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(ELECTRICAL AND ELECTRONICS ENGINEERING)**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**LEARNERS' PERSPECTIVES ON INTEGRATING BLENDED
LEARNING: A CASE OF ISLAMIC UNIVERSITY OF
TECHNOLOGY (IUT)**

by

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The thesis titled “Learners’ Perspective on Integrating Blended Learning: A case of Islamic University of Technology (IUT)” submitted by Aqel Surama Mohammed Al Suraimi Students no: 181031206 of Academic Year 2019-2020 has been found satisfactory and accepted as partial fulfillment of the requirement for the degree of Master of Science in Technical Education (EEE).

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This is to certify that the work presented in this thesis is the outcome of the investigation carried out by Aqel Surama Mohammed Al Suraimi under the supervision of Dr. Mahbub Hasan at the Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), Gazipur, Bangladesh. It is hereby declared that this thesis/report or part of it has not been submitted elsewhere for the award of any Degree or Diploma.

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DEDICATION

Dedicated to my family and friends.

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ABSTRACT

This study aims at investigating university students' perceptions about the integration of Blended Learning (BL) in theory courses at the Islamic University of Technology (IUT), Bangladesh. To explore students' perceptions of BL as a teaching-learning platform, a mixed-method research approach was adopted through the construction of a structured questionnaire including open-ended questions. A total of 226 students from different departments of IUT participated in this study. An electronic survey was conducted that includes three subsections: a) to improve learners' interaction, b) to increase their interests, and c) to provide autonomous learning. Besides online surveys, printed questionnaires were also distributed to the students who resided in the halls of residence (male and female). Based on the data collected, the descriptive frequencies and thematic analysis were conducted to study students' perceptions of integrating Blended Learning. The results indicate an overall positive attitude towards integrating BL in university courses. It is recommended that there is an increase for integrating BL at the university level curriculum to stimulate the process of teaching and learning. This study also provides valuable insight into the academic process participants to harvest benefits of the technology, collaboration, boosting motivation, and encouraging personalized approach in university teaching and learning.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Blended learning is becoming a popular teaching method that facilitates a mixture of collaborative learning, problem-solving, and independent learning. Beginning with the definition of blended learning is; there can be different definitions concerning blended learning; blended learning can be defined as systems that represent a mixture of face-to-face with computer-mediated learning (Curtis J. Bonk, 2005). As recommended by Allen, a blended course has anywhere between 30% to 79% of online content delivery with the remaining content delivered in a non-web-based method, such as face-to-face instruction (Elaine Allen, 2007). Blended learning may also be described as a method of instruction that combines online with face-to-face learning activities that are integrated in a “planned, pedagogically valuable” way, where some of the face-to-face time is replaced by online activities (Picciano, 2006).

Blended learning has several advantages over face-to-face learning. In a blended learning environment, the combination of a face-to-face setting and a learning management system is used to introduce cognitive, constructive, and skill-based interactive processes during learning (Hoic-Bozic, 2009). Blended learning can also provide several advantages, which include improving the efficiency of the teachers to explain difficult concepts. Also, blended learning allows students to operate at their own pace, thereby avoiding burnout. In all educational aspects, blended learning provides a pedagogical approach that is expected to be better for all learners and may diminish the dropout rates (Hamad, 2015).

1.2 Statement of the problem

Despite having advantages, students may not realize the importance of this learning mode due to many internal reasons, such as they may not feel comfortable using technology. Based on the literature, students perceive the usefulness of BL; then, it is also essential to know in what ways students see the benefit of BL. My study addresses these concerns by utilizing a standardized survey tool (Bukhari & Basaffar, 2019), which explores students' perceptions of integrating BL in educational settings.

This study intends to investigate students' perception of the effectiveness of integrating blended learning and its role in reducing the effect of matters that involves calamities such as strikes, natural disasters, pandemic and unexpected events. As for example, in 2017-18, IUT experienced a series of strikes by both teachers and students in 2017 and 2018. One lasted for over three weeks. After the end of the strike, there was no practical plan to overcome the students' lost time except postponing the semester by another three weeks for students to catch up. In 2018-19 academic year, the Bangladesh citizens started a transport strike which stopped business activities due the lack of transport. This strike began in November when students were about to do their final examinations. This transport strike affected the university primarily for the students who were non-residence because they could not travel to the university to attend the examinations. The university administration was forced to extend the final exam of that year by another week. The world was recently hit by the covid-19 pandemic, which caused the world over organizations to lockdown to mitigate the virus's first spread. IUT was not isolated from this incidence.

The university was affected in the way that it was shut down for one and a half months just after two months of the beginning of the new academic year. This shut down forces the administration to find the means to bridge the lost time because of the pandemic.

The above incidents mentioned are not the last to happen in the lifetime of the IUT. Therefore, it gives a motivation to study a mechanism that can help the university to mitigate the impacts of these incidents that may otherwise hold the university to shut down for an unplanned time. Henceforth, blended learning can propose a better way to minimize these problems by offering a combination of online and face-to-face education. Therefore, this study investigates the possibility of how blended learning can provide uninterrupted education to the students by seeking learners' perspectives on integrating blended learning.

1.3 Research aim and objectives

This study seeks to answer the following research questions about learners' perspectives on integrating blended learning across departments, gender, year of study, and geographic status based on their geographical location.

1.5 Research questions

To explore students' perceptions about the integration of BL in their courses, the following research questions were formulated:

- i) Do the learners find the integration of BL more useful than face-to-face mode?
- ii) Do the learners believe that the integration of BL will increase their interaction?
- iii) Do the learners believe that the BL environment will boost their autonomy?

1.4 The hypothesis

H₀: Learners show a positive attitude towards the integration of BL in IUT.

H₁: Learners believe that the integration of BL can increase collaboration between students and teachers of IUT.

H₂: Learners believe that the integration of BL helps students to become independent learners.

1.6 The significance of the study

The study conducted by Kintu (2017) shows that an effective blended learning environment is necessary for undertaking innovative pedagogical approaches through technology in teaching and learning (Mugenyi Justice Kintu, 2017). Therefore, this study investigated the learners' perception regarding the importance and significance of an effective blended learning environment to ascertain the results found in the study mentioned above. And also, in the education system, blended learning can be significant to both the learners and the instructors in the following ways:

- i) It provides an effective environment for teaching-learning. Studies have shown that blended learning proves to have an effective learning outcome for most students because blended learning incorporates multiple instruction methods from an assortment of perspectives.
- ii) Furthermore, in terms of flexibility, blended learning can offer the instructors flexibility in how they represent educational material and for the learners in the variety of the learning approaches they practice.

- iii) Moreover, it may impact teacher empowerment that the teachers can move with the activities to interact with an individual or small groups of students and check on progress(learning, 2018).

This study will be of great value to the policymakers of IUT and other universities in Bangladesh in different ways. For example, they can formulate BL policies that favor students learning. This study also discusses what percentage of online and face-to-face mode to be included in Blended learning mode.

The researcher also hopes that this study's results will also be of great value for future researchers interested in examining students' perceptions of integrating blended learning in other countries. Again, this study encourages future researchers to investigate teachers' perceptions of BL so the results could be compared to implement BL in university settings.

1.8 Organization of the thesis

This thesis is organized in five chapters. Chapter 1 gives the background of the study, research aims, hypothesis, and significance of the study, assumptions, research questions, and definition of the terms. Chapter 2; explores the related literature of the study. Chapter 3; provides the methodologies used in this study. Chapter 4; provides the analysis of collected data from online and printed questionnaires. Chapter 5; presents a discussion of the findings, limitations, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

Blended learning is a unified approach to teaching and learning that includes multiple methods of instruction and learners' practice (Graham, 2006). Blended learning includes students' ability to personalize learning, which is based on students' strengths, interests, skills, and requirements. During personalized learning, students are allowed to harvest the best of their ability through self-paced learning. A personalized learning environment involves incorporating self-reflection, goal setting, flexible, intentional master of schedules, digital content, and tools that enable purposeful learning. Moreover, it involves a flexible and grading conversion that is independent of the learning environment. Lastly, personalized learning allows students to create a learning playlist (Su, Tseng, Lin, & Chen, 2011). Besides, Blended learning can enable students to progress, which is achieved through personalized platforms in which students can always go back and fix the gaps that they would otherwise have missed during their face-to-face sessions. By doing so, learners keep engaging with the use of a variety of learning contents.

Further, learners have a comprehensive platform upon which they can seek help and support, for example, through discussion forums and content traits. On the part of instructors, blended learning provides an easy way of assessing learners' progress, enabling them to act accordingly in situations where learners find difficulty in mastering concepts. BL offers practical training for any learning style in which students might need repetitive learning and reflection. Additionally, it improves the training costs and returns over investments in the teaching-learning process (Saltan, 2017).

Blended learning requires that education goals be formulated in advance so that the combinations of both online and face-to-face instruction procedures are in sync. This can include defining the

course contents that need to teach online and face-to-face. In doing so, the technologies also need to be specified for their effectiveness (Heinze & Procter, 2004). Components of the blended learning model must include self-paced e-learning, face-to-face training, mobile learning, social learning, and virtual classrooms (Boelens, De Wever, & Voet, 2017). Chen (2012) highlights blended learning types as follows: i) rotation of blended learning, which involves both face-to-face instruction and online study time. ii) Flex blended learning, whose primary focus is on online education with small groups having access to face-to-face instructions. Flex blended learning is similar to rotation blended learning, except that face-to-face is more focused on specific learners. iii) A La Carte blended learning, which involves online instruction, but some training may occur in a physical classroom. In A La Carte, blended learning learners receive a classroom or lab environment in addition to online learning. iv) Enriched virtual blended learning is mainly centered on the face-to-face instruction supplemented by online tools and resources after instructor-led sessions have been completed. The key benefit of these models includes consistency and availability; learners control what they learn, learners have a greater interest in what they learn, thus leading to greater intention, training is cost-effective and provides a personal learning experience to a large extent. The challenges of blended learning include resistance to the use of technology, course-related tool, implementation of the system, and teaching approaches in both environments, which is online and face-to-face, and managing and monitoring course activities (Graham, Allen, & Ure, 2005).

Many studies have been done on understanding the perception of learners' on blended learning to a more significant extent. Wichadee (2017) developed a blended learning model using the Edmodo learning tool to examine students' oral proficiency, motivation, and attitudes on an English course. His study designates that blended learning is more efficient than the traditional ways of learning.

Based on his research, students who attended blended learning outperformed those who did not. Besides, both groups had positive attitudes towards Edmodo. His study implies that technology can facilitate the learning and teaching process and produce better academic performance.

In another study Saltan (2017) investigated students' experience in studying Pedagogic Formation Program (PFP) in blended learning design, specifically looking at attendance, self-confidence, and PFP attitude and teaching profession. They showed that blended PFP was highly promising in professional development, self-confidence, accessibility, and solved issues related to distance and classrooms, and provided a balanced approach to learning. On the other hand, participants' perceptions indicated that face-to-face was more authentic, applied, and effective than the online counterpart. In the same study, participants preferred to regularly attend online classes because of their comfort and availability concerns. In general, blended learning allowed the students to gain a broader perspective regarding teachers' responsibility, the importance of communication, and students' psychological characteristics; however, they believed they required more practice and experience.

Sagarra and Zapata (2008) explored the impact of the online workbook on the learners' attitude towards their pedagogical tool. They measured students' attitudes towards electronic workbook. From their findings, most of the students praised the usefulness of online workbooks in grammar and vocabulary acquisition. Even though the study shows a generally positive attitude about the online workbook, concerns were raised about the amount of time needed to complete the online exercise. They concluded that most of the students found the online tool easy to access and acknowledged a mutual relationship between class content and online material. Further, they stated that the electronic workbook helps them to learn more.

Al Zumor, Al Refaai, Eddin, and Al-Rahman (2013), in their study, showed the advantages of merging face-to-face learning instruction and online language learning using a blackboard learning management system. They demonstrated that blended learning provides a more effective environment in terms of metacognition and social strategies. The drawbacks indicated by the study are mainly technical problems, lack of proper training for students, an increased number of labs, and recognizing the excellent performance of both instructors and students. They indicated that blended learning creates a supported learning opportunity for learners. In their conclusion, they noted that the concept of blended learning remains relatively new to many academic institutions. However, adequately implemented blended learning can significantly improve learning experiences because blended learning provides strength that can bridge the gaps created during face-to-face learning.

The perception of the students about integrating blended learning in a course “English as Foreign language (EFT)” was examined in studies by Bukhari and Basaffar (2019). Firstly, the perception was viewed whether integrating blended learning is an ideal motivator to the learning process; secondly, if it excites students positively; third, if it increases the opportunity of interaction and lastly if integrating blended learning provides independence for learners. In their findings, the most significant percentage of learners favored incorporating online learning into face-to-face learning to a ratio of 2:3. They expressed a strong interest in integrating blended learning classes as an alternative for long hours of in-class sessions; however, students also mentioned that blended learning should only be combined if face-to-face learning is not possible. Integrating blended learning is seen as an effective mode to enhance learners' interaction, autonomy, and interest. It was seen as an alternative to the long-hour study mode. They recommended integrating blended learning and creating an environment that consists of online and face-to-face education.

In another study by Waha and Davis (2014), university students' perspective on blended learning was examined for postgraduate students in library and information science. They identified the aspects that included support, efficiency, and design of blended learning. The study investigated students' perception in terms of expectation, satisfaction, and flexibility in delivering the problem. From the students' perspective, they found that the online environment provides flexibility that is not found in the class environment. Unlike face-to-face mode, blended learning offers social interactions among peers that are important for learning. Conclusively, students provided positive feedback and expressed expectations in keeping the blended learning approach combined with online and face-to-face education.

In their study, Arkhipova, Belova, Gavrikova, Lyulyaeva, and Shapiro (2017) explored the inspiration for blended learning to different age groups. Their results show that learners' age group is a defining factor of the necessity of information technologies used in the learning process. They argued that young learners are more IT-oriented, while older learners are inclined towards traditional methods. Additionally, a combination of student-centered methods and modern technology serves as a useful teaching tool.

Therefore this study has been conducted to examine the learners' perspective on integrating blended learning in engineering courses in terms of the usefulness of BL, student-teacher and student-student interaction, and learners' autonomy at the Islamic University of Technology (IUT).

CHAPTER THREE

METHODOLOGY

3.0 Research settings and sampling methods

3.1 Research settings

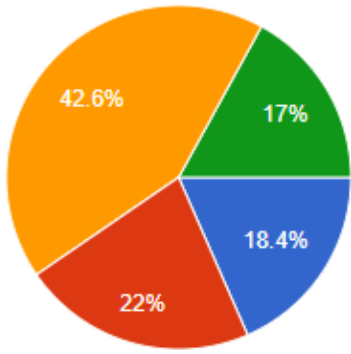
The study was conducted at the Islamic University of Technology (IUT), investigating the learners' perspective on integrating blended learning, considering an overall population of 2500 students. The sample size of the study was drawn concerning the six departments (Civil & Environmental Engineering, Electrical & Electronic Engineering, Computer Science & Engineering, Mechanical & Production Engineering, Business & Technology Management, and Technical & Vocational Education) of Islamic University of Technology (IUT). The administrative structure, teachers, and students of Islamic University of Technology (IUT) are a well-proportioned distribution of members from South Asia, the Middle East, and Africa. IUT is an international university, located in Board Bazar, Gazipur, Bangladesh, one of the leading and prestigious Ph.D. granting engineering universities in Bangladesh, and it is a subsidiary organ of the Organization of Islamic Cooperation (OIC). The students studying in IUT are in two categories Residential and non-residential. This study sought the perspectives of both residential and non-residential students regarding integrating blended learning.

3.2. Sampling methods

The Cluster sampling method was used in which 70 students were chosen from the Civil and Environmental Engineering (CEE), Electrical and Electronics Engineering (EEE), and Computer Science Engineering (CSE) departments each, 64 students from the Mechanical and Production Engineering (MPE) department, and 30 students from Business & Technology Management (BTM) and Technical & Vocational Education (TVE) departments each, which the sum of them all give us the final sample size which is 334.

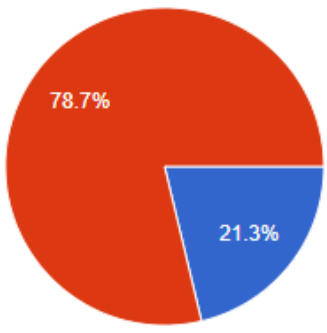
Table 1 Total Sample size (334)

S/N	Departments	Gender	N	Students year in the university	N	Total
1	CEE	Male	50	1 st & 2 nd -year students	35	70
		Female	20	3 rd & 4 th -year students	35	
2	EEE	Male	50	1 st & 2 nd -year students	35	70
		Female	20	3 rd & 4 th -year students	35	
3	CSE	Male	50	1 st & 2 nd -year students	35	70
		Female	20	3 rd & 4 th -year students	35	
4	MPE	Male	50	1 st & 2 nd -year students	32	64
		Female	14	3 rd & 4 th -year students	32	
5	BTM	Male	25	1 st & 2 nd -year students	15	30
		Female	5	3 rd & 4 th -year students	15	
6	TVE	Male	30	1 st & 2 nd -year students	30	30
		Female	0			



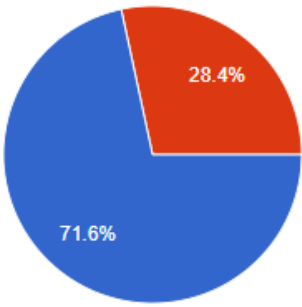
- 1st year
- 2nd year
- 3rd year
- 4th year

Fig 2(a) Year of Study



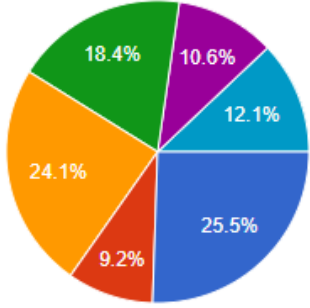
- Female
- Male

Fig 2(b) Gender



- Resident
- Non-Resident

Fig 2(c) Residential status



- Civil & Environmental Engineering (CEE)
- Electrical & Electronic Engineering (EEE)
- Computer Science & Engineering (CSE)
- Mechanical & Production Engineering (MPE)
- Business & Technology Management (BTM)
- Technical & Vocational Education (TVE)

Fig 2(d) Departments

An overview of the participants is shown in the above figures. Fig 2(a) shows the percentage of the respondents concerning their study level, and fig 2(b) represents the proportion of male and female respondents. As the number of male and female students in IUT is around 3:1, the percentage ratio shows the population's representative sample. The same ratio is also represented through students' residential status in fig 2(c). Fig 2(d) shows the distribution of the participants among the six departments of IUT. Based on the sample's representation, it can be concluded that the sample of this study represents the population of this study.

3.3. Data collection

The data collection was done having consent from the relevant authorities. The consent to administer the questionnaire to the students was sought from either the heads of department and/or lecturers of participating sections of students. The questionnaire was distributed either through emails or physically in the halls of residence. This questionnaire was adapted from the work of (Bukhari & Basaffar, 2019), who explored English Language learners' perception of integrating blended learning. The questionnaire consists of 16 items seeking to investigate and examine the perceptions of the Islamic University of Technology (IUT) regarding usefulness of Blended Learning Integration, Integration of blended learning increasing the student-student and student-teacher interactions, and blended Learning environment boosting the students' autonomy followed by an open-end question which seeks the students' perspective on which factor the proper way of learning depends. Before the participation of the students, the researcher introduced the purpose of the study and confidentiality issues related to the data collected.

3.4. Data analysis

Demographic data and data related to learners' perspectives on integrating blended learning were collected and entered into SPSS software. Following the quantitative analysis method, data was collected through the printed questionnaire and online form then analyzed from the respondents using the questionnaire and tabulated in the frequencies and percentages followed by a detailed interpretation.

For the open-ended question analysis, responses were categorized based on different themes related to students' perceptions of integrating blended learning at university settings. Five different categories were formed from the responses of the participants from the open-ended questions.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Demographic data related to participated students

The Cluster sampling method was used in which 70 students were chosen from the CEE, EEE, and CSE departments each, 64 students from the MPE department, and 30 students from BTM & TVE departments each, which the sum of them all give us the final sample size which is 334.

Table 1 Total Sample size (334)

S/N	Departments	Gender	N	Students year in the university	N	Total
1	CEE	Male	50	1 st & 2 nd -year students	35	70
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		Female	20	3 rd & 4 th -year students	35	
4	MPE	Male	50	1 st & 2 nd -year students	32	64
		Female	14	3 rd & 4 th -year students	32	
5	BTM	Male	25	1 st & 2 nd -year students	15	30
		Female	5	3 rd & 4 th -year students	15	
6	TVE	Male	30	1 st & 2 nd -year students	30	30
		Female	0			
Grand Total						334

4.2 Findings

4.2.1 Students perception of integration of BL

Table 6: Students perception about the importance of integration of BL for student

Constructs	i1: BL: the best way of delivering course content				i2: helps the learners to have better performance		i3:BL facilitates the learners' access		i4: BL accelerates education progress		i5:BL: helps students gain a clear understanding	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent		
Strongly Disagree	19	7.1	16	6.0	11	4.1	16	6.0	25	9.4		
Disagree	27	10.2	33	12.4	24	9.0	23	8.6	42	15.8		
Neutral	53	19.9	72	27.1	60	22.6	71	26.7	70	26.3		
Agree	99	37.2	94	35.3	104	39.1	93	35.0	81	30.5		
Strongly Agree	68	25.6	51	19.2	67	25.2	63	23.7	48	18.0		
Total	266	100.0	266	100.0	266	100.0	266	100.0	266	100.0		

Table 6 represents the frequency and percentages of the respondents' perception of the first section of the survey. The results show that 63% (SA68 + A99 = 167) of students agreed to statement no. 1 that "the BL is the best way of delivering content". However, 17% (D27 + A19 = 46) students disagreed, and around 20% (N=53) students stayed neutral to the statement. On the issue of whether BL helps learners have better academic performance, 55% agree and only 18% disagree. Only 13% of the responses disagree that BL can facilitate learners' access to essential university resources.

In comparison, 64% accept that BL provides the platform for essential resources such as notes, ppts, videos, etc. As far as accelerating education progress is concerned 59% agree, however 15%

don't agree. Lastly, 48% of the students agree that BL helps them to gain a clear understanding of what is taught in class, while 25% disagree.

In summary, it can be inferred that the integration of blended learning is considered to be essential and useful to university students concerning the five statements included in the first section of the questionnaire.

4.2.2 Interaction in BL environment

Table 7: Interaction in Blended Learning (BL) environment

Constructs	i6: BL: increases student-student communication		i7:BL improves student-teacher communication		i8: BL is beneficial to get teachers' feedback		i9: provides opportunities to get peers' communication		i10: provides opportunities for collaboration	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly Disagree	28	10.5	28	10.5	24	9.0	24	9.0	27	10.2
Disagree	56	21.1	45	16.9	28	10.5	33	12.4	36	13.5
Neutral	58	21.8	59	22.2	74	27.8	78	29.3	60	22.6
Agree	71	26.7	85	32.0	94	35.3	75	28.2	87	32.7
Strongly Agree	53	19.9	49	18.4	46	17.3	56	21.1	56	21.1
Total	266	100.0	266	100.0	266	100.0	266	100.0	266	100.0

Table 7 shows the students' responses about interaction in a Blended Learning environment. 31.6% of the students disagree that blended learning increases student-student communication whereas 46.6% of them agree. Item no. 7 shows that whether blended learning improves student-teacher communication. From the survey results, 50.4% of the students agree that blended learning improves student-teacher communication, whereas 27.4% disagree. Only 19.5% of the students

disagree that BL is beneficial to get teachers' feedback, while 52.6% agree. In providing opportunities to get peers' communication through blended learning, 49.3% are in agreement. However, 21.4% don't agree. Lastly, 53.8% of the students agree that BL provides opportunities for collaboration, while 23.7% disagree.

Conclusively, it can be inferred that a blended learning environment is perceived as a practical and interactive environment for the students. In one way, they can benefit from peer feedback, peer-interaction, and teacher feedback or suggestions, on the other way.

4.2.3 Autonomy in BL environment

Table 8: Autonomy in Blended Learning (BL) environment

Constructs	i11: BL helps learners to study at their pace		i12: BL provides an opportunity for effective time management		i13: BL allows learners to do their tasks independently		i14: BL: helps learners to learn		i15: interested in joining BL	
Responses	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly Disagree	19	7.1	13	4.9	15	5.6	21	7.9	25	9.4
Disagree	36	13.5	29	10.9	21	7.9	31	11.7	38	14.3
Neutral	58	21.8	73	27.4	69	25.9	68	25.6	58	21.8
Agree	92	34.6	101	38.0	95	35.7	86	32.3	85	32.0
Strongly Agree	61	22.9	50	18.8	66	24.8	60	22.6	60	22.6
Total	266	100.0	266	100.0	266	100.0	266	100.0	266	100.0

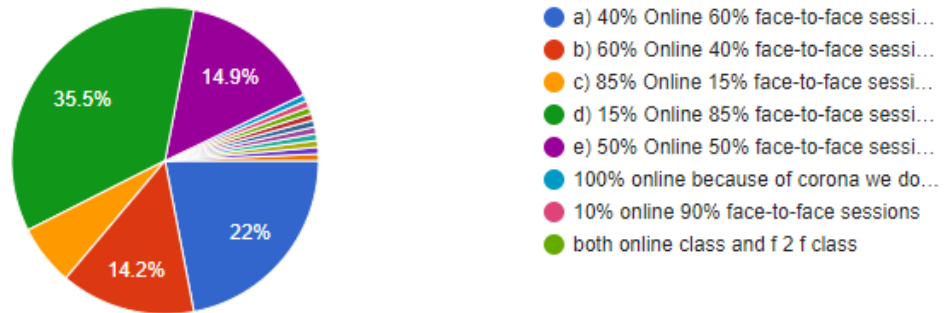
The results in Table 8 above shows the students' responses about Autonomy in a Blended Learning environment. 20.6% of the students disagree that BL helps learners study at their pace whereas 57.5% of the students agree. Responses regarding the statement “BL provides an opportunity for effective time management” by students show that 56.8% of students agree with the statement, and 15.8% disagree. Merely 13.5% of the responses disagree that BL allows learners to do their tasks independently, while 60.5% agree. As far as BL helping the learners to learn is concerned, 54.9% of students are agreed that blended learning helps the students to learn in a better way, while 19.6% are in disagreement. Lastly, 54.6% of the students agree that they are interested in joining BL whereas 23.7% disagree.

The above data exhibits a strong inclination towards the perspective that a blended learning environment allows learners to do their learning tasks independently.

4.2.4 Portioning intervals in BL environment

Chart 1 below shows the responses of preferred proportions of the face to face and online sessions, as suggested by respondents. 35.5% of the respondents prefer that 15% of the time online teaching should be conducted, whereas 85% of the time should be taught using face to face method. 22% of the respondents prefer 40% of the time; they must be taught using the online method, whereas the rest must be conducted face-to-face. Slightly below 15% prefer to split 50% each of the methods or 60% split in favor of online teaching method. The rest of the combinations are below 10%.

Chart 1: Showing the preferred proportion of face to face and online sessions



Response to the Open-ended question

Along with the fifteen questions that help explore students' perceptions of integrating blended learning, an open-ended question was also included in the questionnaire to get more insight into their perceptions. The open-ended question was, "*I find that the proper way of learning depends on.....*". Based on the answers of the participants, few highlights are stated below.

Emphasize Blended learning

Students response to the open-ended question also supports their response on the Likert scale questions. Students reported integrating blended learning in university settings, which was backed up by qualitative data. For example, one student wrote:

I think it's too necessary for the learning is being Blended, it's so great that if the lectures can be filmed and uploaded to a platform the students can access it anytime and anywhere. For me as a student it'll be so easy to re-watch the lecture at home and studying it all over, I can study the chapter by watching the lecture part by part, I can write extra notes, before the exams I can review the topics that the teacher was so interested during the lecture. This is just my opinion of the uploading lectures, regardless of the chances of attending the classes from home if something happens to me just like the meetings that happen in Tongi and we can't come to IUT because of the Traffic, for example, it has a lot of Pros.

Emphasize face-to-face communication

Though students were supportive of the integration of blended learning, they emphasized the importance of the face-to-face mode over the online mode. Some students even ignored the necessity of blended mode for teaching engineering courses. Some of the students' comments that reflect their perception of blended learning are stated below.

"I find that the proper way of learning depends on....."

the way students and teachers communicate face-to-face rather than depending on the most of online learning.

face to face interaction in an academic environment.

face to face communication.

nothing can replace face to face learning this has been the way throughout history, so this BL or online stuff is not necessary in Engineering.

This finding support students voice when they were asked about the ratio of the online and face-to-face portion in blended learning. Most students preferred 15% online and 85% face-to-face in blended learning mode. This means, most students rely on the face-to-face mode than online mode in engineering education.

Student-Teacher communication

Students also highlighted that blended learning success depends on effective communication between the course teacher and the students. Learning is accelerated when the blended learning platform offers an interactive environment both for teachers and students. Few remarks from students are stated below.

"I find that the proper way of learning depends on....."

the betterment of communication Between teachers and students.

interacting with my Teacher and peers effectively and solving problems together.

the presence of the teacher and the students in the same classroom and being interactive with each other.

the method of learning as well as in the teacher-student relationship, which can be more developed via face-to-face learning than online.

mutual interaction between the teacher and the student.

communication between the learner and the teacher.

This qualitative finding also supports of the findings of the second research question, which was investigated through quantitative survey.

Teachers' attitude

Another important aspect highlighted by the students is teachers' teaching quality and their motivation to learn new technologies. Students mentioned that teachers' sincerity, pragmatic way of transferring the contents, and useful teaching methods help students motivate online classes. Without these qualities of the course teacher, the online portion of the blended learning becomes relatively meaningless. Students' perception of this topic is reflected in their statements.

"I find that the proper way of learning depends on....."

teacher's teaching capacity, dedication, and students' interest in learning. And I think engineering or science-related topics cannot be taught properly in online.

power of the teacher to disseminate knowledge pragmatically and the receptiveness of the students.

the quality of the teacher, case studies, and practical implementations.

how teachers teach the students, which is a great way to make everything simple and easy.

I find that the proper way of learning depends on the teacher's method of teaching.

Student motivation/interest

Besides mentioning teachers' attitude towards blended learning, students also reported that students' motivation is also an important element to be benefited from the blended learning environment. Students' motivation and teachers' attitudes are interlinked. A well-framed teaching method grabs students' motivation. Also, motivated students help teachers to be engaged in online activities sincerely. Few remarks from the students are stated below.

"I find that the proper way of learning depends on....."

Students' commitment, motivation, clear academic vision, and teachers' cooperation.

students' willingness, motivation, and access to the resources they want.

the students' interest in the topic as well as the way the teachers explain it.

the situation and the interest of the students.

the interest of the students and on the learning method.

Role of Administrative policies

Administrative policies may impact the effectiveness of the blended learning process. Proper instructions or training from the university authority help teachers to prepare their online class classes more effectively. For example, one student said:

"I find that the proper way of learning depends on....."

whatever the authority decides to teach lessons via online programmes.

From the above findings, it can be concluded that students' perceptions need to be sought before integrating blended learning in university settings. Teachers teaching quality and students learning motivation need to be monitored. University administration needs to adopt appropriate policies and offer workshops and seminars for effective implementation of blended learning.

CHAPTER 5

DISCUSSION OF MAJOR FINDINGS, IMPLICATIONS

From this study, a sample of 226 students was surveyed using a questionnaire about learners' perspectives on integrating blended learning in their engineering education. The general perception of the students was found to be positive. This is because blended learning gives students the ability to control the way they learn outside the classroom. Secondly, it helps them to interact with their peers outside a controlled environment where the teacher is seen to know the content he is teaching. Thirdly, BL enables students to reflect on the content thought and converted into the world of work based on their learning experiences. The following sections discuss the major findings of this study in five dimensions: Integration of BL in their studies, their perception of increased interaction, their perception about environment and autonomy, the proportion of face to face versus online learning in blended format, and the proper way that BL should be conducted.

5.1 Discussion of major findings

Findings attained from this study strongly support that participants of the study have an optimistic approach towards integrating blended learning in their studies. Results in Table 6 confirm that the total average of 58% of the students agrees that integrating BL in the education system is useful and can improve their performance. This finding is in line with Wichadee's (2017) study which shows that students who are taught through blended learning have better performance than those who are taught face-to-face mode. This happens because collaborative learning is a contributing factor to active better learning outcomes. The students' benefits through blended learning are not

limited to sharing knowledge, offering opportunities to those with low capability and teamwork. However, the team can answer BL personal responses before the intervention of the teacher. On this point, we conclude that integrating BL in their studies is a good idea, more specifically during the period when students cannot attend class at their convenience. If BL is introduced to students mainly during this period of COVID-19, students can learn from home and communicate with their classmates and teachers online.

The results in table 7 show whether the integration of BL would increase interaction. The constructs of this item results show that 50.5% of the students agree that, on average, BL improves their communication at both student-student and student-teacher levels. Besides, BL provides an easy way to get feedback from the teachers, comments from the whole class, and quizzes online. Further, BL provides opportunities for collaborative learning. This is in line with Arkhipova's (2017) study, in which the authors ascertain that BL brings a harmonious balance between traditional and online classes. They further establish that BL activates connectedness and increases the activity of students during learning. BL demonstrates the ability of students to communicate and improve other skills in training. This enables students to learn how to modularize principles, split materials by their difficulty, and ask questions only in places where they find it difficult. By principle, students tend to connect during the online group classes, tasks, and exercises.

Table 8 shows the students' perception of the BL environment and its impact on boosting autonomy. The total average of 56.8% of the students agrees that BL, in general, enables them to work at their pace. Besides, it allows them to manage their time effectively. Further, BL helps students to learn independently. This result supports the findings of Dikmenli's (2013) study. They state that the students' attitude towards BL courses usually is high in both BL and virtual classroom applications. Students make significant contributions to their academic achievement in online

learning than face to face. Students attribute their achievements to the fact that they can effectively use multiple sources of material to learn and interact with other students and teachers more effectively in online mode than in the face-to-face mode. The students can easily merge learning in multiple directions, depending on the sources they come across first.

Additionally, the students subjected to BL establish much better student-teacher interaction and obtain much greater satisfaction in teacher support, course targets, course content, and perceived institutional support. On the students' perception of the learning environment, we conclude that even if the average of perception is slightly above 50% BL provides a sufficiently better environment for students to learn. This enables students to craft and combine material from different sources in addition to their experiences to learn the subject content. It also enables them to interact with teachers at a substantially high level beyond material thought in their classes. Therefore, BL provides a better environment for teaching engineering courses, where the theoretical part can be taught remotely, and the practical part can be taught in the laboratory or the field as industrial training, internships, and apprenticeships, among others. With BL in person, attendances can be boosted and controlled.

From the analysis of the proportions in the study, most of the students prefer 85% face-to-face, followed by those who prefer 60% face-to-face, those who prefer 50% split online, and those who prefer 60% online. The findings of this study reveal that very few students prefer wholesome online or face to face. Instead, students prefer a mix of an online and face-to-face mode of teaching, where the significant portion may be taught in face-to-face mode and the remaining in online mode.

Most students find proper learning in BL environment motivated by the teachers' and students' interactions, commitment of the teacher to teach regularly using either of the moods. Students' interest in learning the material, availability of technology and commitment of the university,

availability of guiding policies including teaching methods may have an impact on the effectiveness of the BL model.

From the analysis of proportions, the data shows an average percentage of interest found among learners for the online courses to be taught along with the face-to-face sessions. 65% of the students find blended learning more interesting than face-to-face. Students have an optimistic approach towards integrating BL. Also, the perception of the students about integrating blended learning Engineering education as per this study is positive, which is in line with the study done by Bukhari and Basaffar (2019).

5.2 Implications of the study

Considering the usefulness of blended learning, as perceived by the participants of this study, blended learning mode can be integrated at the university level to enhance teachers' teaching quality and students' learning ability. This study also has implications for introverted students who feel shy in face-to-face communication. As blended learning provides opportunities to accelerate the interaction among peers and teachers, integrating BL could help engage the introverted students in the learning process.

From this study, BL contributes to learning in engineering education compared to face-to-face, which is justified through this research. Therefore, this implies that adopting blended learning mode has a significant impact on students' learning based on their perceptions. Secondly, the BL approach causes a meaningful difference in the perception of students towards engineering courses. BL comes with significant improvement in interaction, communication, and exploration.

This study will be of great value to the policymakers of IUT and other universities in Bangladesh in different ways. For example, they can formulate BL policies that favor students learning interactively and interestingly. This study also discusses what percentage of online and face-to-face mode to be included in Blended learning mode.

5.3 Limitations

The sample size was relatively small in comparison to its population. A study with a bigger sample may evolve more inclusive results. Also, the study was done in one university therefore a comparative study may be needed to ascertain if the same conditions are met in other universities. This study was conducted during the first phase of the COVID-19 pandemic; other than the international students most of the local students were out of campus. Students psychological state might not be normal during the COVID-19 pandemic. Some students might have participated in this study, and their psychological condition might impact their responses, which was not considered in this study.

CHAPTER 6

CONCLUSION, AND RECOMMENDATION

6.1 Recommendations

1. It is recommended that BL approaches be applied to engineering courses to boost continuous learning as long as full utilization of the advantages of the BL technologies is available to students and teachers.
2. It is also recommended that out of the class activities are provided to the students to access the BL platforms to promote efficient integration.
3. This study recommends that a proper framework that integrates policies, content, stick holders, and the university administration may be created to enable appropriate BL activities.
4. It is recommended that homogeneous technologies be adopted for all engineering courses to enable students, teachers, and evaluators to complete activities.
5. Lastly, It is recommended that outcome-based BL may be adopted for streamlining contents to ease teaching, learning, and evaluation.

6.2 Conclusion

There is an increase in the need to integrate BL in students' curriculum at the universities to stimulate teaching and learning and represent efficient ways of organizing the educational environment. BL mode allows academic process participants to harvest benefits of the technology, collaboration, boosting motivation, and encouraging personalized approach into learning. BL

consists of technologies that encourage communication between the students and their teachers, intensifies different components and activities, forming in-depth and reliable skill acquisition. Introducing BL may result in a class boost of morale and creativity. Thus, the process of BL to improve education in engineering among students is a subject of continuous research. The evidence provided herein is that BL enables useful learning, increases interaction, and boosts autonomy. Further, we ascertain the most appropriate way of portioning face to face and online sessions in the BL methodology. Lastly, our study lists appropriate mechanisms for integrating BL in the university. In the future, studies on individual effects on students BL concerning courses taught, gender, residential status of the students may be appropriate. Secondly, studies on BL's teaching tools to improve teaching and learning among different groups of learners at the university may be explored. Thirdly, students' performances in the BL environment is another area of lucrative research. Lastly, concerning upcoming technologies, the integration of social media such as Facebook and Twitter into the BL platform to improve students' learning may provide a new avenue of research.

Future studies may be conducted to ascertain the relationships among variables that affect students' academic performance in general, cutting across all departments. Studies that represent the academic performance of students who experienced BL in the university and their post-university performances at the place of work may also be an area of investigation for future researchers.

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Appendix

QUESTIONNAIRE

To the respondents:

Please consider each item carefully. Your answer to the questions will help and provide awareness on *Learners' perspectives on integrating blended learning: a case of Islamic University of Technology (IUT)*.

Your answers will be kept highly confidential.

RESEARCHER
AQEL AL-SURAIMI

Directions: Kindly fill up the following and put a checkmark (✓) on the following information which suggests to you.

Name : _____ Student ID: _____
Department : _____ Gender : Female Male
Year of study : _____ Status : Resident Non-Resident

What is Blended Learning?

Blended learning (BL) is a method of instruction that combines face-to-face and online learning. BL has two components:

1. Face-to-face component (for example, physical classroom teaching-learning environment)
2. Online component (for example, Google classroom, Zoom, etc.)

SA: Strongly Agree, **A:** Agree, **N:** Neutral, **D:** Disagree and **SD:** Strongly Disagree

S/ N	Items	SA	A	N	D	SD
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Do you think the integration of BL is useful for student learning?						
1.	Blend of face-to-face and online teaching-learning method is the best way of delivering course contents.					
2.	Blended learning (BL) helps the learners to have better academic performance.					
3.	BL facilitates the learners' access to essential resources.					
4.	The Integration of BL accelerates education progress.					
5.	The Integration of BL is an enhanced way of learning Engineering courses.					
	Do you believe that the integration of BL will increase your interaction?	SA	A	N	D	SD
6.	Blended learning increases student-student communication					
7.	Blended learning improves Student-Teacher communication					
8.	Blended learning is beneficial to get teachers' feedback.					
9.	Blended learning provides opportunities to get peers' comments/ suggestions					
10.	Blended learning provides opportunities to work on collaborative projects.					
	Do you believe that the BL environment will boost your autonomy?	SA	A	N	D	SD
11.	Blended learning helps me to work according to my own pace of work					
12.	Blended learning provides the opportunity for effective time management					
13.	Blended learning allows to do independent task-work environment					
14.	Blended learning helps me to learn the way I want to					
15.	I fell interested in joining Blended learning courses at my university					

16. Which proportion of face-to-face and online sessions do you suggest?

- a) 40% Online 60% face-to-face sessions
- b) 60% Online 40% face-to-face sessions
- c) 85% Online 15% face-to-face sessions
- d) 15% Online 85% face-to-face sessions
- e) 50% Online 50% face-to-face sessions

Others (.....)

17. Please complete the below sentence –

"I find that the proper way of learning depends on....."