Meeting the Challenges of Online Education during Covid-19 Pandemic: Implications for Blended Learning

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Abstract
In response to the COVID-19 pandemic, technological and administrative systems for implementing online learning, and the infrastructure that supports its access and delivery, had to be adapted quickly. While disparity in accessibility existed between urban and rural students, extensive resources had been allocated and processes developed to connect learners with course activities and materials, to facilitate communication between instructors and students, and to manage the administration of online learning. Educators needed to make way for this transition with the available technological support and their existing IT skills. Although the pandemic is over, online education still remains a viable option for continuing education in an emergency situation. Exploring the challenges faced during the Covid-19 pandemic and delving deep into the nature and the types of these challenges and their possible reasons will pave the way of translating these insights into academic practices required for laying the foundation of blended learning (BL) in higher education. Recently the University Grants Commission of Bangladesh has published a proposal for adopting BL in the higher education institutions of Bangladesh. This case study consisting of both quantitative and qualitative research, explores the challenges faced by the teachers of the University of Asia Pacific (UAP) during the online shift of education because of the pandemic. Based on the findings, a blended learning framework has been developed which can be applied in tertiary level education in Bangladesh and elsewhere.
Keywords: Blended Learning, Online Education, Teachers' Perception, Teaching Learning

Introduction

Education system is ever evolving as it needs to incorporate changes in keeping with the advancements made in the society, especially technological advancement. Educators need to come up with innovative approaches to teaching for enhancing or facilitating students' learning outcomes. Teachers need to develop or adapt teaching practices according to students' preferred learning styles that again may change with the development of technology. Technology-based education allows learners to become the center of importance, giving them greater access to knowledge resources and the autonomy to take greater control over their learning than they do in the traditional classroom. Blended learning, which is an outcome of the integration of technology in education, is defined by Graham (2006) as a combination of "face-to -face instruction with computer mediated instruction" (p.5). If used effectively, it can facilitate learning in the classrooms and outside of it. However, effective implementation of BL requires a clear guideline that will be at par with the teaching learning

context and the needs of the learners. In Bangladesh, the tertiary level academics have already had the experience of conducting classes online during the Covid 19 outbreak. However, implementation of Blended learning is quite different as it is not an emergency learning measure, rather it is a well-planned learning system that makes an effective blend of online and offline resources and teaching.

During the Covid-19 pandemic all educational activities had to be shifted online as instructed by the World Health Organization. Recent technological advancement in the field of pedagogy offered different online platforms such as, Google Classroom, Zoom, Blackboard, Coursecraft, etc., and to a large extent made this rapid transition possible. In spite of the availability of these online teaching-learning platforms, the measures adopted in most educational institutions around the globe after the Covid-19 pandemic were quite distinct from the already established online teaching programs that were in practice long before the pandemic started. The distance education mode of learning provides programs that are well-planned and mostly use uploaded materials including lectures and videos that students can use at their convenient time. But this shift to online mode is what Adedyin & Soykan (2023) termed as the 'crisis-response migration'. This practice is entirely different from the well-structured practices often called distance education or distance learning. It is a remote education that had to be adopted to continue the educational activities which otherwise would have come to a complete halt (Bozkurt and Sharma, 2020). Chiu et al. (2021) pointed out summarized the major challenges of online education faced during the Covid-19 pandemic including the following.

- Initiation and sustenance of learner and teacher motivation.
- Preparing learners for online learning, especially helping them to develop their skills in relevant technology and improving their self-efficacy.
- Creating an online environment where learners can work collaboratively and receive support from their peers (Sormunen, 2020).
- Assisting teachers' professional development so that they can apply the theories and principles for engaging learners in online education (Chiu et al., 2020; Ryan & Deci, 2020).

- Ensuring social justices and equity in terms of getting the same opportunities of technological support required for online learning (Chiu & Lim, 2020).
- Considering the psychological needs of the learners while designing online courses (Chiu, 2021)

Among the stakeholders, teachers probably had to face these challenges to a greater extent as they were asked to prepare for online classes within a very short period of time. Not all the institutions had the ability to devise a well-planned strategy for this transition. In any educational program, teachers are the center of all learning activities- they have to prepare lessons, manage the classroom environment, design or adopt materials, assess students' performance and most of all, sustain learners' motivation to take up the challenges of learning. And to carry out all these activities, teachers need appropriate communication strategies. Online teaching during the pandemic entailed running all these activities losing physical connection with the learners. Moreover, the effectiveness of the same strategy was likely to vary in the different contexts of physical and online mode of learning.

In Bangladesh, the adopted online study program was not distance learning which is mostly asynchronous that allows students flexibility in completing a course (Arshavskiy, 2013). It had been synchronous during the pandemic where instructors gave lessons in real time. Although many teachers were already computer literate, they received a little or no training to create a positive learning environment through online teaching. One of the major challenges for the teachers was to sustain a positive attitude and motivation to move themselves from heavy reliance on the physical mode of classes to the completely new mode without any proper training. This unprecedented shift to online learning received doubts as well as positive criticisms. Kuama & Intharaksa (2016) pointed out two areas of future research including problems related to technology and the individual problems that learners face in online education. Simamora (2020) stated that stakeholders need to find solutions to these problems as this will lead to greater satisfaction with the online learning and enhance students' motivation.

UNESCO (2020), for example, stated that this online teaching is a favorable learning opportunity for the learners and instructors to improve their strengths, creativity and innovation in teaching and learning. After the pandemic, many institutions have opted for blended learning where face-to face learning is integrated with online learning. The University grants Commission (UGC) of Bangladesh has made a plan on the basis of the suggestions made by the Strategic Plan for Higher Education (SPHE). The SPHE emphasized on creating an advanced e-learning environment given the advancement of ICT-based pedagogy.

However, purely online learning, which was adopted during the pandemic, and BL share some fundamental differences and should be investigated 'in its own right' (Hockly, 2018, p. 97). Understanding the nature of BL is important to use it in its full potential. Under the current status of maintaining the continuity of academic semesters, the burning issue is if the opportunity of online education should be kept as a strategic option in its full potential to address COVID or related types of crises such as power crisis, political unrest, space constraint, traffic congestion, pollution, digitalized upgradation and global immersion. Moreover, the online mode will allow the educational institutions to avail the lectures or instructions from the local and international experts residing in foreign countries. This is why, it has become increasingly compelling to investigate the future implications of online education, more specifically the blended mode throughout the country. The faculty members of the University of Asia Pacific (UAP) which shifted to the online mode during the pandemic, went through the experience of conducting online classes with little training. This study investigated the faculty members' perception of online education after around two years of experience of online teaching. Based on their perception, an interview was conducted regarding the challenges they encountered and the measures they took to overcome them. The results of the study will be used to find out implications for future online studies, specifically the adoption of blended form of teaching that the government of Bangladesh has recently been emphasizing in the context of tertiary level of education.

Objectives

Considering the future prospect of online education, this paper aims to fulfil the following specific objectives:
• Investigating teachers' perception of online education and the challenges it poses;
• Investigating the teachers' strategies for solving the challenges of online education in the context of COVID 19 pandemic; and
• Based on the findings, formulating a Blended Learning (BL) framework to be applied in tertiary level education in future.

Methodology
Demographic Information

The study was conducted on 143 faculty members of University of Asia Pacific who belonged to the Departments of Architecture (Arch), Business Administration (BA), Civil Engineering (CE), Computer Science and Engineering (CSE), Electrical and Electronic Engineering (EEE), English (Eng), Law and Human rights (LHR) and Pharmacy (Pharm). Table 1 shows the participation of faculty members from different departments in the intended study. The participants were selected on a random basis and their teaching experience ranged from 1 year – 25 years.

Table 1 Department-Wise Participation of Numbers and Percentages of Students in the Online Feedback Survey

	Arch	BA	BSH	CE	CSE	EEE	Eng	LHR	Pharm
Number of faculty members participated	14	11	6	20	17	18	15	10	22
Percentage of Total faculty members that participated	82%	65%	60%	74%	81%	90%	79%	77%	81%

The study was conducted in two phases including problem identification and problem solution.

Problem Identification

Phase I was conducted by quantitative data analysis based on responses of survey questions designed to address the perception, preparedness, interaction, resources and mode of teaching factors. A questionnaire was developed accordingly and the research was carried out by distributing the questionnaire to the faculty members.

Validity and reliability of the questionnaire for different departments of the multiple-question Likert-scale surveys was assessed using Cronbach's alpha tests (Cronbach, 1951). The survey questionnaire conceptualized for the faculty members consisted of the following categories:
- Perception on online education
- Preparedness for teaching in the online mode
- Interaction with students
- Available online teaching platforms and resources
- Way forward: Blended learning

Problem Solution

In order to investigate the nature of the problems and solutions to the challenges, interview questions were formulated. Twenty faculty members were interviewed based on their experience with online education at UAP. The interview questions were open ended focusing on the challenges they faced in the online teaching/learning process and the measures they took to mitigate the challenges. The questions focused on the following aspects:
- Student motivation and engagement
- Nature/Type of blended learning
- Setbacks of implementing blended learning
- Teachers' training and skill development

Rather than recording the interview sessions, teachers were provided with the questions in hard copies to allow them to think before responding. This also allowed the researchers to analyze the responses better as tape recordings sometimes are not audible.

Data Analysis

Responses of quantitative survey were analyzed following the process mentioned below:
- The survey questionnaire was formulated in Google Form with multiple queries under the mentioned categories which teachers were asked to fill in individually.
- The survey was conducted separately for each department to collect responses from the faculty members for the respective departments.
- Cronbach's alpha coefficient is used for internal consistency reliability and is considered the basis while describing the internal consistency reliability of any Likert-type item of the questionnaire (Gliem & Gliem, 2003). Pallant (2020) states that Cronbach's alpha values should exceed 0.7 in order to pass the reliability test. However, Mohtar provided guidelines stating that the range of reliability measurements falls between minimally acceptable (0.6 or higher) to excellent (0.9 or higher). The Cronbach's alpha for assessed departments ranged from 0.646 to 0.991 for the subscales, indicating substantial to excellent internal consistency of the survey questionnaire.
- Feedback or responses that were collected from the survey were documented and analysed in excel file and were later summarized in the light of expected outcomes and the anomalies observed.
- Outputs were analysed separately for each department and were also analysed averaging the overall outputs across the departments to obtain a bigger picture.
- Qualitative comments or inputs were summarized in categories based on the nature of the suggestions.

Results and Discussions
Findings on the Quantitative Survey
Overview of the Perception of the Faculty Members

Figures 1 to 5 show the overall opinions of faculty members across UAP.

Figure 1 demonstrates the overall perception of faculty members regarding online education. Faculty members mostly agreed (>50%) regarding supportiveness of administration of UAP and the awareness about online education system. Significant number of faculty members opined with some level of neutrality that institutions in Bangladesh are not

well equipped with adequate infrastructural support for online education. Neutrality and mixed opinions were prominent on the perception of the validity of the online degrees.
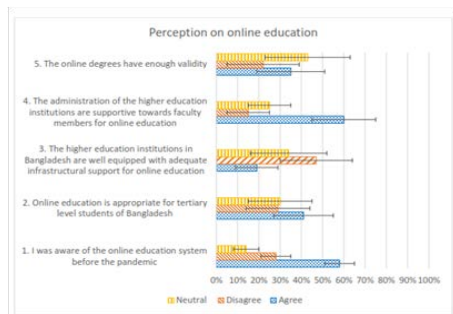
Figure 1 Overall Perception of Faculty Members on Online Education (Error Bars Represent Standard Deviations)

Figure 2 shows how the teachers were aligned with their preparedness for teaching in the online mode. Maximum agreement across UAP (>60%) was obtained regarding the comfortability with the devices for online teaching, teaching without significant technological issues and adequacy of training before starting the online classes. Without major level of agreement (>40%), neutrality was prominent regarding getting adequate trouble shooting support and opportunities for continuous professional development on digital literacy.
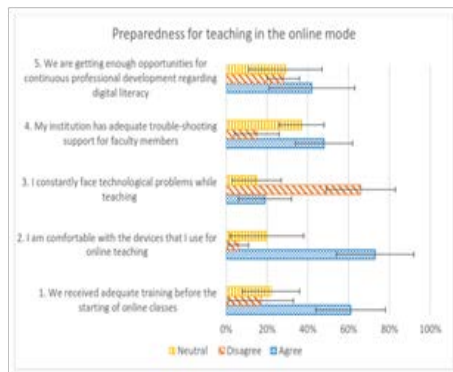
Figure 2 Overall Preparedness of Faculty Members for Teaching in the Online Mode (Error Bars Represent Standard Deviations)

Figure 3 represents the faculty experience across UAP on interaction with the students. General agreement (>50%) was obtained regarding

supportiveness of students for the transition towards the online mode mostly without disruptive behavior. Neutrality was notable on student engagement and effective assessment. Division in opinion and neutrality were obtained regarding responsiveness of students.
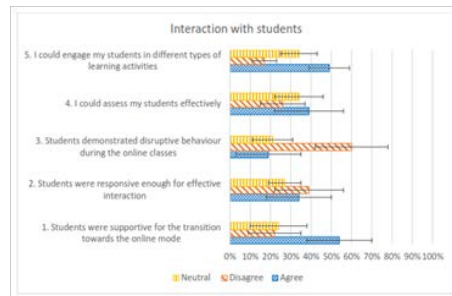
Figure 3 Overall Perception of Faculty Members on Interaction with Students (Error Bars Represent Standard Deviations)

Figure 4 demonstrates overall opinion of faculty members at UAP regarding the available online teaching platform and resources. Agreements were prominent on smooth and easy sharing of online resources (>80%), systematic feedback provision on performance (>60%) and well-designed platforms for effective teaching (>50%). Mixed opinions and neutrality were common on satisfaction with platform features and detection mechanism of plagiarism and unfair means.
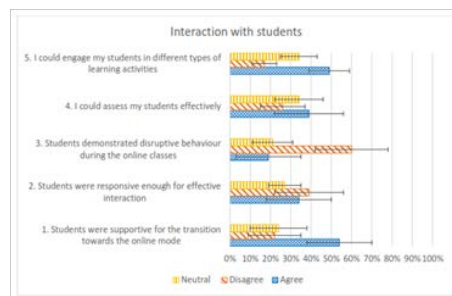
Figure 4 Overall Perception of Faculty Members on Available Online Teaching Platform and Resources (Error Bars Represent Standard Deviations)

Figure 5 demonstrates faculty members' perceptions across UAP on the modes to be undertaken in future. Agreement was obtained mostly regarding cost effectiveness of the online mode

(>50%), possibility of adopting blended learning for future (>60%) and LMS platforms with additional assessment features (>80%) while notable many also opined to return to physical mode (>40%). Neutrality was obtained on the readiness to implement blended learning and the option to return to physical mode as before.
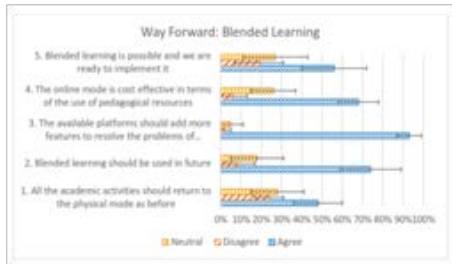
Figure 5 Overall Perception of Faculty Members on Blended Learning (Error Bars Represent Standard Deviations)

Areas of Agreement Across Departments

Faculty members across departments expressed general agreement and consistencies on very few factors with <8-10% standard deviation on the following factors:

- Faculty members were mostly aware of the online education system.
- Agreement and neutrality were observed on the perception of engaging the students in learning activities online.
- Faculty members agreed on accessibility of online resources and LMSs; however, they expressed the requirement for adequate features for assessment.

Areas of Disagreement Across Departments

Variation was pretty high among the faculty members regarding most of the factors with standard deviations >10 -15%. Certain factors are mentioned below:

Faculty opinions deviated regarding appropriateness of online education in tertiary level of education in Bangladesh, well-equipped infrastructural support for the institutions, administrative support and validity of online degrees.

Deviation in opinion was considerable (>18%) among teachers regarding the comfortability of the devices used for online teaching, opportunities for continuous professional development and facing technological problems. There were deviations (>10%) also regarding adequate training and troubleshooting support.

Variations among the teachers' opinions were significant (>10 – 15%) regarding students' support for online transition, responsiveness and disruptive behavior from students and student assessment.

Deviations were notable (>10 – 15%) regarding adequacy of available platforms for effective teaching, systematic exchange of performance feedback and means to detect plagiarism and unfair means.

Deviations were common and significant (>10 – 15%) regarding returning to physical activities as before, blended learning for future, the cost effectiveness of the online mode and the readiness for the blended learning approach.

Findings on Qualitative Survey

The narrative discussion of this section will be divided into four broad categories keeping in mind the relevance of the questions asked on similar issues. The outcomes are presented in open coding tables for respective categories.

Motivation and Engagement

Table 2 summarizes the findings that addressed the issues of students' motivation and engagement and the strategies required to manage students' distraction:

Table 2 Open Coding Tables Summarizing Student Motivation and Engagement Issues

Open code	Properties	Examples of Participants' Comments
Motivation	Motivation will help to meet the challenges faced in the teaching learning environment including:	
	a. Handling emergency situation for example an outbreak, power shortage, political crisis and any other unavoidable circumstances.	"In case of political turmoil, learning will not be interrupted; effective and timely communication can be ensured through e-learning platforms, etc."
	b. Reducing traffic jam and air pollution.	"Blended learning allows students to learn without coming to the campus, thus increasing learner's freedom in learning from his own environment."
		"Highly motivating as traffic is a big issue for both parties."
	2. Motivation will depend on various factors such as:	
	a. A balanced ratio of online and offline mode.	"I think if online teaching is more than 25% of the total contact hours in a course, then there is a risk that students will lose interest and motivation to learn."
	b. Availability of logistic support	"Motivation will depend on both the technological support and how the instructors use the blended learning."
	c. Types of learners	"Introvert learners might find online motivating whereas the extrovert ones are likely to prefer the campus mode or the offline mode as they get reinforced by the campus."
	d. Class size	"Interactive online classes with a very large group of students will be quite challenging."
Student engagement, participation and distraction management	1. Use of appropriate Learning Management Systems (LMS)	"To engage the students, proper LMS should be used having necessary online tools to make the delivery attractive and engaging."
	2. Frequent Q & A sessions	"To engage students, classes should be interactive. Students should be asked questions after the lessons and class performance should be evaluated."
	3. Breaking down complicated tasks into several simpler tasks	"Teachers should incorporate short and simple tasks quite frequently. The tasks should not be very challenging. Challenging tasks can be segmented into several easy tasks that learners find easy to handle online."
	4. Use of live/online tasks	"Interactive teaching (with more pictures and videos) and oral-examinations would be the best way to engage the students. To avoid distraction, they should be asked to keep videos on during the classes."
	5. Assessment through surprise quizzes	"The best way to engage students in online classes is through conducting sudden online quizzes and online class assessment. A few minutes' break would definitely prevent the distraction."
	6. Mixed level classes	"In mixed level classes, students can be divided into different groups based on their competence levels and can be assigned different activities creating different classrooms using an LMS such as Google classroom."

Nature and Type of Blended Learning

Table 3 summarizes the form and frequency of blended learning, effects of assessment and validity issues.

**Table 3 Summarizes the Form and Frequency of Blended Learning,
Effects of Assessment and Validity Issues**

Open code	Properties	Examples of participants' words
Form and frequency of blended learning	1. A combination of online and offline modes depending on needs analysis.	"In origin, any learning method should be need-based, thus BL should be adopted if and when the topic requires it. Lesson plan of each week may not contain topics that require blended method."
		"In my opinion, it should definitely be need based to begin with. If necessary, this can be transformed to weekly basis or other periodic forms. It can be mentioned here that the 'original' online teaching also started as need based (i.e. COVID-19), but soon became weekly (e.g. classes) or daily or monthly (e.g. meetings) based."
	2. Careful planning of courses.	"All courses (course contents) are not suitable for blended learning so careful planning is needed."
	3. Ratio of online and offline classes based on course content.	"50% offline and 50% online courses for each theoretical course per week could be used while online should be avoided for sessional courses which must be instructed in the laboratories or classrooms."
Effects of assessment on blended learning	1. Blended Learning (BL) approach should be adopted differently keeping in mind that BL is fundamentally different from a traditional approach	"The teaching learning process in online classes needs to be different from physical classes."
	2. Students get more opportunities to use the unfair means if they are assessed online	"If online assessment is taken, it becomes quite difficult for teachers to detect if students are using any unfair means."
		"Students should be compelled to turn on the videos during online assessment. The reason is very obvious as it allows the teachers to monitor the students."
		"Tracking student activities in the online mode is challenging and thus assessment will be questionable."
	3. Preferred mode of assessment depending on individual skills and needs	"Assessment in any form should be done in the face-to-face mode."
		"Assessment will not necessarily get affected as it completely depends on how an individual teacher is using the blended method, on the specific topics for which online classes are used and if proper LMS and assessment techniques are used."
Visibility in online classes	1. Students should be asked to turn on their videos from time to time	"Turning on videos should be compulsory to monitor whether students are actually attending the classes."
		"…for checking attendance throughout the class, for distraction management, for making lively interactions, for bridging the gaps between the teachers and the learners and for holding their attention."

Validity of degree		"BL will not affect the validity. If teaching learning methods are properly designed to incorporate BL, then it should not have any effect on the validity of the degree."
		"Assessment will be affected. Keeping track of both the offline and online assessments and combining the marks may be difficult."
		"Attitude towards blended learning will also affect the validity as the online classes should be incorporated to get the most out of the blended learning and not just simply conducting classes online."

Setbacks of Implementing BL

Table 4 summarizes the setbacks related with BL such as logistic support from the management, network connectivity, space, other environmental issues, electricity, devices etc.

Table 4 Open Coding Tables for Setbacks of Blended Learning

Open code	Properties	Examples of participants' words
Setbacks	1. Inadequate network support	"In Dhaka, network coverage is adequate, but the case is not the same elsewhere."
		"All students do not have access to Wi Fi and the data connection is not so stable everywhere."
		"Existing network coverage may be adequate for most teachers and some students (particularly living in Dhaka), but with large percentage of students living with cellphones (no computer), frequent power outage and inadequate internet facilities, it will take time for the network coverage to become adequate."
	2. Financial strength/logistic support is required for satisfactory administrative support	"Government should ensure free and uninterrupted internet connections and required electronic devices for students and teachers."
		"If the administration is convinced about its benefits for students, it is expected that they would provide necessary support."
		"Not all administrations have sufficient resources to provide enough logistic support."
		"Major impediments for teachers are that they do not have sufficient training, and logistic support to conduct blended learning. Institutes and administration and overall educational environment in Bangladesh are still not equipped enough to adopt BL. Attitude of the administration towards teaching load of the faculty members also put some obstacles."
	3. Adjustment of office hour and teaching load	"Office hour and teaching load of the faculty members need to be readjusted for BL. Necessary training needs to be given for effective use of BL. However, students may exploit online system if it is not properly handled."
	4. Organizing proper training sessions	"Major impediments for teachers are that they do not have sufficient training and logistic support to conduct BL."
		Proper training sessions must be introduced to address the challenges especially regarding students' lack of attention or engagement.
	5. Lack of social interactions	Students will miss their campus. Lots of students come to university only to enjoy campus environment.

Setbacks	6. Lack of teachers' motivation due to the stressful nature of BL	"Online teaching is a time-consuming task and teachers' teaching load should be reduced proportionately. Otherwise, teachers will lose motivation as quality online teaching requires more efforts, concentration and time."
	7. Physical and mental effects	"Poor network connection, physical and mental effects of prolonged digital screen exposure and lack of interaction with students can make the teachers tired and frustrated to conduct their classes or other academic activities."
		"BL should not have any adverse impacts on faculty members. However, 100% online classes would impose severe psychological impacts and health issues."
		"Both teachers and students should be more aware of eye problems due to extended exposure to computer screen."

Teachers' Training and Skill Development

Table 5 Summarizes the Needs for Skill Development for the Faculty

Open code	Properties	Examples of participants' words
Teachers' training and skill development	1. Training sessions on online specific assessments	"Teachers should attend training sessions on online specific assessments."
	2. Development of online based tasks that are engaging	"Teachers should know how to prepare online specific questions, online resources management and development of relevant tasks for the online activities."
	3. Technical pedagogical training	"Technical and pedagogical training related to e learning."
		"Training of faculty members needs to be focused on using effective LMSs, online tools and addressing outcomes in the BL process."

UAP Framework of Blended Learning

A framework on blended learning has already been referred by UGC (UGC, 2021) which was originally developed by Khan (2005). This widely used octagonal framework includes eight dimensions of blended learning including institutional, pedagogical, technological, interface design, evaluation, management, resource support and ethical consideration. However, adoption of any framework that has not been contextualized is quite risky as it may or may not include all the relevant dimensions and their interrelationships. For this reason, this study will develop a framework based on the findings of the surveys discussed in the earlier sections. Moreover, it will relate the dimensions and show how they are relations are bidirectional.

Since the current framework is based on the case study of UAP, henceforward it will be termed the UAP BL framework. The framework involves the factors such as student motivation and engagement; selection of an appropriate type of blended learning; teachers' training and skill development leading

to the relevant sub factors. The framework also depicts the setbacks that have been experienced. The overall framework provides an understanding on the different components of blended learning along with the challenges that would be mitigated from the components in return.
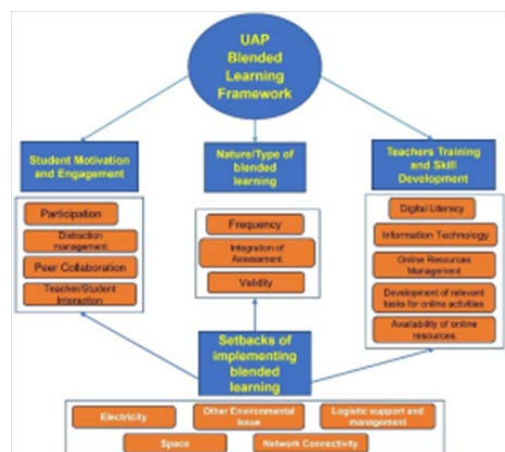

Figure UAP BL Framework

Conclusions

The study involved the online teaching experience of the faculty members of the University of Asia Pacific in an attempt to develop a BL framework for future implementation. Certain limitations of the study include lack of involvement of all stakeholders since the study was purely teaching/learning focused, lack of focus on affective and ethical issues. The framework is based solely on this case study on UAP and hence it does not address the other issues that might exist in other higher education institutions in Bangladesh. The framework can be applied in other tertiary level institutions in Bangladesh or elsewhere with similar context. Further research should focus on a broader context possibly involving several universities of Bangladesh to check its validity and reliability.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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