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Determinants of Online Education Satisfaction: A Peri-COVID Study

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Abstract
Impact of COVID-19 has drastically affected the education sector, forcing universities to take alternative measures to continue educational activities. Without any prior action plan, universities had to implement online educational tools to continue programs, as a damage control plan. Given the ad hoc nature, it is important to understand if satisfactory education is being provided via the online medium, determine the predictors of online education satisfaction, and identify areas of improvement. This study, conducted on the students at Bangladesh University of Professionals during the COVID-19 pandemic reveals that students feel a lack of interaction in online classes. While online classes establish a better class life balance, students' perception of their learnings as well as overall satisfaction is neutral. Analyzing the Partial Least Square Based Structural Equation Model revealed that perceived learning is a statistically significant construct that has a strong effect on overall satisfaction. Thus, universities may concentrate their efforts towards this direction, so that students can vouch for their learning. Universities may equip their faculty members with tablet computers to eliminate the gap of interaction and learning that is created due to the lack of white/black boards in an online classroom. This would allow a more natural and spontaneous way of interaction. Collaborative writing board and brainstorming apps may further enhance 'learning by doing'. Teachers should also utilize the benefits of online media to introduce learning materials, examples, and new interaction opportunities. Such actions may allow students to cope better with the new normal and improve overall satisfaction.

Keywords: Online Education, Perceived Learning, Class-life Balance, Online Class Interaction, Satisfaction, COVID-19

Introduction

Impact of COVID-19 pandemic has resulted in restriction of a lot of basic activities. The sudden implications resulted in requiring to take an alternative approach to continue human activities. Education sector has been severely affected, especially given the ban on social gatherings. Schools and Colleges have been shut indefinitely, and exams have been postponed. A lot of universities halted classes, enrollment, and exams. Finance Minister AHM Mustafa Kamal, in his budget speech, pointed out that 40 million students are unable to continue regular academic curriculums across Bangladesh (Tariq & Fami, 2020) [17]. Government of Bangladesh initially announced general holiday as a measure for the pandemic on March 26, 2020 and restricted movement of people, vehicles and gatherings. Educational institutions were also closed down. Despite such, few universities established alternative ways of conducting educational activities, including taking online classes, online exams etc. as a damage control policy. But access to sound internet connection, proper equipment and costs associated with such are also issues which can restrict a lot of students from accessing online learning platforms properly. Online education is also a very new way of teaching in Bangladesh, for which most students and faculties are not accustomed to using the platforms that are used for the purpose. They lack the technical know-hows required to use the tools and diagnose problems if faced with such. While the general holiday has ended and other regular activities have resumed, educational institutions remain closed as of the time of writing this paper. Given the circumstances, delivering education through online platforms still remains to be the only widescale option. Bangladesh University of Professionals (BUP) is the first public university to implement online learning platforms as a tool to continue teaching and learning activities, as well as enrollment of new students in the post pandemic era. BUP currently uses a combination of online communications platforms to conduct online classes and take online exams as an alternative to physical classes and in-person exams. *Without any pre-planned and prepared platform to provide online education, a discrepancy is to be expected in comparison to physical classes.* BUP currently takes live classes via Zoom

Meetings app and share course materials through Google Classroom, Facebook Groups and UCAM – BUP's own teacher and student academic management platform. Some faculties also use Google Hangout, Facebook Messenger for communication and material sharing with students, in addition or as replacement of the above. Question arises, if the university is able to deliver similar quality education and satisfaction through the use of these online – alternative platforms. *Are students receiving proper education via online platform? Are they satisfied with the learning experience via online platforms?* As there is no previous measurement of effectiveness of teaching and students learning satisfaction in regular (physical) environment at BUP, we are not going to conduct a comparative analysis of online education vs physical education delivered by BUP. Instead, the purpose of the research is to determine if BUP is providing satisfactory education through online platforms, which act as a replacement to its regular platform. The objective of the research is to identify and assess:

1. The determinants of overall satisfaction of students regarding online education.
2. Areas of improvement to improve satisfaction.

We want to determine if *Online Class Interaction, Class-Life Balance* and *Perceived Learning* are significant predictors of *Overall Satisfaction*. Using this, we will measure where BUP lags in terms of providing online education, so more focus can be brought to improving those areas.

Literature Review

Online learning has shown significant growth over the last decade. There are numerous online learning platforms in the market such as Udemy, Coursera, Lynda, Skillshare, Udacity that serve millions of people…. Top tier universities are also democratizing the learning by making courses accessible via online (Koksal, 2020) [11]. Even before the pandemic online education market was expected to boom. Research and Markets forecasted that Online Education Market would reach US$ 350 Billion by 2025, globally due to the introduction of flexible learning technologies in the corporate and education sectors (Research and Markets Ltd., 2019) [14]. As a result of the COVID-19 pandemic, it became difficult for schools and educational institutions to continue educational activities in the traditional way which has resulted in online education becoming the preferred way to continue learning. For instance, countries that were the first to be heavily impacted by the virus, such as China, South Korea, Italy, and Iran, have already shifted to temporary homeschooling via online educational tools and platforms (Tam & El-Azar, 2020) [16]. It is also expected that this sudden shift in how education is delivered is going to widen the equality gap as people fail to afford to adopt to this change. For countries like Bangladesh, it is a bigger problem given the socio-economic status. A quick survey done by The Business Standard revealed that only 23% of the students were in favor of taking online classes in this situation. Among the participating student 34% are currently located in a rural area and 66% in an urban location (Islam *et al*., 2020) [9]. "*The underlying fact of this strong dissent becomes clear when we found only 55.3% of the students have access to a laptop, PC, or a tablet to attend an online class. It shows us 44.7% of the students cannot attend online classes due to lack of logistics. The most important factor for online classes is internet connectivity and our survey revealed that 55% of the students are not supported by proper internet connections at this moment to continue with online education. We found that 40% of the students are already attending online classes, among whom the majority (70%) are from private universities"* - (Islam *et al*., 2020) [9]. Despite such, universities are initiating online education as a damage control policy to continue education. Online education at BUP is mainly conducted via social media and video conferencing tools. Online classes are taken using video conferencing apps like Zoom and Google Hangout while post-class communications are done through social media like Facebook and Facebook Messenger. Faculties also use Google Classroom and UCAM, BUPs' own platform for student affairs management; though UCAM is rarely used as an online class platform.

It is important to note that lots of studies have been conducted to evaluate different aspects of online learning. Most studies regarding online education assess the effectiveness, experience and satisfaction of such approach. But. In most cases, the participants are self-taught who voluntarily choose to take online classes as an alternative learning method. The major driving force for this popularity is the development of new markets of nontraditional students, especially working adults (Confessore, 1999, pp. 26-28) [4], who are geographically distant from the source but seek time and location flexibility for their education. Many research have been conducted regarding the interactivity, access to proper tools, advantages and disadvantages of online education. These issues form the basis of measuring satisfaction of online education. One approach to understanding student satisfaction is to study students' evaluations of the course and their attitudes toward the course (Ellram & Easton, 1999, p. 17) [6]. Perhaps one of the most important aspect that may be considered for satisfactory online education is the level of interactivity in an online learning environment. Many educators believe that interactivity is a vital element in the educational process. Are computer-based interactions good enough? Are they better than traditional classroom interaction, or are they best as complementary? Critics usually stress that interactivity is the missing element or ingredient in distance education because online classes lack traditional face-to-face interactions. Students are able to not only interact with instructors, but also with other students in a traditional environment. If an instructor's goal were simply to replicate the classroom learning environment on the Internet, it would be difficult according to media richness (Daft & Lengel, 1984). However, proponents state that interactivity in distance education is just as good as, or even better than, the traditional classroom, and recent research suggests that it is a highly significant predictor of online course outcomes (Arbaugh, 2005, p. 144) [1]. Internet communication in an online environment is mostly based on verbal input. Though for our case, classes are conducted via video communication platforms. Therefore, non-verbal communication is also possible in online classes. Still, due to the limitations of technology, it is not possible to convey full range of non-verbal cues like it is possible in traditional classrooms. More importantly, video and voice communication is less fluid than regular face to face conversations. Mason (1991) studied interactivity in a distance education class at the Open University in Great Britain and found that teachers played a major role in directing the online discussions. Instructors influenced the discussion process by encouraging

new topics, sharing new material, and redirecting the conversation patterns. The project did find that student interactions were fostering learning by integrating personal experience into class discussions and by gaining insights from other students. Yet only one third of the students actively engaged in providing and receiving online feedback. The study raised additional concerns that student interactions did not promote critical thinking opportunities to seriously examine course themes. In traditional teaching platforms in Bangladesh, students can interact with teachers and themselves in campus. Online only interaction limits this only to social media and video conferencing tools. One other important part of interaction is students' interaction with study materials and content. In some studies, adequate opportunity to participate in online discussions has been associated with increased satisfaction with online courses and discussion forums, particularly when courses use smaller groups within the course to facilitate discussion (Jonassen *et al*., 1995, p. 13) [10]. Even in traditional group-based classroom environments, the majority of a student's learning time is spent independently, outside of class; the standard expectation is 2 to 3 hours of study outside of class for every 1 spent in class. There is an even greater myth that students in conventional institutions are engaged for the greater part of their time in meaningful, face-to-face interaction. The fact is that for both conventional and distance education students, by far the largest part of their studying is done alone, interacting with textbooks or other learning materials. (Twigg, 2000, p. 1) [18]. Online education being received at a place other than an education institution may likely affect student's satisfaction level. Convenience and flexibility often are acclaimed as the distinctive and most valuable features of Web courses (Arbaugh & Duray, 2001) [2]. Online based education allows student to save commuting time, arrange better work schedules, and spend more time in other activities; which can lead to more satisfaction and a preference for online education. Student's demographic characteristics like age, gender, GPA have provided little predictive power in terms of determining preference for online education (Parnell & Carraher, 2003, p. 432) [13], though the discussion is still open.

The current scenario therefore challenges the conventional course interaction, class-life balance and perceived learning of students. Regular students have not chosen to adopt online education on their own, but had to adopt to it to continue learning as traditional system is currently not accessible. This paper will explore if, given the circumstances, online education satisfaction is influenced by such variables to ultimately measure if online classes at BUP are satisfactory. The study will not consider personal characteristics variables, instructor-behavior variables because the courses are being taught by the same instruction and the students are the same students who enrolled in the traditional program. BUP therefore cannot influence such characteristics to improve satisfaction even if such were related. By eliminating the above considerations, we will be able to construct a model which will only explore variables that BUP can influence to increase satisfaction. Primarily we will determine, if such variables can predict overall satisfaction and how much it can explain the variances of overall satisfaction, all in the context of Online Classes at BUP only.

Materials and Methods

The key analysis tool used was, Partial Least Square Based Structural Equation Model (PLS-SEM). Target population of the study are the student of BUP. Data was collected through an online questionnaire where participants had to respond to 34 questions posed as statements through the 7-point Likert Scale, where 1 is Strongly Disagree and 7 is Strongly Agree. The questionnaire was adopted from the paper *"A Structural Equation Model of Predictors for Effective Online Learning"* by Marks *et al*., 2005 [12]. Minor modifications were made to the questionnaire to apply it to the context of our study, including eliminating questions regarding online education as an option along with physical classes and incorporation of class-life balance instead of work-life balance/flexibility. Unlike the above-mentioned paper, instructor behavior was excluded as students do not have any control over choosing their instructor. The indicator questions were formed as a 7-point Likert scale. We measured *Online Class Interaction* through indicator variables relating to instructor-student, student-student and student-content interaction. Participants were asked 15 questions that relate to each of the above components and together reflect level of *Online Class Interaction*.

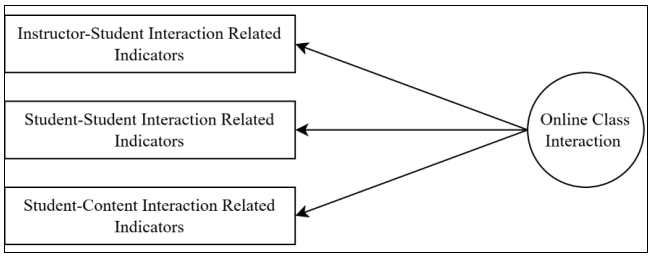

Fig 1: Reflective Measurement Model – Online Class Interaction

Similarly, *Class-Life Balance* was initially measured through 6 indicator variables related to class-life compromises, online platform advantages and disadvantages, and accessibility of online education. *Perceived Learning* was initially measured through 8 relevant indicator variables.

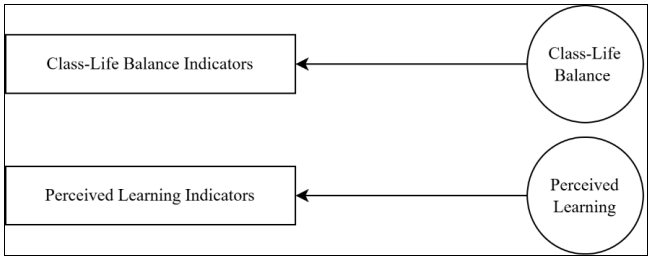

Fig 2: Reflective Measurement Model of Class-Life Balance and Perceived Learning

For *Online Class Interaction*, *Reflective Measurement Model* was used, as Formative Measurement Model requires comprehensive set of indicators that cover all aspects of the construct, which requires robust theoretical understanding and an extensive literature review, even after which it is often difficult for social science constructs. Therefore, the *Reflective Measurement Model* approach was taken for *Online Class Interaction*, *Perceived Learning,* and *Class-Life Balance* constructs.

Overall Satisfaction was measured through one global variable – *Overall Satisfaction and* 4 satisfaction related statements, and is a *Formative Measurement Model*. The global variable is measured as the direct response from the participants against the statement *"I was very satisfied with online classes at BUP"*. We will determine if the above 3 constructs can explain and predict *Overall Satisfaction*.

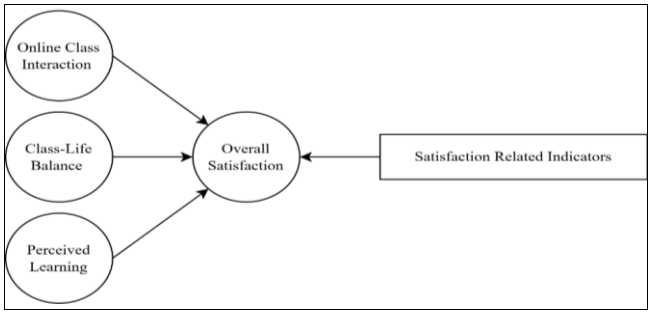

Fig 3: Structural Model of Overall Satisfaction

The final *Structural Equation Model* can be used to explain and predict *Overall Satisfaction* score. It will identify the effect of the other 3 constructs and how much these can explain the *Overall Satisfaction* score. Thus, *Online Class Interaction, Class-Life Balance,* and *Perceived Learning* are exogenous latent variables, and *Overall Satisfaction* is an endogenous latent variable, which is dependent on the other exogenous latent variables.
The study therefore hypothesizes the following:

Table 1: Hypotheses of the Study

Hypothesis	H
Online Class Interaction has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H1
Class-Life Balance has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H2
Perceived Learning has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H3

Thus, The *Overall Satisfaction* equation is:

$$Overall\ Satisfaction = b_1 * Online\ Class\ Interaction + b_2 * Class\ Life\ Balance + b_3 * Perceived\ Learning$$

Here, b_i is the *Path Coefficient* for each exogenous construct which are measured as *Reflective Measurement Models*. The following indicators were considered, of which some were excluded from the final model based on the results of the PLS-SEM analysis.

Table 2: List of Indicators

Indicators	Construct	Measurement Model
I1 to I15	Online Class Interaction	Reflective
C1 to C6	Class-Life Balance	Reflective
L1 to L8	Perceived Learning	Reflective
S1 to S4	Overall Satisfaction_F	Formative
S5	Overall Satisfaction_R	Redundancy Analysis

This model can be used to prioritize importance of different aspects of online classes at BUP and course of action can be suggested and prioritized to improve satisfaction level. Sample size for the study is 31. Questionnaire was sent to students of Department of Accounting & Information Systems at BUP via central social media group of the department. The survey covered students from the second year to fourth year, as well as MBA students, who recently graduated from the bachelors' program of the same department. The sample size meets the rule of thumb which states that the sample size should be at least 10 times the maximum number of structural paths pointing at a single construct. In our model, Overall Satisfaction has 3 incoming paths, thus requiring 3x10=30 sample size.
PLS-SEM was analyzed using PLS algorithm (path weighting scheme) of SmartPLS 4 and its Bootstrapping option (5000 subsamples, complete, 2-tailed, sig 0.05). The formative measurement model was evaluated using the result of convergent validity (redundancy analysis), collinearity between indicators, significance and relevance of outer weights, and outer loading, after which statistically insignificant indicators were removed to construct the final model. The reflective measurement models were evaluated using indicator reliability (outer loadings), internal consistency reliability, convergent validity, and discriminant validity; and indicators failing to meet the requirements were removed. The structural model was evaluated from the results of the PLS Algorithm, Bootstrapping, considering Collinearity between Constructs, Coefficient of Determination (R^2), Path Coefficients, Statistical Significance of Path Coefficients, Effect Size (f^2), and Predictive power of the structural model was evaluated using PLSpredict (10-fold cross validation) through Predictive Relevance (Q^2) and comparing RMSE and MAE of the PLS model and the Linear Model.

Results and Discussion

Descriptive Statistics

Table 3: Descriptive Statistics of Indicators

Statement (1=Strongly Disagree, 7=Strongly Agree)	Indicator	Mode
Classroom dynamics were not much different from physical classes.	I1	2
In general, the instructor was effective in motivating the students to interact in this course.	I3	2
Taking this class via the Internet allowed me to arrange my other schedules more effectively.	C3	7
Taking this class via the Internet allowed me to arrange my home work for the class more effectively.	C4	4
There were no serious disadvantages to taking this class via the Internet.	C6	2
I learned to interrelate the important issues in the course material.	L1	4
I learned a great deal of factual material in this course.	L2	3
I gained a good understanding of the basic concepts of the material.	L3	4
I learned to identify the central issues of the course.	L4	3
Conducting the course over the Internet improved the quality of the course compared to physical classes.	L7	2
If I had another opportunity to take another course via the Internet I would gladly do so.	S1	2
I am satisfied with the amount of time required for this course.	S2	5
I was very satisfied with online classes at BUP	S5	4

Most participants disagreed that classroom dynamics were not different from physical classes (Mode I1 = 2

(Disagree)). Level of interaction between class participants were low and most strongly agree that interacting with teachers in an online environment was harder (Mode I4 = 7). Instructors were also not effective in motivating students to interact in online classroom. In contrast, Class-Life Balance was excellent for most students as most were able to participate in classes they would otherwise miss, save time on commuting and arrange other work schedules (Mode C1, C2, C3=7). However, that did not provide any benefit in terms of arranging homework for class and most believe advantages of online classes doesn't outweigh disadvantages. Most agree that there were serious disadvantages to taking online classes. Most have a neutral to slightly disagree opinion on indicators of Perceived Learning. This may indicate a lack of confidence on their learning. In contrast, most do agree that conducting the class via online made it more difficult and online classes did not improve the quality of learning. Most also do not want to take another online class if they had the opportunity to do so. Though they are satisfied with the time it took for courses conducted via online classes, their Overall Satisfaction is neutral. It is important to know that, while their opinions contrast from neutral point of the Likert Scale for indicators relating to Online Class Interaction and Class-Life Balance; Online Class interaction having a more negative outlook and Class-Life Balance a more positive outlook; they have a more or less neutral outlook on Perceived Learning and Overall Satisfaction.

Evaluation of Measurement Models

Firstly, the *Formative Measurement Model* of *Overall Satisfaction* was evaluated. The model included 4 satisfaction related indicators (*S1, S2, S3, S4*) against which 1 global indicator (*S5*) was set to conduct the redundancy analysis to establish the convergent validity and determine if it reliably measures overall satisfaction.

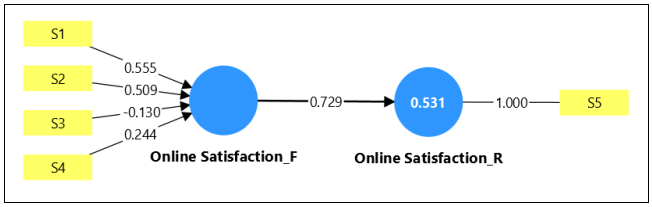

Fig 4: Redundancy Analysis – Formative Measurement Model – Overall Satisfaction

As Path Coefficient of Overall Satisfaction_F (0.729)>0.707; it can be concluded that it does not lack Convergent Validity (the extent to which formative measure correlates positively with reflective/global measure for same construct (Hair *et al*., 2016) [7]. Next, collinearity between formative indicators are measured, which indicates that predictors capture different aspects of overall satisfaction separately. Outer VIF<5 ensures that there is no multicollinearity problem.

Table 4: Collinearity Statistics – Formative Measurement Model

Indicator	VIF
S1	1.808
S2	1.671
S3	1.817
S4	2.042

The following shows that although *Outer Weights* for some of the indicators are insignificant, *Outer Loadings* for all the indicators of Overall satisfaction are > 0.5. Therefore, it is acceptable to keep these indicators in the measurement model.

Table 5: Outer Weights – Formative Measurement Model

Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
S1 -> Overall Satisfaction	0.027	0.021	0.208	0.132	0.895
S2 -> Overall Satisfaction	0.566	0.520	0.217	2.604	0.009
S3 -> Overall Satisfaction	-0.210	-0.164	0.273	0.770	0.441
S4 -> Overall Satisfaction	0.714	0.674	0.224	3.189	0.001

Table 6: Outer Loadings – Formative Measurement Model

Indicator	Overall Satisfaction
S1	0.634
S2	0.802
S3	0.530
S4	0.895

Therefore, it can be concluded that the *Formative Measurement Model* of *Overall Satisfaction* sufficiently acts as a proxy of *Overall Satisfaction*.

In order to evaluate reflective models of Online Class Interaction, Perceived Learning, and Class-Life Balance; Internal Consistency Reliability, Convergent Validity, and Discriminant Validity will be evaluated. After testing, predictors that did not meet the criteria for reflective measurement models were removed. Predictors included in the final Reflective Measurement Models are: Online Class Interaction (I1, I2, I3, I6, I7 and I10), Perceived Learning (L1, L2, L3, L4, L5, L6) and Class-Life Balance (C1, C3, C4, C6). As indicated by the following results, Internal Consistency Reliability measured through Cronbach's Alpha and Composite Reliability, their value is greater than 0.7 and less than 1. Thus, all 3 reflective measures meet the first criteria according to (Hair *et al*., 2016) [7].

Table 7: Internal Consistency Reliability, Convergent Validity – Reflective Measurement Models

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Class-Life Balance	0.761	0.776	0.843	0.574
Online Class Interaction	0.831	0.882	0.873	0.540
Perceived Learning	0.934	0.938	0.949	0.755

Convergent Validity (the extent to which a measure correlates positively with alternative measures of the same construct (Hair *et al*., 2016) [7]. is indicated by Average Variance Extracted (AVE) (A measure to establish convergent validity on the construct (Hair *et al*., 2016) [7]. AVE should be 0.5 or higher, as is the case for the three constructs.

Table 8: Outer Loadings – Reflective Measurement Models

Indicator	Class-Life Balance	Online Class Interaction	Perceived Learning
C1	0.751		
C3	0.696		
C4	0.854		
C6	0.721		
I1		0.654	
I10		0.817	
I2		0.794	
I3		0.867	
I6		0.646	
I7		0.586	
L1			0.795
L2			0.905
L3			0.899
L4			0.912
L5			0.893
L6			0.802

Outer Loadings indicate the indicator reliability and preferably should be above 0.7 and should not be less than 0.4. In these cases, 12 indicators have outer loading>0.7 and 4 indicators have outer loading>0.4. This is acceptable as per (Hair *et al*., 2016) [7].

Finally, Discriminant Validity (the extent to which a construct is truly distinct from other constructs by empirical standards. Establishing discriminant validity implies that a construct is unique and captures phenomena not represented by other constructs in the model. (Hair *et al*., 2016) [7]. Measured by Hetero Trait-Mono Trait Ratio (HTMT) should not be above 0.9; as is the case for our constructs measured through reflective measurement model.

Table 9: Discriminant Validity (HTMT) – Reflective Measurement Models

Construct	Class-Life Balance	Online Class Interaction	Perceived Learning
Class-Life Balance			
Online Class Interaction	0.515		
Perceived Learning	0.397	0.573	

Thus, we conclude that our constructs measured through the reflective measurement models meet required criteria.

Evaluation of Structural Model

The initial structural model includes 3 exogenous reflective measurement models and 1 endogenous formative measurement model. For this study, *no mediating or moderating effects on the constructs were examined.*

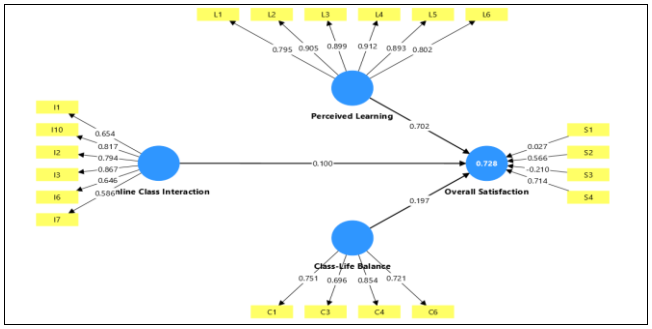

Fig 5: Structural Equation Model – Overall Satisfaction of Online Education

Before evaluating the predictive capacity of the model, we will evaluate collinearity issues within the constructs. *Inner VIF* values indicate that there are no Collinearity issues of our constructs with the endogenous construct Overall Satisfaction. The R^2 *Value* indicates that our constructs explain 0.728 or 72.8% of the variances in Overall Satisfaction; which is substantial. To avoid bias towards complex models, *adjusted* R^2 *is* also evaluated, which is 0.698 or 69.8% and is also moderate.

Table 10: Collinearity Statistics – Structural Model

Collinearity Statistics – Inner VIF	
Relationship	**VIF**
Class-Life Balance -> Overall Satisfaction	1.196
Online Class Interaction -> Overall Satisfaction	1.482
Perceived Learning -> Overall Satisfaction	1.469

Table 11: R Square – Structural Model

R Square Matrix		
Construct	**R-square**	**R-square adjusted**
Overall Satisfaction	0.728	0.698

Path Coefficients for the exogenous constructs indicate their effect on the endogenous construct, *Overall Satisfaction*. *Path Coefficient* statistics reveal that *Perceived Learning (0.702)* is the most important construct in measuring *Overall Satisfaction*, followed by *Class-Life Balance (0.197)* and *Online Class Interaction (0.100)*. Therefore, our preliminary equation for predicting *Overall Satisfaction* is:

$$\begin{aligned} &Overall\ Satisfaction \\ &= 0.1 * Online\ Class\ Interaction + 0.197 * Class\ Life\ Balance + 0.702 \\ &* Perceived\ Learning \end{aligned}$$

Bootstrapping reveals that *Online Class Interaction and Class-Life Balance* are not statistically significant.

Table 12: Path Coefficients – Structural Equation Model

Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Class-Life Balance -> Overall Satisfaction	0.197	0.224	0.163	1.208	0.227
Online Class Interaction -> Overall Satisfaction	0.100	0.121	0.172	0.581	0.561
Perceived Learning -> Overall Satisfaction	0.702	0.669	0.156	4.506	0.000

Effect size reveals that perceived learning has a large effect (>0.35) on overall satisfaction as per the criteria established by Cohen (1988) [3] and Hair *et al*. (2021) [8], indicating its significant influence as a determinant.

Table 13: Effect Size – Structural Equation Model

Construct	Overall Satisfaction
Class-Life Balance	0.119
Online Class Interaction	0.025
Perceived Learning	1.235

PLSpredict (10-fold cross validation) was used to determine the Predictive Relevance (Q^2) (the model's out-of-sample predictive power) of the model. Q^2 statistic for all the indicators of the endogenous construct is greater than 0, and RMSE and MAE of the PLS model are also less than the linear model, which is clear indication of predictive relevance of the model on Overall Satisfaction.

Table 14: Predictive Relevance – Structural Model

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE	IA_RMSE	IA_MAE
S1	0.234	1.676	1.436	3.164	2.452	1.914	1.698
S2	0.366	1.355	1.035	2.444	1.970	1.701	1.459
S3	0.101	1.466	1.148	2.332	1.814	1.546	1.252
S4	0.495	1.037	0.808	2.173	1.738	1.459	1.214

Following the criteria established by Shmueli *et al*. (2019) [15], the structural model demonstrates high out-of-sample predictive power, suggesting that the results are highly generalizable for predicting student satisfaction in similar online education contexts.

Conclusion

Table 15: Summary of Findings

Hypothesis	H	Decision
Online Class Interaction has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H1	Not Supported
Class-Life Balance has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H2	Not Supported
Perceived Learning has a statistically significant relationship with Overall Satisfaction of Online Class at BUP	H3	Supported

The study concludes that *Perceived Learning* is a statistically significant determinant of *Overall Satisfaction* of online classes at BUP in the peri-COVID scenario. Therefore, BUP has to primarily ensure that their students get to learn better to ensure satisfaction with online education. As evidenced by this paper, if the students can vouch for their learning (perceived learning), they will be satisfied with the online education that BUP is providing. A great first step to improve learning is to identify methods of learning and incorporate those with methods of teaching. The most basic methods of learning are referred to as learning by seeing (visual), hearing (auditory), and doing (Kinesthetic). A big feature missing from online learning is the use of boards and hand-written demonstration in a manner that is as convenient as using boards in a physical classroom. Teachers may be equipped with tablet computers which they can use to write with their hands and present a more alive demonstration. Along with that, opportunity to teach online allows teachers to instantly show additional materials from online. Equipping the tools of education available with online access with preparation from the part of the teacher can greatly improve learning by seeing and hearing. One limitation of online classes is that face to face discussion and brainstorming are more limited in features. Introducing collaborative whiteboard apps/software to classroom can ease the practice of group discussion which may, subject to further research, improve learning by doing. A lot can be done to improve learning in general. But to improve learning in an online environment to deliver satisfactory education for such environment, incorporation of the above should be considered by BUP.

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