Transitioning to Online Learning during COVID-19 Pandemic: Case Study of a Pre-University Centre in Malaysia

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***Abstract*—In the last decade, online learning has grown rapidly. However, the outbreak of coronavirus (COVID-19) has caused learning institutions to embrace online learning due to the lockdown and campus closure. This paper presents an analysis of students' feedback (n=354) from the Centre of Pre-University Studies (PPPU), Universiti Malaysia Sarawak (UNIMAS), Malaysia, during the transition to fully online learning. Three phases of online surveys were conducted to measure the learners' acceptance of the migration and to identify related problems. The result shows that there is an increased positivity among the students on the vie of teaching and learning in STEM during the pandemic. It is found that online learning would not be a hindrance, but blessing towards academic excellence in the face of calamity like the COVID-19 pandemic. The suggested future research direction will be of interest to educators, academics, and researchers' community.**

***Keywords*—E-learning; STEM; coronavirus: pandemic; education technology; assessment; technology acceptance**

I. Introduction

In the last decade, online learning has expanded rapidly due to its convenience [1]. Online learning attempts to provide flexibility to study ubiquitously for both the instructors and learners [2][3], and it is without its unending challenges. However, the world is shaken with the outbreak of the Coronavirus (COVID-19) outbreak [4]. The situation has forced learning institutions to impose a temporary halt in the academic calendar. Certain level of education are in dilemma whether to abide by the enforcement or to abruptly welcome online learning [5]. The Centre of Pre-University Studies (PPPU), Universiti Malaysia Sarawak (UNIMAS), Malaysia chose to complete its academic calendar, migrating its teaching-learning to online.

Thus, the objective of this paper is to study the students' perceptions of the sudden shift to online learning in terms of participation and examination. This paper presents an analysis of the feedback from the students in PPPU. It is high time for pre-university instructors and learners to readjust their preparedness to tackle the challenges in the migration of offline to online learning. Among the essential elements that need to be addressed include instructors' and learners' readiness of the transition to online teaching and learning. This paper is structured as follows: Section II discusses the literature review. Section III presents the case study of the PPU migration to online learning. Meanwhile, Section IV explains the methodology. Section V presents the results of the survey. Next, Section V discusses the findings. Finally, Section VI summarizes the project and offers future research opportunities.

II. Literature Review

In Malaysia, the effect of the global pandemic has hampered the learning institutions during the mid-semester break of undergraduate programs and the ongoing second semester of pre-university programs [6]. To further tackle the alarming infection rate of the deadly coronavirus, the Malaysian government had issued a movement control order (MCO) [7] that fully dampen the learning institutions' operational activities. Thus, with little to no option left, learning institutions should opt to alter its course of action from the standard norms to an already seemingly positive alternative of embracing online learning. However, the change must be well planned and appropriately designed to avoid further disruptions caused by the MCO. As the situation provides, there would be ample time to prepare a good instructional design of bachelor degree programs to suit the needs of the current learning environment.

However, online learning comes with massive challenges. Firstly, the students need to have technology access as the primary indicator of the online learning readiness [8]. As students also take their learning independently, instructors may also need more time to design their content delivery effectively [9] as learners will most definitely be facing technical and adapting difficulty. Highlighting a report from UNESCO reported that over 87% of the world's student population from more than 160 countries were impacted by the lockdown [10]. In Malaysia, this unprecedented crisis has provided an opportunity to improve online education for almost 5 million school students and 1.2 million university students [11].

Due to the pandemic, particularly when all educational activities are stopped, online and web-based learning platforms have become dramatically popular. It allows universities to adapt their conventional blended-based learning during the pandemic quickly. However, the migration process onto online

learning must not be time-consuming and easy to set up. Table I shows the method for institutions with the prospect to adopt online learning [12] during the pandemic.

TABLE I. METHOD FOR THE TRANSITION FROM FACE TO ONLINE LEARNING

Function	**Method**	**Applications software**
Teaching delivery	Lectures can be pre-recorded then uploaded (offline) or streamed live (online).	*ZOOM Cloud Meeting, Youtube*
Assignments and evaluation	Students upload their quizzes or assignments online.	*Socrative, Google Docs*
Peer-interaction	Group discussions and projects are conducted online.	*Google Hangouts Meet, Microsoft Teams*
Learning resources sharing	Learning materials are shared in a digital learning environment through a learning management system (LMS)	*Blackboard, Google Classroom, Moodle Cloud*

Besides, web-based training tools have been widely used by physicians in the US as learning resources [13], and has been demonstrated to be successful. Thus, universities, colleges, and schools have resorted to online learning. Meanwhile, technology-enhanced distance learning (TEDL) [14] is linked with the 'modern teaching machines'.

However, adapting to the new normal is not a straightforward process. In response to the MCO, higher education institutions across the nation must revoke in-class teaching methods. They must execute online electronic communication platforms to facilitate teacher-student interaction. Nevertheless, this approach may be inadequate for certain field like hands-on medical [15] or technical education.

Meanwhile, a dataset involving 460 students in Vietnam reported how the students responded to the situation related to e-learning tools and skills during the nationwide school closures due to COVID-19 [16]. Meanwhile, three limitations pertaining to online learning behavior was found among students at a university in Italy during the pandemic lockdown [17]:

- Live classrooms put a lot of workload on the teaching server.
- Students who relied on 4G or lower access experienced restricted throughput.
- Some users reported poor Internet reliability due to increased traffic.

While the pandemic has shocked conventional face-to-face instruction, it has now provided learning institutions with a unique opportunity. Thus, there is a need to refurbish the existing way of delivering learning. Commonly, formal education has always depended on a traditional face-to-face approach. For example, it was reported [18] that despite the current popularity of online learning, only less than 5% of classes utilized it.

Therefore, it is the time for educational institutions to adopt disruptive learning technologies, especially during the disease outbreak, and its consequent recovery period [19]. COVID-19 has given rise to a sheer necessity of online and blended learning approaches. Blended learning is critical to distance and open education mostly during the emergence of the pandemic, as it is especially useful for teaching and learning processes in the rural areas [20]. A good example would be the State of Sarawak, Malaysia where almost half of its population lives in rural areas.

Thus, the unanticipated transition to blended learning nicely fits into the context of the COVID-19 pandemic. It is suddenly of utmost importance to education. Therefore, teachers and educators need to keep up with the evolving learning and tools theories to support learners' needs. As a result, online cloud-based platforms such as ZOOM Cloud Meeting and Google Drive are presently essential to support diverse and geographically disperse learners from all four corners of the globe. The educators' role has changed from the "sage on the stage" to "the guide on the side".

Various teaching and learning modes like media social (Facebook, Whatsapp, Telegram), live video conferences (Zoom, Microsoft Teams) as well as pre-recorded lecture videos (Youtube) were deployed. The situation has appeared as an opportunity for learners to consume and instructors to diversify via the flexibility on the delivery and timing of online learning [21]. The synchronization of online classes can help students feel a stronger sense of connection to their peers and instructors. Students would have full control and freedom [22] to complete their course learning materials at their own time from any location with Internet access.

III. THE CASE STUDY

PPPU, UNIMAS offers one-year programs, namely Foundation for Physical Sciences, Foundation for Life Sciences, and the International Foundation in Science. The programs consist of two semesters (18 weeks per semester). For the current session, there are 613 enrolled students with 63 academic and administrative staff members involved.

The COVID-19 pandemic has forced PPPU to a temporary shutdown. The teaching and learning process must be transformed into remote instruction with a learning-from-home approach. The MCO has halted the regular classes in between a running second semester (December 2019 to April 2020), which led to the transition to online learning. Since the MCO, all educational institutions were not allowed to proceed with their face to face learning activities. However, the ministry's directive declares that online educational platforms may only be used if adequate preparation has been done, and students' connectivity to the Internet is satisfactory. Hence, PPPU has launched a survey to gauge the students' accessibility to the Internet to allow for the continuance of online learning. Being the pioneering center to entirely adopt online learning within a short period, the challenges faced by PPPU's students and academicians were significant.

However, with full commitment and excellent support, this initiative has been accomplished. PPPU has gradually initiated full online delivery and online assessment beginning 1 April 2020. The university's learning management system (LMS) named eLEAP was used. This resulted in the migration of fully

online learning, involving 613 PPPU students. *eLEAP* allows lecturers and instructors to design their virtual classes and deliver their courses that include various tools to enable teaching and learning to be delivered in synchronous and asynchronous modes.

All PPPU's assessment activities in March to April were conducted online, including the final examination. Over 613 PPPU students have successfully taken their final examination (27th to 30th April 2020). The assessments were conducted through online report submission, take-home tests, and online examination via eLEAP. Other suitable assessments have also replaced the laboratory's practical assessments.

IV. Methodology

Through the time PPPU migrated towards online learning, the surveys were conducted in the first three weeks to measure the learners' acceptance of the migration and identify pressing issues. The online survey was deployed in three phases, namely, Phase 1, Phase 2, and Phase 3 (sample size: $N_1 = 557$; $N_2 = 332$; $N_3 = 354$). The survey consists of a 5-point Likert scale (1-strongly disagree, and 5-strongly agree) for statements representing students' perception of the transitioning of traditional classroom sessions to online learning mode.

V. Results

The analysis shows that the mean score of the students' responses to the statement increases over time, represented by the phases. Students tended to agree more in terms of their personal device and Internet efficiency by the third phase. Moreover, they became more participative, less anxious and were capable of performing tasks while enjoying their online learning sessions. Learners also believed that learning new knowledge and concept online is not hard. Besides, the learners understood its usefulness as the learning empower them to work with their peers.

The online learning content prepared was very interactive, and technical support was also sufficiently provided. As a result, more students felt that online learning was able to replace their face-to-face classes effectively. Statements 13 to 18 represent the score by individual course performances of the students' point of view. The result shows that all courses have an increase in their means from the second to the third phase. The learners' thoughts on online mode of examination also increased significantly over time as they trusted the instructors to prepare, then assess them fairly. This result suggests an overall improvement in the learners' online learning experience and proves that the migration and transition to online learning was a success despite the emerging circumstances. Table II shows the descriptive statistics of the students' perception of UNIMAS PPPU online learning deployment.

TABLE II. Descriptive Statistics of the Students' Perception of UNIMAS PPPU Online Learning

Statements	Mean			Std. dev.		
	Phase			Phase		
	1	2	3	1	2	3
Device efficiency in accessing online content	3.86	3.82	3.99	0.95	0.91	0.85
Internet connection efficiency in accessing online learning content	3.70	3.64	3.83	0.99	0.97	0.94
Participation in online learning content so far	4.37	4.51	4.74	0.89	0.78	0.56
I feel anxious using online learning to learn	3.50	3.56	3.31	1.03	1.00	1.00
I think I can perform instructions and assignments well in the online learning content	3.26	3.40	3.71	0.98	0.85	0.87
I find that learning via online learning is enjoyable	2.89	2.94	3.37	1.10	1.04	0.96
I believe that learning new things via online learning is easy	2.75	2.78	3.10	1.03	0.99	0.99
I think that the online learning content so far is useful for learning	3.61	3.69	3.96	0.97	0.93	0.86
I feel that online learning content enables me to work well together with my peers	2.76	2.95	3.23	1.13	1.07	1.07
The online learning content that I have participated so far is interactive	3.38	3.53	3.80	0.95	0.91	0.87
I think that there is sufficient technical support to help students access the online learning content	3.39	3.53	3.81	0.95	0.94	0.90
I feel that the online learning content provided is sufficient as a replacement for face-to-face class	3.02	3.04	3.44	1.15	1.11	1.07
Quality of online learning content: [Biology]	-	3.96	4.04	-	0.88	0.90
Quality of online learning content: [Physics]	-	3.80	4.01	-	0.84	0.84
Quality of online learning content: [Chemistry]	-	3.71	3.97	-	0.85	0.88
Quality of online learning content: [Mathematics]	-	3.54	3.73	-	0.91	0.95
Quality of online learning content: [English]	-	3.77	3.90	-	0.87	0.89
Quality of online learning content: [ICT Competency]	-	3.73	4.01	-	0.84	0.84
I think that online examination is a fair approach to replace the traditional examination considering the current situation	2.87	3.40	4.09	1.42	1.29	0.84
Overall satisfaction towards the method of online examination	-	-	4.01	-	-	0.81

The results of the analysis on clusters of students' feedbacks were obtained. This section consists of three questions regarding UNIMAS PPPU online learning. The questions are as follows:

- Reasons for students not having full participation in online learning.
- Reasons for students not agreeing with online learning.
- General comments on online learning contents.

The data collected is categorized into several equivalent factors that students have encountered.

This data was captured from students answering the first question, admitting of having less than 100% participation to the online learning sessions or activities assigned (Ph. 1, Ph. 2 and Ph. 3 are N_1 = 181, N_2 = 87 and N_3 = 56 respectively). The analysis from the students' feedback reveals four main factors of difficulties with online learning faced by students. Technical issues (Ph. 1, 38.67%; Ph. 2, 47.13%; Ph. 3, 30.36%) and self-attitude (Ph. 1, 33.15%; Ph. 2, 31.03%; Ph. 3, 58.93%) contributed as the biggest factor in the learners' absence from online learning. Most of the students confessed that technical issues such as Internet connection caused them to fail in completing online activities and assessments. Compatibility issues with operating systems, browsers or devices were also reported as technical issues by a few students. Online learning content administration and management (Ph. 1, 16.02%; Ph. 2, 11.49%; Ph. 3, 10.71%) such as unclear instructions or procedures, no notification for assignment dues and tight schedule between activities, assignments and consultations are also among the issues reported by the students. Environment distraction (Ph. 1, 3.87%; Ph. 2, 5.75%; Ph. 3, 0.00%) is the last of the four factors identified from the students' feedback.

The rest of the responses were recorded as other factors (Ph. 1, 8.29%; Ph. 2, 4.60%; Ph. 3, 0.00%) consisting of varying feedbacks such as disagreeing to online learning, unreadiness for the transition, felt that online learning is ineffective and proposing to defer the second semester to another date. Overall, Ph. 3 (self-attitude) is the biggest hurdle faced by the students, and contributed to the most significant percentage. This result suggests that learners can slowly adapt and gear themselves to embrace online learning, given the opportunity and the time. Table III shows the percentage of students who did not fully participate in the online learning content by factors and phases.

This data was collected from students who answered disagreed with the implementation of online examination (Ph. 1, Ph. 2 and Ph. 3 are N_1 = 322, N_2 = 137 and N_3 = 54 respectively). Most students expressed their disagreement due to the possibility of technical problems. Thus, they think it was an ineffective final assessment. Besides that, the attitude of students is one of the critical reasons for disagreeing with the online examination.

Surprisingly, peer attitude is considered as another primary concern for the students as they felt that it would be viable for some learners to cheat during the individual examination such as copying others or discussing the answers. But in *Ph. 3*, analysis shows that students expressed a bigger concern for themselves rather than their peers, showing their trust in the instructors to prepare a fair assessment. Course management and learner environment factors were also reported by the students; thus, making them feel the need to disagree with having online examination.

Some of the other students, however, responded with suggestions for improvement if the online examination is to be conducted. By Ph. 3, the number of respondents decreased significantly as students were exposed to a mock online examination conducted by the Mathematics course. Later, the learners applied to their first-hand experience for the actual examination. This helps students to evaluate the effectiveness and relevance of online examination. However, a few of them hoped that the online examination would be replaced with better and more effective assessments in the future. Table IV shows the percentage of students who disagreed with the online examination by factors and phases.

This data was obtained from students who answered the third question to provide general comments on the online learning transition (Ph. 1, Ph. 2 and Ph. 3 are N_1 = 246, N_2 = 83 and N_3 = 68 respectively). In this analysis, the students' feedbacks were clustered into similar factors and quantified accordingly to obtain the percentages. Positive feedback on online learning from the students (Ph. 1, 41.87%; Ph. 2, 37.35%; Ph. 3, 48.53%) slightly increases over phases. This indicates that most of the students can participate in and obtain new experiences with online learning activities and assessments despite some negative feedbacks provided which may be affected by some uncontrolled factors (Ph. 1, 20.33%; Ph. 2, 14.46%; Ph. 3, 7.35%). The good news is that the negative feedbacks display a decreasing trend.

Most of the students suggested improvements for online learning in every phase since they find that online learning is the best method for teaching and learning considering the pandemic (Ph. 1, 28.46%; Ph. 2, 34.94%; Ph. 3, 32.35%). This goes to show that the learners are well aware of their rights and responsibilities in an online learning environment. For other factors (Ph. 1, 9.35%; Ph. 2, 13.25%; Ph. 3, 11.76%), some students suggested ending the semester because they feel that they are not adequately prepared for online learning. Other than that, some feedbacks have little to no relevance with the online learning transition. Table V shows the percentage of the students' general comments on online learning by factors.

TABLE III. PERCENTAGE OF STUDENTS WHO DID NOT FULLY PARTICIPATE IN THE ONLINE LEARNING CONTENT BY FACTORS AND PHASES

Phases	**1**		**2**		**3**	
Sample (N)	181		87		56	
Respondents	*n*	%	*n*	%	*n*	%
Technical Issues	70	38.67	41	47.13	17	30.36
• Internet connection	57		32		14	
• *eLEAP*	7		5		1	
• Device	6		4		2	
Self-Attitude	60	33.15	27	31.03	33	58.93
Learning Management	29	16.02	10	11.49	6	10.71
Environment	7	3.87	5	5.75	0	0.00
Others	15	8.29	4	4.60	0	0.00

TABLE IV. PERCENTAGE OF STUDENTS WHO DISAGREED WITH THE ONLINE EXAMINATION BY FACTORS AND PHASES

Phases	**1**		**2**		**3**	
Sample (N)	322		137		54	
Respondents	*n*	%	*N*	%	*N*	%
Technical Issues	117	36.34	59	43.07	22	40.74
• Internet connection	94		57		15	
• *eLEAP*	6		0		1	
• Device	17		2		6	
Attitude	112	34.78	44	32.12	20	37.04
• Self	42		22		18	
• Peers	70		22		8	
Course Management	16	4.97	7	5.11	4	7.41
Learner Environment	18	5.59	6	4.38	0	0.00
Others	59	18.32	21	15.33	8	14.81

TABLE V. PERCENTAGE OF STUDENTS WHO WERE NOT ADEQUATELY PREPARED TO PARTICIPATE IN ONLINE LEARNING CONTENT BY FACTORS AND PHASES

Phases	**1**		**2**		**3**	
Sample (N)	246		83		68	
Respondents	*n*	%	*N*	%	*n*	%
Positive	103	41.87	31	37.35	33	48.53
Negative	50	20.33	12	14.46	5	7.35
Suggestion for improvement	70	28.46	29	34.94	22	32.35
Others	23	9.35	11	13.25	8	11.76

There is a decline in students having problems and an increase in positivity in online learning during the transition. Most of the students were shocked by the new circumstances that forced them to participate in online learning activities and assessments provided in the environment of eLEAP with zero experience, making them feel less confident and demotivated. In Ph. 2 and Ph. 3, more students became more familiar with the learning environment. Instructors were also provided with more precise procedures related to online learning.

VI. DISCUSSIONS

In overall, a planned transition to online learning is a well-thought idea of improving teaching and learning delivery. In this case, the transition is of a desperate situation. This study is geared to the reporting the students' experiences of this rare occurrences, to curb with their teaching and learning given the sink or swim circumstances. The leaders and instructors of PPPU sought as many resources as possible for the benefits of the learners. The survey deployed and the data collected was originally used to clearly identify the issues amlong learners that need to be addressed as soon as possible to support their learning process, for the completion of their study.

In this section, the major issues commonly and frequently arise among learners are reported. Below are some outlined main challenges that institutions may face when migrating to online learning in similar emergency situations like COVID-19.

A. Factors affecting Online Learning Experiences

Technical challenges in terms of both hardware and software requirements) are the most common issues when delivering teaching and learning online [23]. Neglecting the hardware requirement, students are not required to have above average computer skills [24]. Thus, technical support provided by instructors [25] is compulsory to ensure a smoother teaching and learning process.

Meanwhile, unpleasant emotion may hinder online learning [26, 27]. The feeling of anxiety includes overwhelming apprehension, worry, distress, or fear—and may worsen. Learning without an instructor's interaction makes students less comfortable. As interactivity is a key element for an excellent online learning, it produces positive learning impact [28]. Thus, interactivity is regarded as a vital element for an impactful online learning experience [29]. Moreover, teamwork also plays a huge role to increase positivity in learning experiences [30]. Teaching science and mathematics (STEM)-related subjects is hard through traditional face-to-face means [31], let alone learning new concepts online. Thus, a proper instructional design is needed to enable an appropriate migration to online learning, allowing the students to not falter in learning [32]. In addition, online learning musters the learners' lifelong learning ability [33], especially as the Internet is the biggest library for new skills and knowledge.

B. Students Participation in Online Learning

Learners' participation is crucial in determining excellent online learning results. This can be challenging when the learners may be in an anxious state due to being out of comfort zone, added with technical complexity [34]. Competency level in digital literacy may disrupt the students' motivation to be engaged online. Besides, managing self-learning time independently is also a challenge. Also, the diversity of learners must be considered to ensure active participation in online activities [35]. Besides, online learning enables students to work and study at their time and venue [36], which may lessen the cost of distance education, while tackling learners from rural and remote areas [37]. Online learning has proven to increase the activity of discussions and collaborations [38]. As a result, shyer or introvert learners can participate actively [39]. Lastly, learners' participation can be boosted by the usage of interactive tools [40] such as online forum and videos.

C. Online Examination

Many students feel uncomfortable taking examination online due to the potential of unjustified actions such as cheating [41] or discussing for individual assessment [42]. Furthermore, authentication of examination takers is a big concern [43]. In terms of question design, the preparation can be a major hassle as it can be tedious while raising fairness issues [44][45][46]. Despite the constraints, online examination improvises assessment by reducing the operational time. The management of the examination becomes flexible in terms of planning and executing with various tools [47]. The tools may be embedded with an automated marking process [48], making the students receive their feedbacks faster [49]. Additionally, online examination help institutions to reach remote students [50]. Overall, the online examination may produce an equal level of students' performance [51] and also helps to boost the students' results [52] as compared to the paper-based examination.

D. Limitations

The sudden transition to online not only shocked the students, but the instructors as well, resulting in an immense challenge of implementing it "right". Prior to the pandemic, online learning was simply a voluntary alternative. Now, policy instructors are imposed on transferring all the planned and available teaching and learning materials to the cloud, resulting in extra burden on their job [53]. Furthermore, on-the-go training is needed for a responsible instructor [54]. This is very important among instructors who are not well-versed in computer skills or ICT tools [55]. There are cases where certain instructors could not convey their 'learning style' due to flaws in implementing online learning [56]. Additionally, instructors find it difficult to gauge how much a student can take or handle [57]. By proper planning and outlining, instructors could be more well-equipped technically for a better instructional design, and learners would be well-prepared for a full teaching and learning approach via e-learning. Then, a more rigorous research measurement tool may be applied to study the impact of a comprehensive online learning.

VII. Conclusion and Future Works

In conclusion, the students' feedback from PPPU, UNIMAS, Malaysia have been presented, during the transition to full online learning through online surveys among 354 respondents. The result shows that there is an increased positivity among the students about online learning during the pandemic. Despite the challenges, online learning leads to better student participation. The present study opens up an insight into the trends on how colleges and universities react to the pandemic. Surely online learning would not be a hindrance, but a blessing towards academic excellence in the face of calamity like the COVID-19 pandemic.

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