.6%) than those who did not.

Table XIV shows the cross-tabulation of ODL

participation, concern and acceptance with number of courses and credit hours enrolled. For those enrolled with higher number of courses and credit hours, ODL participation level drops correspondingly, suggesting the struggle with managing multiple courses and heavy workload online. Those with the highest number of courses and credit hours also showed higher concerns in general, and vice versa.

It is interesting to note that those with lower number of courses and credit hours found ODL more enjoyable than effective, whereas those with higher number of courses and credit hours found ODL less enjoyable than effective.

Table XV shows the cross-tabulation of ODL participation, concern and acceptance with admission qualification. Participation level was the highest for other diploma students, followed by polytechnics, matriculation, in-house diploma, others, and in-house

foundation. This suggests that students admitted from other institutions were more adaptable to the new learning mode. Similar trend can be observed for PG where international students and other local degree students exhibited better ODL participation then in-house degree students.

In terms of ODL concerns, the trend reinforces the above observation where polytechnic and matriculation students were less concerned compared to in-house diploma and in-house foundation students. However, other diploma students showed the highest concern for their study. For PG, local degree students were less concerned than in-house degree students.

It is interesting to note that from the perspective of admission qualification, UG students in general found ODL more effective over enjoyable, whereas PG students found it more enjoyable than effective.

Table 14: Cross-tabulation of ODL Participation, Concern and Acceptance With Number of Courses and Credit Hours Enrolled

	Number of courses				Number of credit hours				
	<=3	4	5	>=6	<=12	>12 - 15	>15 - 18	>18 - 21	>21
ODL participation									
I consider myself disciplined during ODL.	3.76	3.40	3.15	2.99	3.68	3.30	3.01	2.96	3.06
I consider myself productive during ODL.	3.57	3.23	3.08	2.88	3.47	3.17	2.92	2.84	0.00
I consider myself proactive during ODL.	3.53	3.19	3.09	2.84	3.36	3.16	2.93	2.75	2.93
Average	**3.62**	**3.28**	**3.11**	**2.90**	**3.51**	**3.21**	**2.96**	**2.85**	**2.00**
ODL concerns									
I am concern about my understanding and learning.	4.25	4.34	4.28	4.38	4.33	4.32	4.32	4.32	4.38
I am concern about my results.	4.57	4.65	4.54	4.66	4.55	4.62	4.60	4.60	4.60
I am concern about graduation on time.	4.30	4.57	4.21	4.36	4.30	4.50	4.32	4.27	4.42
I am concern about my Industrial Training.	2.64	2.34	2.51	3.49	2.45	2.67	3.20	3.56	3.35
I am concern about my project*	4.02	4.31	3.05	3.39	3.59	3.90	3.18	3.41	3.80
Average	**3.96**	**4.04**	**3.72**	**4.06**	**3.84**	**4.00**	**3.92**	**4.03**	**4.11**
ODL acceptance									
I enjoy ODL.	3.37	3.16	2.74	2.33	3.27	2.91	2.42	2.26	2.52
I consider ODL can be effective for student learning.	3.16	2.90	2.77	2.37	3.08	2.82	2.47	2.29	2.53

*1 □least agree to 5 □most agree

Table 15 : Cross-tabulation of Odl Participation, Concern and Acceptance With Admission Qualification

	UG					PG			
	In-house diploma	Matri-culation	Poly-tech.	In-house found.	Other	Other diploma	In-house degree	Local degree	Int. student
ODL participation									
I consider myself disciplined during ODL.	2.93	3.15	3.38	2.48	2.63	3.58	3.54	3.88	4.43
I consider myself productive during ODL.	2.83	2.96	3.35	2.57	2.53	3.33	3.39	3.72	4.14
I consider myself proactive during ODL.	2.81	2.93	3.30	2.48	2.47	3.17	3.33	3.74	3.57
Average	**2.86**	**3.01**	**3.34**	**2.51**	**2.54**	**3.36**	**3.42**	**3.78**	**4.05**
ODL concerns									
I am concern about my understanding and learning.	4.37	4.31	4.30	4.29	4.21	4.08	4.13	4.06	4.00
I am concern about my results.	4.63	4.59	4.56	4.48	4.53	4.75	4.47	4.34	4.43
I am concern about graduation on time.	4.38	4.25	4.37	3.86	4.11	4.25	4.44	4.18	4.00
I am concern about my Industrial Training.	3.23	3.35	3.41	3.62	2.84	3.75	2.04	2.00	3.29
I am concern about my project*	3.41	3.55	3.18	3.86	2.37	3.75	4.27	4.04	3.43
Average	**4.00**	**4.01**	**3.96**	**4.02**	**3.61**	**4.12**	**3.87**	**3.72**	**3.83**
ODL acceptance									
I enjoy ODL.	2.26	2.62	2.91	2.19	2.26	2.58	3.28	4.02	3.14
I consider ODL can be effective for student learning.	2.26	2.67	2.94	2.38	2.42	2.67	3.11	3.54	3.14

*1 □least agree to 5 □most agree

4. Discussions

Many of the students who underwent ODL from home have expressed fatigue from the online learning. Owing to socio-economy background, many struggled with device sharing with siblings and the lack of conducive working space. Some needed to juggle with domestic chores including taking care of younger siblings in the midst of the MCO which upend the regular routines of numerous families. These factors interfered significantly with their regular learning pattern and hence the learning outcome and potentially the academic performance (Lathisgara et al., 2021).

In anticipation of these circumstances, a university directive ordered the switch towards emphasis on formative assessment during the ODL. The change aimed to mitigate potential issue of teaching and learning by ODL and reduce the weightage of a virtual final examination which cannot be properly invigilated. This nevertheless translated to higher workload throughout the semester, which added on to the students' hectic learning schedule.

According to Cifrain et al. (2020), it is essential to improve the rubrics for assessing learning activities with high qualitative content where the subjective capabilities of students are assessed. This is especially important with the increased proportion of continuous assessment. Higher education instructors have reported that the adapted syllabi, assigned tasks and provision of feedback to students are not entirely up to the mark (Kashyap et al., 2021). Martín-Carrasco et al. (2014) cautioned that students tend to reduce their effort once a satisfactory score is achieved in the learning assessment. Examination scores can be significantly lower and even the appearance of a higher grade may mask a lower level of learning - more so with students' primary concern being results and graduation rather than actual learning. In this study, the final grades of students were indeed higher than the preceding cohort or semester in general. Hence, the effectiveness of the change in assessment may be subjected to debate.

Overall, the general lack of enthusiasm amongst students towards ODL reported herein is consistent with the findings of Kaur et al. (2021). The prevalent sentiment that ODL is neither enjoyable nor effective is a worrying sign that educators are generally lagging behind in terms of deploying and exploiting the available technology to enhance teaching and learning. Piyatamrong et al. (2021) have called for educators to rethink the adoption of technology-mediated delivery to ensure effective learning and for students to be flexible and open-minded.

Notwithstanding the above, the accessibility of online classes due to internet connection and data cost remains a holdup especially for students facing financial constraints. The absence of home broadband and poor mobile network coverage are amongst the issue faced, suggesting that the country's internet penetration rate is still under par.

Students' self-assessment of their discipline during ODL was higher than productivity, which in turn was higher than proactiveness. This suggests learning output (productivity) may be lower than input (self-discipline), but most had not taken additional initiatives (proactiveness) to address the problem. Mizani et al. (2022) showed that student engagement is found to have a positive relationship with academic achievement and served as a mediator between loneliness and academic achievement. Emotional and psychological support for students undergoing ODL in isolation is thus crucial for their overall well-being.

The middle year students (Y2 and Y3 in the present study), are shown to be most resistant to ODL. According to Spence et al. (2022), this group of students typically suffers from high credit loading and lack consistent contact with an academic mentor (such as that afforded in the final year project). They are thus most vulnerable to losing motivation, affecting not only the academic outcomes but possibly dropping out from the highly demanding engineering course. Hence, it is important to pay attention to this student group especially their need of interactions with peers and mentors to drive them forward.

Furthermore, Y3 students were generally concerned of their upcoming industrial training (at the end of Y3) whereas students in the final year, Y4, were more concerned of their capstone and final year projects. These have direct consequence to their graduating-on-time and future employment. Unfortunately, the Covid-19 MCO had restricted on-site attachment where some students were forced to undergo this crucial training by working from home, which impacted students' learning process to improve their professional skills and emotional intelligence (Bae et al., 2022).

Last but not least, the relatively smaller number of

PG respondents (142, equivalent to 10.9%) covered in the present study should not be overlooked. Note that many of the PG students were working adults and may also be married. According to Koc et al. (2002), the perception of work-life balance is inextricably influenced by the country they study or live in. As a Malaysian society, the PG students would have higher tendency to give more time for their spouse and family members especially during such trying times during the MCO. This group were most receptive of ODL likely due to the benefit of flexibility. However, these matured students usually have concerns and needs, which are layered and interconnected, yet exhibit lower help-seeking tendencies (Bork & Mondisa, 2022). More detailed study will be required to understand the common issues amongst them.

One of the important observations from the present study is the diverging learning attitude and adaptability of students admitted from in-house programs and students admitted from other institutions. The findings may be simply explained as "familiarity breeds contempt", where students who has been in the same system for too long place higher expectation on consistency and continuity within their comfort zone, hence becoming less pliable. Meanwhile, students who have experienced change can more readily adjust to yet another circumstantial shift. A more worrisome explanation is the program, or the institution, have not prepared the students well for malleability. Another possibility is the student catchment, of which the behavior may be attributed to their socio-economy background. Lathigara el la. (2021) emphasized the importance of identifying students' demographic, socio-cultural and economic background to ensure that potential 'vulnerable' group is given the necessary support. As an institution aimed to transform the lives of the less privileged people group in the country, this university is in for a challenging long-term social restructuring endeavor.

5. Conclusion

A survey aimed for continuous improvement of ODL is analysed to identify correlation with student background, circumstance and learning behavior. Socio-economy factor is a limiting factor in ODL accessibility for the less privileged student group, resulting in financial-dominant constraint as well as location-dominant constraint. Students' perception towards ODL as an alternative learning mode is general low due to the poor engagement and effectiveness, which greatly affected student motivation and psychology. Students' self-assessment reveals lower productivity than self-discipline in ODL participation, yet even lower proactiveness. It is worrying to note that students' concerns over results and graduation are higher than the concern of effective learning. One intriguing observation is the lower adaptability of students admitted from in-house programs, which requires further detailed investigation. Amongst the key success factors in ODL implementation within the control of program manager and lecturers include delivery, assigned workload, attention and monitoring to ensure that students are motivated and free from emotional and psychological stress.

Acknowledgement

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