MASTER OF SCIENCE IN TECHNICAL EDUCATION (ELECTRICAL AND ELEETRONIC ENGINEERING)

Identifying major problems faced by Government Polytechnic Teachers to conduct lectures through blended teaching in Bangladesh.

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BY

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Thesis submitted in partial fulfillment of the requirements for the degree of **Master of Science in Technical Education** with specialization in **Electrical and Electronic Engineering**

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DECLARATION

This project work is authentic, and it is an outcome of the investigation carried out by **Md. Bulbul Islam** under the supervision of Prof. Dr. Md Abu Raihan**,** in the Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), Organization of Islamic Cooperation (OIC), Gazipur, Bangladesh. It is hereby declared that this thesis/report or any part of it has never been submitted elsewhere for the award of any Degree. All literatures and contributions cited are fully acknowledged.

_____	_____
Prof. Dr. Md Abu Raihan	**Md. Bulbul Islam**
Supervisor	Student No.171031201

DEDICATED

This thesis is dedicated to my family for all their continued love and support. First and foremost to my beloved Mother ***Mrs Rabia Khatun*** *for all of their support and encouragement. You have successfully made me the person I am becoming.*

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The researcher also likes to convey his deep gratitude and appreciation to the members of the committee for their guidance and valuable suggestions regarding this study.

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Md. Bulbul Islam

ABSTRACT

This study explained of what are the problems faced by the teachers to convey lectures using blended teaching learning process in polytechnic institute to teach the students in polytechnic. A total of 108 teachers are from government polytechnic institutes are interviewed with a set of 29 questions in a questionnaire. The results of frequency count that the difficulties of blended teaching is more than the benefits. There were also some positive signs of quick adaption of blended learning and blended teaching. Inadequate logistic support causes the obstacle to achieve the goal of blended learning in Bangladesh. But to achieve the goal of blended teaching and learning need to develop the systems of education. The scale used in this study is five point rating scale (strongly agree to strongly disagree). Blended learning has gained considerable popularity in training and education in recent years. This form of teach which combines face-to-face teaching with some technological aids has been widely used in teaching and learning, making it suitable to be applied in teaching and learning mathematics. A courseware has been developed on the topic of application of integration. It is designed to supplement the lectures given in class and to assist students studying the topic at their own pace and time.

Blended learning offers many opportunities for both the teacher and the student that a traditional brick and mortar classroom may not. With the increasing demands of state standards and busy school days, blended learning permits students to learn a portion of the academic content at home and gives teachers the ability to engage students in a richer, deeper, and more meaningful context in the classroom.

Blended learning enables the teacher to become more of a participant in student learning and can help facilitate student mastery of content with enriching learning activities introduced and completed when the class meets face to face.

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Chapter 1

Introduction

1.1: Introduction: Blended learning (BL) or hybrid learning describes a learning environment that either combines teaching methods, delivery methods, media formats or a mixture of all these. It also refers to the integrated learning activities such as a mixture of online and face-to-face learning. (Ahmad, Shafie, & Janier, 2008)The definitions of learning communities vary, but simply, a learning community is the combination or integration of sets of courses within different disciplines (with something in common) taught to the same cohort of students. (Abbondante, Caple, Ghazzawi, & Schantz, 2014) Blended learning is the collection of the different ways that teachers make to keep students interested, inspired, motivated and driven even after the long time of the completion of their particular courses. In addition, it is the fusion of individual lessons, group lessons and phone lessons. The crucial factor in blended learning is the electronic support coming from E-learning. In comparison to other countries across the world, blended learning is quite new in teaching and learning methodology in Bangladesh. Time has emerged for blended learning as a substitute learning process to the face to face traditional learning techniques. Teachers, students and their parents, administrators in universities virtually feel the importance of a fresh process in learning and teaching sectors over the country. Specially, blended learning as a substitute of traditional learning method was supposed to welcome. But the scenario as to the expectation is completely different. Only text-based lecturing is the way of teaching and learning mode in Bangladesh. The support that requires for the implementation of blended learning is inadequate at this moment.(Hossain, 2013). With the advancement of technology, it is possible to revolutionize the way people learn and to present the information to them. Most of the traditional instruction, students learn from the instructor-led approach. Usually in a traditional classroom setting, students have access to the experts, involved in questions and discussion, exposed to social interaction and have the opportunity to learn from others. Some students prefer an individualized or less structured environment.(Ahmad et al., 2008).

Blended learning offers many opportunities for both the teacher and the student that a traditional brick and mortar classroom may not. With the increasing demands of state standards and busy school days, blended learning permits students to learn a portion of the academic content at home and gives teachers the ability to engage students in a richer, deeper, and more meaningful context in the classroom. Blended learning enables the teacher to become more of a participant in student learning and can help facilitate student mastery of content with enriching learning activities introduced and completed when the class meets face to face.

Blended learning is a hybrid teaching strategy that combines technology and teacher instruction in the 21st century classroom.

In blended learning, students are given a certain level of control over the time, place, pace, or path of online instruction. Students can skip forward, rewind or pause online content. In some cases,

students can choose the time of day at which they learn or even the place in which they learn - whether it's in a coffee house, library or classroom.

Emerging research shows promise for the blended learning strategy for students who have grown up consuming personalized digital content. Blended learning can empower students to learn in ways that work best for them. It also allows teachers to delve into deeper learning through small-group work, or one-on-one discussions with students who need it most.

Blended learning is now part of the learning landscape in higher education, not just for campus-based courses but for courses designed for students studying at a distance as well as for communities of professional learning and practice.

1.2: Background and statement of the problem:

Blended teaching is very important topic in education. It introduces with new information and communication technologies for the development of innovative learning environment and to improve teaching system. The combination of face to face learning and web based e-learning refers to blended learning. It reduces classroom contact hours and especially to bridge the learning gaps between the developed and the developing countries like Bangladesh. "Educational institutions around the world are adopting blended learning (a combination of face-to-face in-class and online course delivery)"(Mirriahi, Alonzo, McIntyre, Kligyte, & Fox, 2015). The definition of blended teaching is not unique. Actually blended teaching system combines 'face-to-face instruction with computer mediated instruction. "Blended Learning, sometimes known as hybrid learning, refers to a mixing of different learning environments. Blended learning gives learners and teachers a potential environment to learn and teach more effectively and efficiently. Essentially, a blended course is a synthesis of a pure online course and a pure face-to-face traditionally taught classroom experience. Part of the course content is taught face-to-face with other portions delivered electronically and independently by students on their own time"(McNeill Jr, 2011).Blended learning environment as the combination of instruction, both methods and delivery media from two initial learning environments, the traditional face-to-face learning environment and the ICT-mediated or e-learning environment(Gyamfi & Gyaase, 2015).

If we define the blended method then we get three definitions "combining instructional modalities or delivery media, combining instructional methods, and combining online and face-to-face instruction. The first two definitions are too broad because they include most courses, which use at least two instruction methods or modalities (i.e. face-to-face lecture and textbook readings). The last definition, which combines online and face-to-face instruction, can be implemented in three ways: providing online materials similar to the course contents, providing online materials as supplementary resources, and replacing portions of the face-to-face contents with online materials"(Alebaikan & Troudi, 2010). The goal of this study will effectively deliver the lecture

with using blended method. Nowadays the blended method are largely effect on education. All classroom have computer or other computer mediated resources. “Assess to the internet from the classroom allow the teacher to link and to display any web site to provide additional support to course content”(McNeill Jr, 2011). Blended teaching is challenging for our country. Because the maximum teachers like to teach using traditional teaching system. “Online learning and teaching is rapidly increasing in many countries”(Dabner, Davis, & Zaka, 2012). The government should take initiative to establish blended teaching method. Students will get more benefit, if government takes the step to establish this method. “Blended or hybrid course offerings in higher education are commonplace and much has been written about how to design a blended course effectively”(McGee & Reis, 2012). “Current views of hybrid/blended learning are combinations of educational theory and technology. Blended and hybrid are both terms used to define courses that are designed to meet in one or more delivery modes. First is the most narrow and commonly used form in which students meet on campus and participate in asynchronous online activities. Second is the more broadly articulated framework of online courses that utilizes synchronous meetings and social network technologies blended with asynchronous work and possible face-to-face meetings to structure a course. Third is a combination of campus based and online students who interact but are physically separated”(McGee & Reis, 2012).The distinction between “hybrid” and “blended” courses is not clearly articulated in the best practices literature. The popular use of the term “hybrid” to describe multiple systems that work independently to offer a service or function. One distinction is that may assist in clarifying the difference between the terms. Hybrid suggests that one mode is unused while the other is used. Blended suggests that there are no perceivable notifications when modes shift, if they do at all. In this manner, blended courses are then seamlessly operational where the transition between classroom meeting and online component is minimal. The use of the term blended is key to understanding the affordance of blended and clarifying what makes a blended course truly blended (McGee & Reis, 2012). The time required by instructors who implement blended courses will increase because they must develop digital content and moderate online learning. Transforming traditional courses into blended courses will require more instructor time than developing traditional courses because of the necessity of redesigning the course(Alebaikan & Troudi, 2010).

1.3: Purpose of the study: The aims of this study is that, investigate the difficulties faced by the teachers during using blended method in teaching learning process.

1.4: Significance of the study:

The new teaching dynamics in blended teaching have begun to change the role of educators. With the growth of accessibility to the internet and its use, faculty members have struggled to balance their different roles. In addition to their teacher-centered courses, educators have begun to teach students how to use new technologies(Ocak, 2010).This study will guide to government educational institutes, especially government polytechnic institutes in Bangladesh on how will they convenient encourage teaching through blended teaching. The convergence of traditional face-to-face and online learning environment that were sharply separated in the past has been in progress by developing blended teaching environment. The roles of educators in blended teaching remain unclear and, therefore, it is necessary to investigate educators' perceptions of teaching blended college courses(Ocak, 2010).Actually "blended learning is the collection of the different ways that teachers make to keep students interested, inspired, motivated and driven even after the long time of the completion of their particular courses"(Hossain, 2013).

1.5: Research Questions:

1. What are the benefits of blended teaching and learning?

2. What are the limitations of blended teaching and learning?

3. What are the difficulties faced by teachers in using blended-teaching and learning during content delivery in the classroom?

Chapter 2

Review of Literature

2.1: Introduction

Blended learning emerged as one of the most popular pedagogical concepts at the beginning of 2000. (; Güzer & Caner, 2014). With an increasing tendency, many researches have reported on blended learning since it flourished. The lack of technological availability prevented blending of traditional face-to-face learning with distributed learning environments. However, within the recent 10 years the introduction of the new technological innovations filled the gap between traditional face-to-face learning and distributed learning environments.(Güzer & Caner, 2014). Distance education is one of the alternatives against traditional instruction(Güzer & Caner, 2014) This chapter will review the growing literature about blended learning and will discuss some of its key issues. Blended learning is a hybrid of classroom and online learning that includes some of the conveniences of online courses without the complete loss of face-to-face contact. The present study used a causal comparative design to examine the relationship of sense of community between traditional classroom, blended, and fully online higher education learning environments. Evidence is provided to suggest that blended courses produce a stronger sense of community among students than either traditional or fully online courses. But it's true that some teachers are not very expert to use blended materials. For them need good training and support from our government.

2.2: Blended Teaching and Learning:

Blended Learning: Blended learning (BL) or hybrid learning describes a learning environment that either combines teaching methods, delivery methods, media formats or a mixture of all these. It also refers to the integrated learning activities such as a mixture of online and face-to-face learning [3]. In other words, BL is a mixture of e-learning and traditional types of learning. It is mentioned as the integrated combination of traditional learning with web-based online approaches, the combination of media and tools deployed in an e-learning environment and the combination of a number of pedagogical approaches [4]. [5] elaborated BL as a set of learning strategies or dimensions that mixes various event-based activities, including traditional instructor-led training, synchronous online conferencing or training and asynchronous self-paced study. Among the benefits of BL reported by recent research [6] were (i) provide students with more control over learning; (ii) help foster critical thinking; (iii) effectiveness of online assessment system and computer tutorials.(Ahmad et al., 2008; Güzer & Caner, 2014) Blended Learning can be described as a learning program where more than one delivery mode is being used with the objective of optimizing the learning outcome and cost of program delivery. However, it is not the mixing and

matching of different learning delivery modes by itself that is of significance, but the focus on the learning and business outcome. Therefore we propose to refine this definition to say:

Blended learning focuses on optimizing achievement of learning objectives by applying the "right" learning technologies to match the "right" personal learning style to transfer the "right" skills to the "right" person at the "right" time.

Embedded in this definition are the following principles:

We are focusing on the learning objective rather than the method of delivery

Many different personal learning styles need to be supported to reach broad audiences

Each of us brings different knowledge into the learning experience

In many cases, the most effective learning strategy is "just-what-I-need, just-in-time"

The experience of pioneers in blended learning shows that putting these principles into practice can result in radical improvements in the effectiveness, reach and cost-effectiveness of learning programs relative to traditional approaches. These improvements are so profound that they have the potential to change the overall competitiveness of entire organizations. Before we share some of this research, let us look at some of the "dimensions of the blended learning"(Ahmad et al., 2008; Singh & Reed, 2001)

Blended learning can keep teaching and learning going even when schools are closed. More important are the opportunities that blended learning offers to extend teaching beyond classroom walls during more frequent mundane events such as sick days, student athletic events, and snow days.

Participants: Twenty Five participants are participated from Junior Instructor Male and Twenty three are from female Junior Instructor and Thirty Five participants are from Instructor are male and Twenty Five are from female. So there are total one hundred eight participants participated for this research.

Blended Teaching:

Blended learning involves course that integrate online with face to face activities. It's involve with the course that are involve with face to face and distance learning. Combining instructional technology and with actual job tasks in order to create harmonious effect of learning. Blended Learning is not so much an innovation as it is a natural by-product of the digital domain creeping into physical spaces.

Broadly speaking, blended learning just means a mix of learning online and face-to-face, which means it's likely your students are already doing some form of blended learning and have for years. As digital and social media become more and more prevalent in the life of learners, it was only a matter of time before learning became 'blended' by necessity.

Teaching using a blended approach is a complex undertaking, where teachers have to address varied discipline and professional learning outcomes, different student capabilities and institutional conditions as well as creating an effective pedagogy by using the strengths of face-to-face and online settings in an integrated fashion. Poor traditional classroom learning has been a major concern in the teaching and learning activity. This conventional chalk and talk‖ method is replaced by pure online learning.(Singh & Reed, 2001) Traditional classroom required the instructor to present, interact, discuss, demonstrate and communicate with students face to face. As well as the students interact and communicate with each other face to face. The instructor has to distribute all the hands on, assignments and exercises to the students all by herself or himself.(Azizan, 2010) Blended learning is expected:

- To develop in education in polytechnic institute.
- To increase learners 'competence and confidence.
- To provide a quality learning experience.
- To develop critical thinking in learning environment.
- To integrate technology as an effective tool to deliver contents to learner.

Blending Offline and Online Learning:

At the simplest level, a blended leaning experience combines offline and online forms of learning where the online learning usually means "over the Internet or intranet," and offline learning happens in a more traditional classroom setting. We assume that even the offline learning offerings are managed through an online learning system. An example of this type of blending may include a learning program that provides study materials and research resources over the Web while providing instructor-led, classroom training sessions as the main medium of instruction.(Azizan, 2010; Singh & Reed, 2001)

2.3: Different types of blended learning: 12 different types of blended learning are given at below:

2.3.1. Station rotation Blended Learning: Station-rotation blended learning is a model that allows students to rotate through stations on a fixed schedule, where at least one of the stations is an online learning station. This model is most common in elementary schools because teachers are already familiar with rotating in centers and stations.

2.3.2. Lab Rotation Blended Learning: The lab rotation model of blended learning similar to station rotation works by allowing students to rotate through stations on a fixed schedule in a dedicated computer lab allowing for flexible scheduling arrangements with teachers enabling schools to make use of existing computer labs.

2.3.3. Remote blended learning: In enriched virtual blended learning, the student's focus is on completing online coursework while only meeting with the teacher intermittently as-needed.

This approach differs from the flipped classroom model in the balance of online to face-to-face instructional time.

2.3.4. Flex blended learning: The 'Flex' is included in types of blended learning and its model is one in which a course or subject in which online learning is the backbone of student learning, even if it directs students to offline activities at times. Students move on an individually customized, fluid schedule among learning modalities. The teacher of record is on-site, and students learn mostly on the brick-and-mortar campus, except for any homework assignments. The teacher of record or other adults provide face-to-face support on a flexible and adaptive as-needed basis through activities such as small-group instruction, group projects, and individual tutoring.

2.3.5. The flipped classroom blended learning: Perhaps the most widely known version of blended learning, a flipped classroom is one where students are introduced to content at home, and practice working through it at school supported by a teacher and peers. In this way, traditional roles for each space are 'flipped.'

2.3.6. Individual rotation blended learning: The individual rotation model allows students to rotate through stations, but on individual schedules set by a teacher or software algorithm. Unlike other rotation models, students do not necessarily rotate to every station; they rotate only to the activities scheduled on their playlists.

2.3.7. Project-based blended learning: Blended project-based learning is a model in which the student uses both online learning either in the form of courses or self-directed access and face-to-face instruction and collaboration to design, iterate, and publish project-based learning assignments, products, and related artifacts.

2.3.8. Self-directed blended learning: In Self-Directed blended learning, students use a combination of online and face-to-face learning to guide their own personalized inquiry, achieve formal learning goals, connect with mentors physically and digitally, etc. As the learning is self-directed, the roles of online learning and physical teachers change, and there are no formal online courses to complete.

For students, the challenge is to seek out models of products, processes, and potential that can provide the kind of spark that can sustain learning while being self-aware enough to know what's working and why and to make adjustments accordingly. Some students need very little to soar, while others need support through very clear pathways that they can guide themselves through with autonomy and self-criticism.

2.3.9. Inside-out blended learning: In Inside-Out blended learning, experiences are planned to 'finish' or 'end up' beyond the physical classroom, but still require and benefit from the unique advantages of both physical and digital spaces. In both the outside-in and inside-out models, the nature of the online learning is less critical than the focus on platforms, spaces, people, and opportunity beyond the school walls. As with outside-in blended learning, there is a need for expert guidance, learning feedback, content teaching, and psychological and moral support from face-to-face interactions on a daily basis.

2.3.10. Outside-in blended learning: In outside-in blended learning, experiences are planned to start in the non-academic physical and digital environments students use on a daily basis, but finish inside a classroom. This could mean traditional letter grades and assessments forms or less traditional teaching and learning that simply uses the classroom as a closed-circuit publishing platform a safe space to share, be creative, collaborate, and give and receive feedback that grows student work.

2.3.11. Supplemental blended learning: In this model, students complete either entirely online work to supplement their day-to-day face-to-face learning, or entirely face-to-face learning experiences to supplement the learning gained in online courses and activities. The big idea here is supplementing critical learning objectives are met entirely in one space while the opposite space provides the student with specific supplementing experiences that the other did not or could not provide.

2.3.12. Mastery-based blended learning: Students rotate between online and face-to-face learning (activities, assessments, projects, etc.) based on the completion of mastery-based learning objectives. Assessment design is crucial in any mastery-based learning experience, the ability to use face-to-face and digital assessment tools is either powerful or complicated depending on the mindset of the learning designer.

Chapter 3
Research Methodology

3.1: Research Design: The study was based on the quantitative method which was followed the purposive sampling method. This chapter describes methods used for data collection, analysis, and interpretation. A quantitative method was used in this research, which includes research design, area of the study, population, sample and research tool and data analysis procedure. The method employed in this research was descriptive type of quantitative research. Descriptive research was introduced to gathering of information about prevailing condition for the description and interpretation purposes.

3.2: Research Field:

The research was conducted on government polytechnic institutes teachers. Five different polytechnic of Bangladesh were selected for conducting the research. The sampled polytechnic were Dhaka polytechnic Institute, Shariyotpur polytechnic Institute, Mymensingh Polytechnic Institute, Kishurgonj polytechnic Institute and Gopalgonj polytechnic Institute.

3.3: Population and Sample:

Population: The target population for this study were the teachers are from government polytechnic institutes under the Bangladesh Technical Education Board (BTEB).

Sampling: The sampling to be followed is purposive sampling method. All teachers of the selected polytechnic institutes were population of the study. The sample from the population were taken on as bellow:

Table: 3.1

Government Polytechnic Institute	Blended Teaching available	Population (Minimum number of teacher)	Sample	Sampling Technique
Total 51 government polytechnic institutes are in Bangladesh. Blended teaching is not available to all 51 institute. Almost 25 polytechnic institutes have Blended-teaching	1.Dhaka Polytechnic Institute	50	35	Purposive Sampling.
	2. Shoriyotpur Polytechnic Institute	30	12	
	3. Mymensingh Polytechnic Institute	35	26	
	4.Gupalgonj Polytechnic Institute	30	20	
	5.Kishurgonj Polytechnic Institute	30	15	
Total		175	108	

3.4: Data Collection tool and procedure: The research will adopt the methods to collect research data by using questionnaires from teachers from the government polytechnic institutes of Bangladesh. Research questionnaire will adopted by the researcher. Above 75% to 80% teachers will be selected to collect out the research data. In this study structured form of questionnaire will

be used as data collection tool. The questionnaire will consist of five point like rating scale. The scale start with 1. Strongly Agree 2. Agree 3.Moderate 4. Disagree and end up with 5. Strongly Disagree. Therefore collecting data from those government polytechnic of Bangladesh were use the formation of rating scale. The questionnaire contains 2 components with 14 items, and was responded to, by the participants using the five-point scale as follows;

Strongly agree (5) Agree (4) Neutral (3) Disagree (2) strongly disagree (1) as shown in Table 3.2

Table 3. 1 Weighted average based on five-point scale

SA (5)	A (4)	M (3)	D (2)	SD (1)
4.50-5.00	3.50-4.49	2.50-3.49	1.50-2.49	1.00-1.49

3.5: Data Analysis and procedure: To conduct a meaningful analysis the negative items were reverse coded. Statistical methods used in this study for the data analysis purpose is descriptive statistics as frequency, percentage, means, and standard deviation. To check the internal consistency of the instrument reliability coefficient was calculated. To examine the hypothesis of each item of the questionnaire, a chi-square test was conducted (non-parametric), with sig. value ($p < 0.05$). Category percentage for each opinion and weighted average were calculated and then tabulated, followed by its detailed interpretation. These tests were considered in the study basically for identifying problems of blended teaching in government polytechnic institute. Data analysis was performed using Statistical Package for Social science software (IBM SPSS v: 25).

Chapter 4

Data analysis and interpretation

4.0 Data analysis and interpretation:

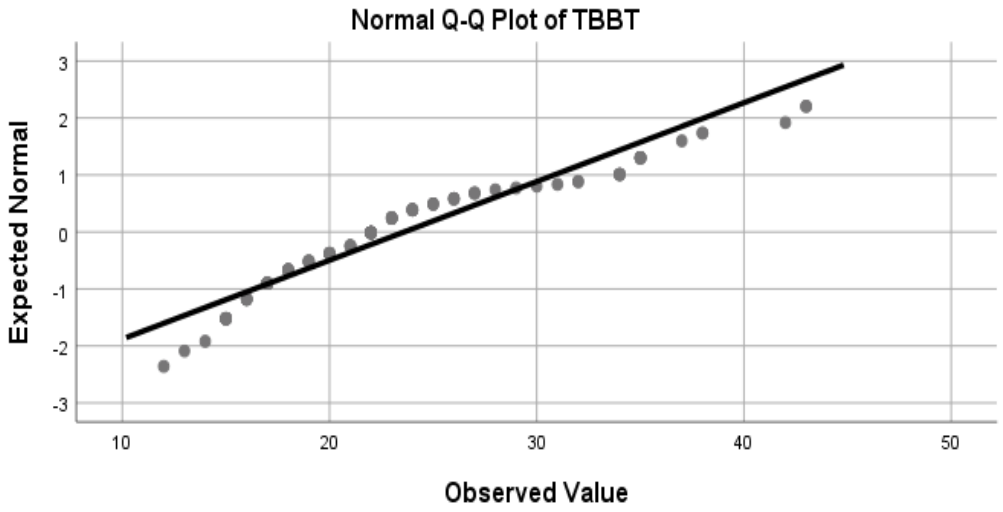
In this section, statistical procedures are presented that were used to analyze both the continuous and categorical data collected from teachers of selected polytechnic. The first section of this chapter discusses about demographic data of the participants. The second section involves analysis of data related to the first and second research question, which are "What are the benefits of blended teaching?" and "What are the limitations of blended teaching?" In this section the data was computed and aggregated, and tabulated in form of frequencies and percentages. Weighted average, means and standard deviations were also calculated. Data analysis related to the second research question, which is "What are the difficulties faced by the teachers during convey lectures using blended teaching?" Chi-square test was conducted by testing the components at 0.05 significant levels. Weighted average, means and standard deviations were also calculated.

4.1 Demographic data:

108 respondents were considered in the sample and questionnaires were distributed to them. The normality of the data was tested before doing any parametric test. Kolmogorov-Smirnov and Shaphiro-Wilk tests are the most widely used numerical method for checking normal distribution. The Sig. value of Kolmogorov-Smirnov and Shaphiro-Wilk tests are greater than 0.05 for this study. From the normal Q-Q plot it was observed that the data points are close to the diagonal line, so the data are normally distributed which satisfied the major assumption required for parametric test. Fig 4.1 shows Q-Q plot of few items.

Normal Q-Q Plots

Fig: 4.1: Normal Q-Q Plots



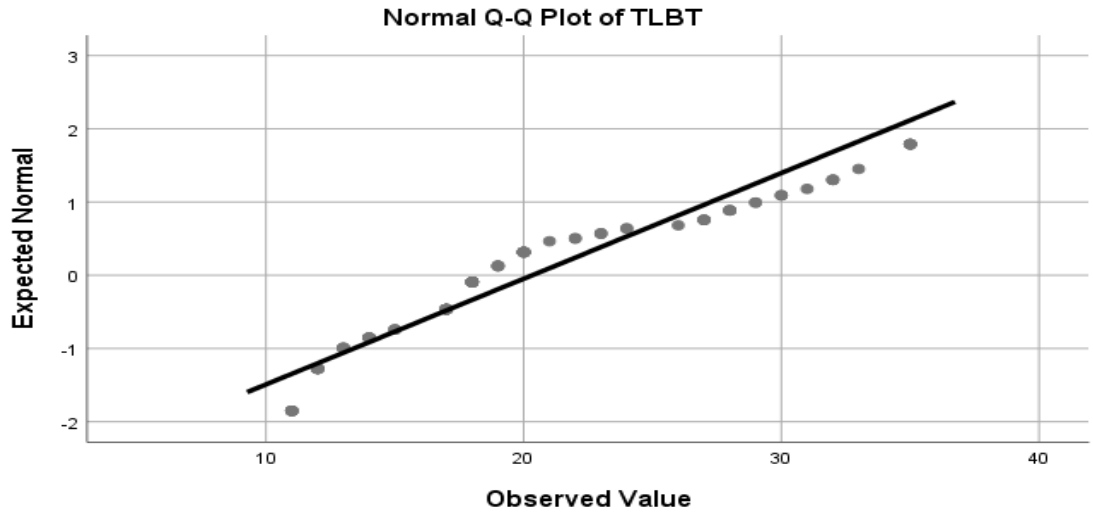


Fig 4.2: Normal Q-Q Plot

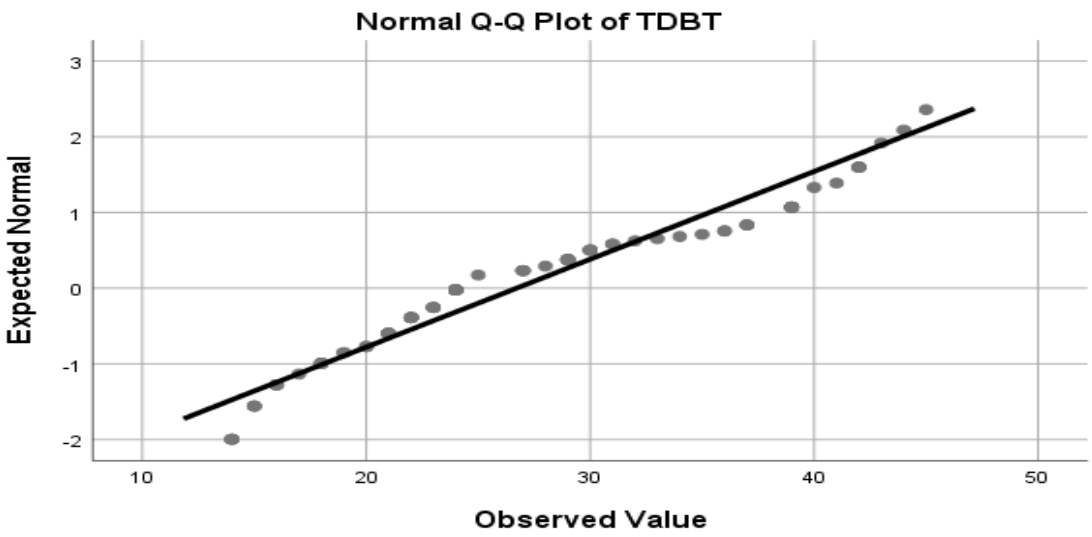


Fig 4.3: Normal Q-Q Plot

Table 4.1: Frequency Distribution

Statistics

		INSTITUTE	DESIGNATION	GENDER	DEPARTMENT
N	Valid	108	108	108	108
	Missing	0	0	0	0

Participants: In this research there are 108 participants. There is no any missing value. Because all of our participants attend to the Questionnaire or items.

Table: 4.2

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	73	67.6	67.6	67.6
	FEMALE	35	32.4	32.4	100.0
	Total	108	100.0	100.0	

About 68% of our respondents are male and about 32% of our respondents are female.

Fig: 4.4 Graph of Gender

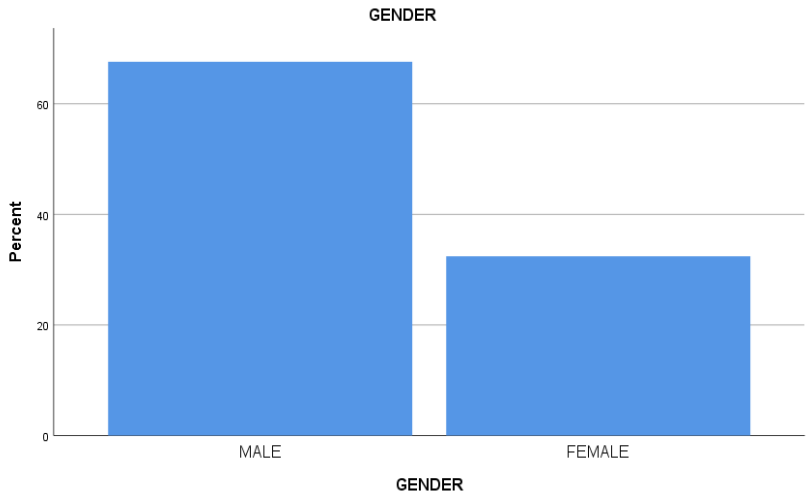


Table: 4.3: Institute

INSTITUTE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DHAKA POLYTECHNIC INSTITUTE	35	32.4	32.4	32.4
	SHARIYOT PUR POLYTECHNIC INSTITUTE	12	11.1	11.1	43.5

	MYMENSINGH POLYTECHNIC INSTITUTE	26	24.1	24.1	67.6
	KISHORGONJ POLYTECHNIC INSTITUTE	20	18.5	18.5	86.1
	GOPALGONJ POLYTECHNIC INSTITUTE	15	13.9	13.9	100.0
	Total	108	100.0	100.0	

Institutions: In this study data was collected from 5 Polytechnic Institute. About 32% of are from Dhaka Polytechnic Institute. And 24% of are from Mymensingh Polytechnic Institute. About 19% of are from Kishrgonj Polytechnic Institute, about 14% of are from Gopalgonj Polytechnic Institute and about 11% of are from Shariyotpur polytechnic Institute.

Fig: 4.5 Graph of Institute

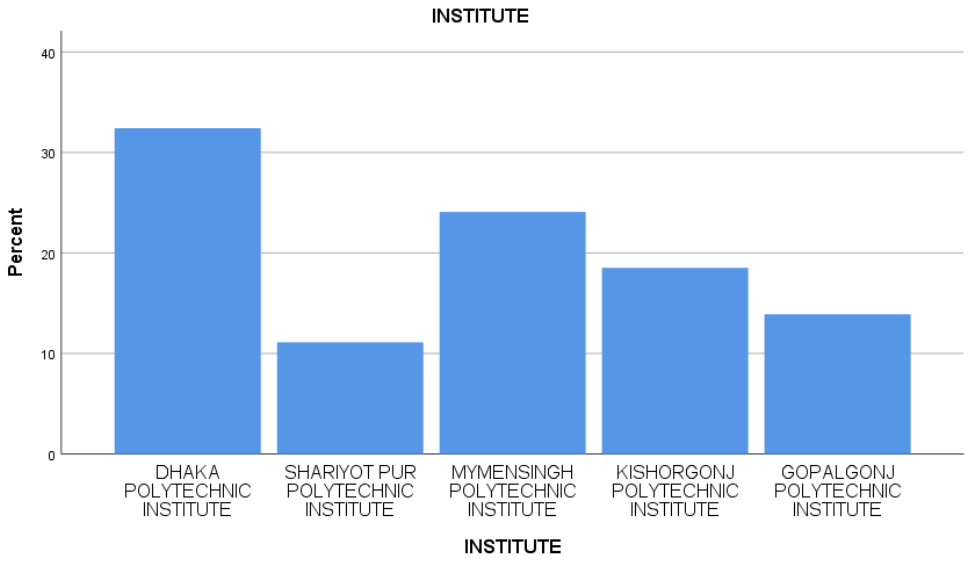


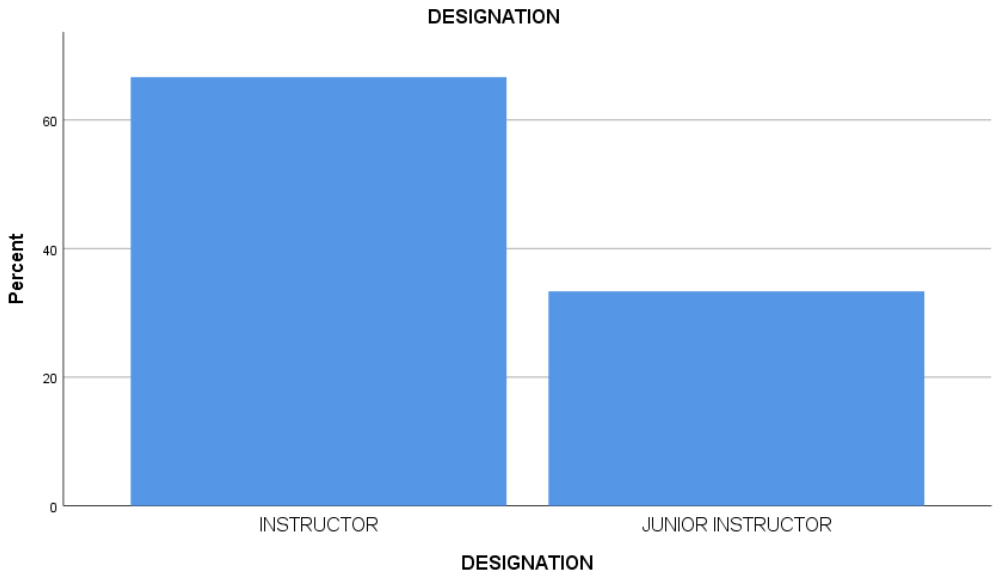
Table: 4.4

DESIGNATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	INSTRUCTOR	72	66.7	66.7	66.7
	JUNIOR INSTRUCTOR	36	33.3	33.3	100.0
	Total	108	100.0	100.0	

Designation: Designations of my respondents are two types. Instructor and Junior Instructor. About 67% of are instructors and about 33% of are from junior instructors.

Fig: 4.6



DEPARTMENT

Table : 4.5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ELECTRICAL	48	44.4	44.4	44.4
	COMPUTER	28	25.9	25.9	70.4
	MECHANICAL	11	10.2	10.2	80.6
	ELECTRONICS	15	13.9	13.9	94.4
	CIVIL	2	1.9	1.9	96.3
	COMMUNICATION	4	3.7	3.7	100.0
	Total	108	100.0	100.0	

Department: The respondents are for my research from 6 department from 5 Polytechnic Institutes. About 44% are from Electrical department, about 26% are from Computer Technology, about 14% are from Electronics department, 10% are from Mechanical Department, about 4% are from Communication Technology and about 2% are from civil department.

Fig: 4.7 Graph of Department

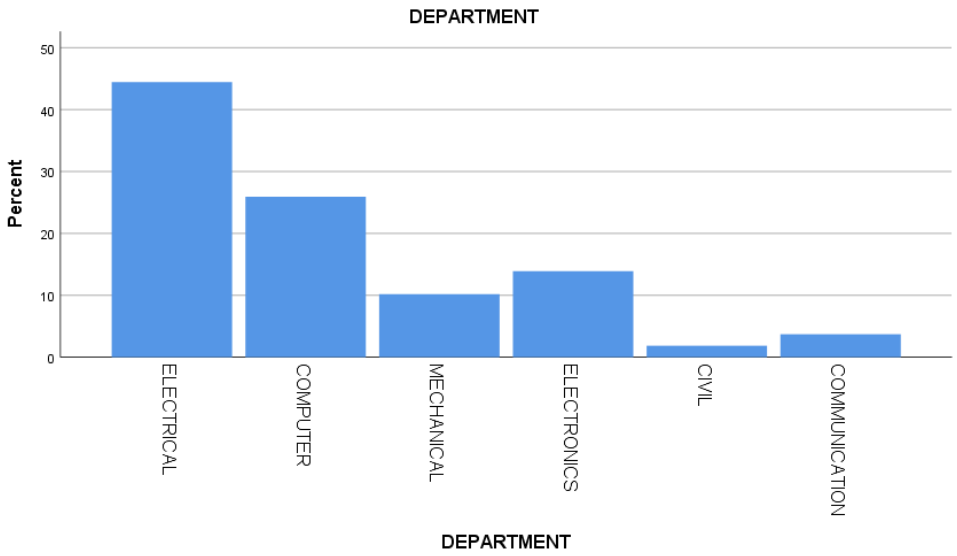


Table: 4.6

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
TBBT	108	12.00	43.00	2549.00	23.6019	.69612	7.23432
TLBT	108	11.00	35.00	2196.00	20.3333	.66680	6.92955
TDBT	108	14.00	45.00	2885.00	26.7130	.82933	8.61866
Valid N (listwise)	108						

The minimum value in the above table indicate the minimum score of every category, the maximum value indicate the maximum score of every category. The sum value indicate the total score of every category. And the mean value indicate the average score of every category. The standard deviation value indicate the standard deviation score of every category.

Table: 4.7

Descriptive Statistics

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
TBBT	.857	.233	-.030	.461
TLBT	.718	.233	-.474	.461
TDBT	.497	.233	-.897	.461
Valid N (listwise)				

The frequency distribution of each category is skewed positively as indicated in table no 4.7 and the kurtosis value of each category is less than that of the normal distribution which means that the score most of our respondents is closed to the mean which described at figure no 4.8.

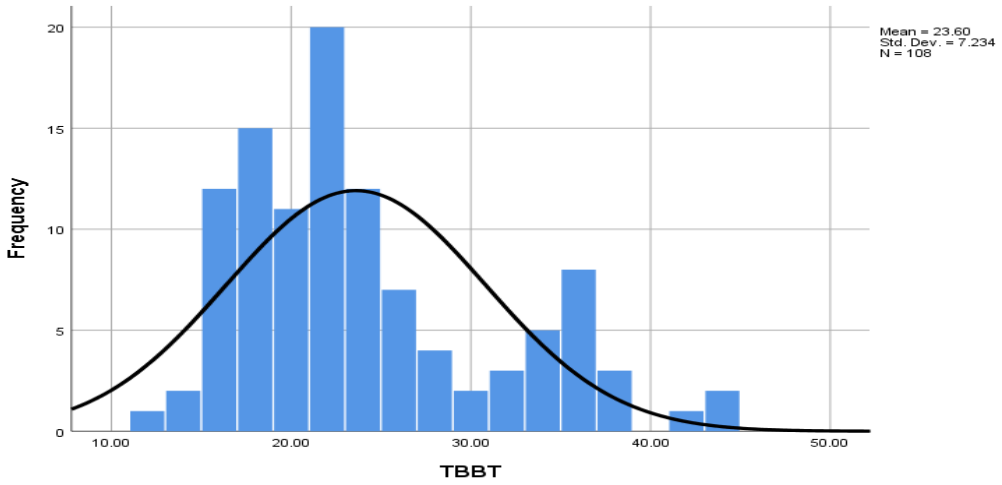


Fig: 4.8: TBBT

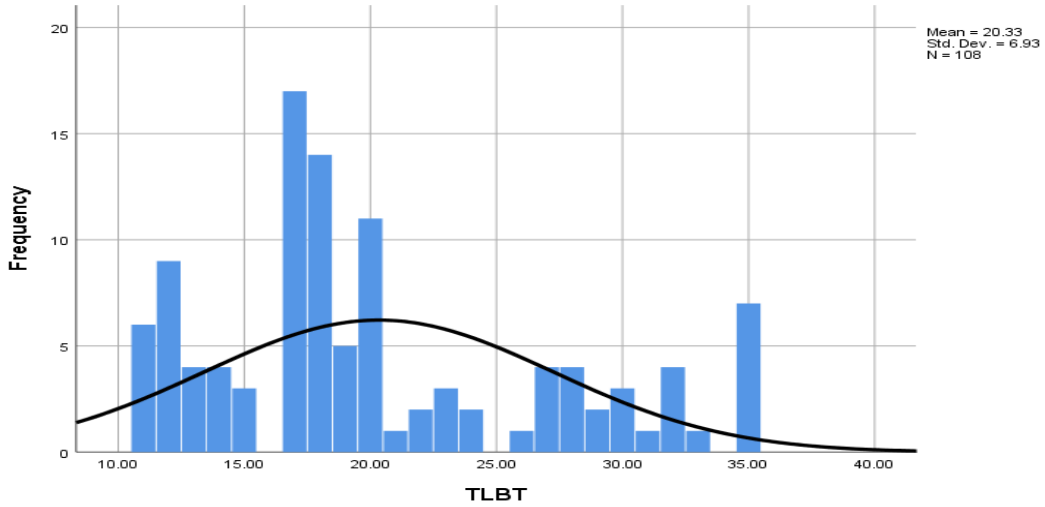


Fig: 4.9: TLBT

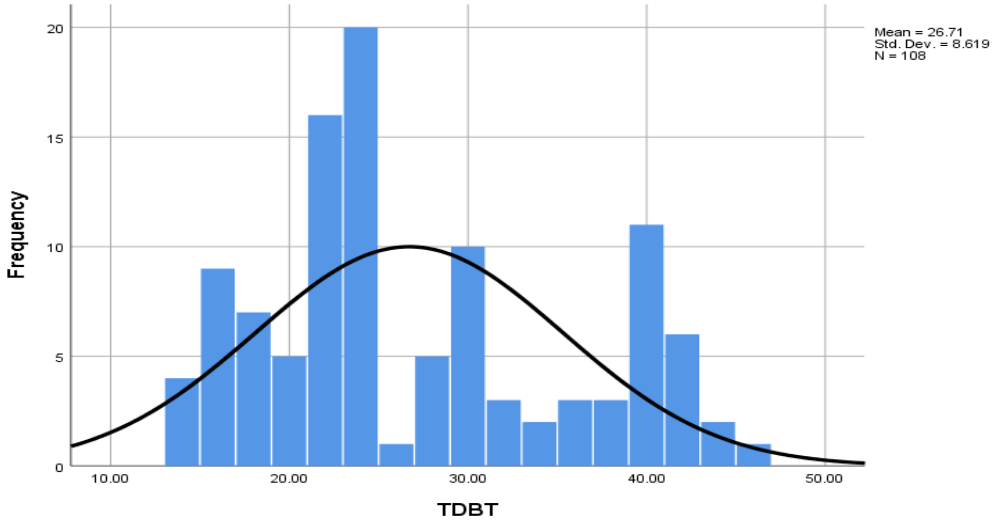


Fig: 4.10 TDBT

Table: 4.8 Tests of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
TBBT	.163	108	.000	.916	108	.000
TLBT	.195	108	.000	.906	108	.000
TDBT	.188	108	.000	.928	108	.000

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
TBBT	108	100.0%	0	0.0%	108	100.0%
TLBT	108	100.0%	0	0.0%	108	100.0%
TDBT	108	100.0%	0	0.0%	108	100.0%

Table: 4.9

Sl.	STATEMENTS	N	SA (5)	A (4)	M (3)	DA (2)	SDA (1)	WA	Chi-square	df	Asm. Sig.
1	It's pretty common knowledge that, different people learn different things in different ways.	108	62	35	3	7	1	4.39	129.407	4	.000
2	Using multiple modalities dramatically reinforces engagement, learning and retention.	108	26	51	22	7	2	3.85	68.574	4	.000
3	Blended teaching and learning encourage demonstrating the effective application of newly learned skills to the workplace.	108	23	50	21	12	2	3.74	59.500	4	.000
4	People learn best when they have some control over their learning. Learners can control the pace of their learning.	108	15	29	39	21	4	3.28	32.926	4	.000
5	Organizations of any size can optimize return on investment by saving costs while increasing engagement and retention by integrating blended learning.	108	23	33	18	28	6	3.36	19.870	4	.001
6	Blended learning allows participants to work with instructors at the facility as well as take assistance from additional online resources while at home.	108	22	24	35	17	10	3.29	15.796	4	.003
7	The students can also avail the opportunity to communicate with their instructors using various online	108	14	43	22	21	8	3.31	32.463	4	.000

	communication methods, receiving advice and support from the class.										
8	Blended teaching and learning strategy also offers a public forum from the experience of others and get solution without the assistance of an instructor.	108	23	28	20	28	9	3.26	11.352	4	.023
9	The strongest aspect of blended teaching is the chance to provide personalized training by every individual, catering to their learning needs.	108	49	45	7	5	2	4.24	100.519	4	.000
10	Blended teaching provides personalized training experiences.	108	15	55	28	8	2	3.67	81.907	4	.000
11	Ineffective use of learning technology tools can waste resources.	108	49	33	17	9	0	4.21	34.963	4	.000
12	Learners must have basic technology knowledge, skills and willingness to learn.	108	29	46	19	12	2	3.81	52.463	4	.000
13	Purchasing the learning technology for blended learning program, such as devices and infrastructure setup, can be costly.	108	23	44	23	8	10	3.57	38.204	4	.000
14	Online learning libraries alone lack the engagement, practical exercise and personal feedback that optimize learning.	108	22	42	23	11	10	3.51	30.796	4	.000
15	Motivation is indeed a critical aspect of blended learning strategy.	108	14	27	36	20	11	3.12	18.944	4	.001
16	If learners encounter too many technical difficulties which cannot be easily fixed, the content may be abandoned completely.	108	11	36	29	21	11	3.13	22.556	4	.000
17	As blended learning mostly based on computer and websites, it requires operational knowledge for successful perseverance among the students.	108	27	24	18	25	14	3.23	5.426	4	.246
18	Most of the teachers in Bangladesh have no basic knowledge on computer operating and even have no email account for communication	108	13	36	20	32	7	3.14	28.019	4	.000
19	Blended learning often relies heavily on technology to deliver online learning experiences.	108	61	32	8	7	0	4.36	71.926	3	.000

20	The digital tools and online assets are not available.	108	29	47	24	8	0	3.9	28.667	3	.000
21	Sometimes the digital tools and online materials are very difficult to use.	108	24	52	16	16	0	3.78	32.444	3	.000
22	Maintenance cost is very high in T-L system.	108	25	40	27	11	5	3.64	35.519	4	.000
23	Blended teaching depend on tools that are sometimes not possible to collect.	108	31	31	25	17	4	3.63	24.037	4	.000
24	Internet speed is very low in blended teaching-learning systems.	108	19	29	30	18	12	3.23	10.981	4	.027
25	Technical skills on blended teaching-learning of both the instructors and the learners are good.	108	19	35	20	24	10	3.26	15.241	4	.004
26	The students and teachers are faced difficulties in accessing the course material for blended teaching and learning.	108	30	19	22	26	11	3.28	9.685	4	.046
27	Some of the learners or students are unaware of instructional technologies used in blended teaching.	108	26	29	23	24	6	3.41	15.056	4	.005
28	The technological tools are inadequate and irrelevance to the course material.	108	25	22	33	25	3	3.38	23.111	4	.000
29	Learners often have the preconceived notion that traditional classrooms are more effective.	108	14	49	21	14	10	3.40	46.352	4	.000

Teacher's response to the statements of the questionnaire:

Statement one: It was observed that overall 97 teachers' opined in the category of strongly agree and agree on statement one, which implies most of the teachers were positive (agree/strongly agree) regarding the statement: Different people learn different things in different ways using blended teaching method. Mean value of this statement is higher than 3.5 (4.49 > 4.39 > 3.5) which means the statement is accepted. The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square* observed χ^2o (129.407) was greater than the *Chi-square critical* $\chi^2 c$ (9.49), that is χ^2o (129.407) > $\chi^2 c$ (9.49), for which

the null hypothesis, responses on this item is not statistically significant, is rejected. Therefore it was statistically significant that different people learn different things using blended teaching method.

Statement two: It was observed that most of the respondent (77) agreed and strongly agreed with the statement. The using of multiple method increase the engagement of retention. The mean value of the statement is higher than 3.5 (4.49 > 4.39 > 3.5) which means the statement is accepted. The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square* observed χ^2o (68.574) was greater than the *Chi-square critical* $\chi^2 c$ (9.49), that is χ^2o (68.574) > $\chi^2 c$ (9.49), for which the null hypothesis: responses on this item is not statistically significant, is rejected.

Statement three: In the third statement most of the respondent 73 agree with the statement: Blended teaching and learning encourage demonstrating the effective application of newly learned skills to the workplace. In this case the mean value is higher than 3.5 (WA = 3.74) which implies the statement is accepted. The Chi-square test was conducted at df = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (59.500) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (59.500) > χ^2c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected.

Statement four: It was observed that 44 participants agreed with statement four: People learn best when they have some control over their learning. Learners can control the pace of their learning. The mean value is 3.28 which is lower than the range 3.5. That means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (32.926) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (32.926) > χ^2c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected. Therefore it can be conclude that People learn best when they have some control over their learning. Learners can control the pace of their learning.

Statement Five: It was observed those 56 participants agreed and strongly agreed with the statement five. Organizations of any size can optimize return on investment by saving costs while increasing engagement and retention by integrating blended learning. The mean value is 3.36 which is lower than 3.5. That means the statement is not accepted. The Chi-square test was

conducted at *df* = 4 with significant value of 0.001, which is less than 0.05 level of significance. Chi-square observed χ^2o (19.870) was greater than the Chi-square critical $\chi^2 c$ (9.49), that is χ^2o (19.870) > χ^2c (9.49), for which the null hypothesis: responses on this item is not statistically significant, is rejected.

Statement Six: In this statement 44 respondents opined in the category of agree and strongly agree with this item. The responses were also in the category of 'Moderate' in terms of weighted average (WA= 3.29) which means most of the respondent allows to work with instructors at the facility as well as take assistance from additional online resources while at home. Chi-square observed χ^2o (15.596) was greater than the Chi-square critical $\chi^2 c$ (9.49), that is χ^2o (15.596)> χ^2c (9.49). For which the null hypothesis: responses on this item is statistically significant, is rejected.

Statement Seven: It was observed that 57 participants agree and strongly agree with the statement seven: The students can also avail the opportunity to communicate with their instructors using various online communication methods, receiving advice and support from the class. The mean value is 3.31 which is lower than 3.5. That means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (32.463) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (32.463) > χ^2c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be conclude that the students can also avail the opportunity to communicate with their instructors using various online communication methods, receiving advice and support from the class.

Statement Eight: It was observed that 51 participants agree and strongly agree with this statement. Blended teaching and learning strategy also offers a public forum from the experience of others and get solution without the assistance of an instructor. The mean value is 3.26 which is lower than 3.5. That means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.023, which is less than 0.05 level of significance. Chi-square observed χ^2o (11.352) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (11.352) > χ^2c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected.

Statement nine: It was observed that 94 respondent strongly agree and agree with the statement nine: The strongest aspect of blended teaching is the chance to provide personalized training by

every individual, catering to their learning needs. The mean value is 4.24 which is higher than 3.5. That means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (100.591) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (100.591) > χ^2c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore the strongest aspect of blended teaching is the chance to provide personalized training by every individual, catering to their learning needs.

Statement ten: It was observed that most of the respondent 70 strongly agreed and agree with the statement: Blended teaching provides personalized training experiences. The mean value is higher than 3.5 (WA = 3.67) which means the statement accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (81.907) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (81.907) > $\chi^2$2 c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected. Therefore it can be concluded that the blended teaching provides personalized training experiences.

Statement eleven: It was observed that the 82 respondent strongly agree and agree with the statement: Ineffective use of learning technology tools can waste resources and the mean value is higher than 3.5 (WA = 4.21) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (34.963) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (34.963) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the Ineffective use of learning technology tools can waste resources.

Statement twelve: It was observed that most of the respondent 75 agree and strongly agree with the statement: Learners must have basic technology knowledge, skills and willingness to learn and the mean value is higer than 3.5 (WA = 3.81) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (52.463) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (52.463) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is

statistically significant, is rejected. Therefore it can be concluded that the Learners must have basic technology knowledge, skills and willingness to learn.

Statement thirteen: It was observed that most of the respondent 67 strongly agree and agree with the statement: Purchasing the learning technology for blended learning program, such as devices and infrastructure setup, can be costly and the mean value is higher than 3.5 (WA = 3.57) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (38.204) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (38.204) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the Purchasing the learning technology for blended learning program, such as devices and infrastructure setup, can be costly.

Statement fourteen: It was observed that most of the respondent 64 strongly agree and agree with the statement: Online learning libraries alone lack the engagement, practical exercise and personal feedback that optimize learning and the mean value is higher than 3.5 (WA = 3.51) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (30.796) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (30.796) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected.

Statement fifteen: It was observed that most of the respondent 41 strongly agree and agree with the statement: Motivation is indeed a critical aspect of blended learning strategy and the mean value is lower than 3.5 (WA = 3.12) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.001, which is less than 0.05 level of significance. Chi-square observed χ^2o (18.944) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (18.944) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it concluded that motivation is indeed a critical aspect of blended learning strategy.

Statement sixteen: It was observed that 47 respondent strongly agree and agree with the statement: If learners encounter too many technical difficulties which cannot be easily fixed, the content may be abandoned completely and the mean value is lower than 3.5 (WA = 3.13) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (22.556) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (22.556) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So it concluded that learner's encounter too many technical difficulties which cannot be easily fixed, the content may be abandoned completely

Statement seventeen: It was observed that the 51 respondent strongly agree and agree with the statement: As blended learning mostly based on computer and websites, it requires operational knowledge for successful perseverance among the students and the mean value is lower than 3.5 (WA = 3.23) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.246, which is higher than 0.05 level of significance. Chi-square observed χ^2o (5.426) was lower than the Chi-square critical χ^2 c (9.49), that is χ^2o (5.426) < χ^2c (9.49), for which is not null hypothesis: responses on this item is statistically significant, not rejected.

Statement eighteen: It was observed that the 49 respondent strongly agree and agree with the statement, Most of the teachers in Bangladesh have no basic knowledge on computer operating and even have no email account for communication and the mean value is lower than 3.5 (WA =3.14) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (28.019) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (28.019) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected.

Statement nineteen: It was observed that the 93 respondent strongly agree and agree with this statement, blended learning often relies heavily on technology to deliver online learning experiences and the mean value is higher than 3.5 (WA = 4.36) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (71.926) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (71.926) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So it is concluded that blended learning often relies heavily on technology to deliver online learning experiences.

Statement twenty: It was observed that the 76 respondent strongly agree and agree with the statement: The digital tools and online assets are not available and the mean value is higher than 3.5 (WA = 3.90) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (28.667) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (28.667) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So that the digital tools and online assets are not available.

Statement twenty one: It was observed that the 76 respondent strongly agree and agree with the statement: Sometimes the digital tools and online materials are very difficult to use and the mean value is higher than 3.5 (WA = 3.78) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (32.444) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (32.444) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected.

Statement twenty two: It was observed that most of the respondent 65 strongly agree and agree with the statement: Maintenance cost is very high in T-L system and the mean value is higher than 3.5 (WA = 3.64) which means the statement is accepted. The Chi-square test was conducted at *df*

= 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (35.519) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (35.519)> $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So it concluded that maintenance cost is very high in T-L system.

Statement twenty three: It was observed that the respondent 62 strongly agree and agree with the statement: Blended teaching depend on tools that are sometimes not possible to collect and the mean value is higher than 3.5 (WA = 3.63) which means the statement is accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (24.037) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (24.037) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So that it concluded blended teaching depend on tools that are sometimes not possible to collect.

Statement twenty four: It was observed that most of the respondent 48 strongly agree and agree with the statement: Internet speed is very low in blended teaching-learning systems and the mean value is lower than 3.5 (WA = 3.23) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (10.981) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (10.981) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So it concluded internet speed is very low in blended teaching-learning systems.

Statement twenty five: It was observed that most of the respondent 54 strongly agree and agree with the statement: Technical skills on blended teaching-learning of both the instructors and the learners are good and the mean value is lower than 3.5 (WA = 3.26) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.004, which is less than 0.05 level of significance. Chi-square observed χ^2o (15.241) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (15.241) > $\chi^2$2 c (9.49), for which the null hypothesis:

responses on this item is statistically significant, is rejected. So the technical skills on blended teaching-learning of both the instructors and the learners are good.

Statement twenty six: It was observed that the 49 respondent strongly agree and agree with the statement: The students and teachers are faced difficulties in accessing the course material for blended teaching and learning and the mean value is lower than 3.5 (WA = 3.28) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (9.685) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (9.685) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So the students and teachers are faced difficulties in accessing the course material for blended teaching and learning.

Statement twenty seven: It was observed that most of the respondent 54 strongly agree and agree with the statement: Some of the learners or students are unaware of instructional technologies used in blended teaching and the mean value is lower than 3.5 (WA = 3.41) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (15.056) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (15.056) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So some of the learners or students are unaware of instructional technologies used in blended teaching.

Statement twenty eight: It was observed that most of the respondent 47 strongly agree and agree with the statement: The technological tools are inadequate and irrelevance to the course material and the mean value is lower than 3.5 (WA = 3.38) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (23.111) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (23.111) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item

is statistically significant, is rejected. So the technological tools are inadequate and irrelevance to the course material.

Statement twenty nine: It was observed that most of the respondent 63 strongly agree and agree with the statement: Learners often have the preconceived notion that traditional classrooms are more effective and the mean value is lower than 3.5 (WA = 3.40) which means the statement is not accepted. The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (46.352) was greater than the Chi-square critical χ^2 c (9.49), that is χ^2o (46.352) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. So Learners often have the preconceived notion that traditional classrooms are more effective.

Summary of the result:

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
TBBT	108	12.00	43.00	2549.00	23.6019	.69612	7.23432
TLBT	108	11.00	35.00	2196.00	20.3333	.66680	6.92955
TDBT	108	14.00	45.00	2885.00	26.7130	.82933	8.61866
Valid N (listwise)	108						

Table: 4.10 Compare of TBBT, TLBT and TDBT.

TBBT: Total Benefits of blended teaching.

TLBT: Total limitations of blended teaching.

TDBT: Total difficulties of blended teaching.

Chapter 5

Discussions and Conclusions

5.1 Summary

The purpose of the study was to find out the problems faced by government polytechnic teachers to conduct lectures through blended teaching method. The study was carried out on the basis of the following objectives:

1. What are the benefits of blended teaching and learning?
2. What are the limitations of blended teaching and learning?
3. What are the difficulties faced by teachers in using blended-teaching and learning during content delivery in the classroom?

The study highlighted the polytechnic teachers performance at their workplace. The analysis reviled that the participant gave overall negative opinion towards the blended teaching. It has more limitations and difficulties than benefits. For the statement wise opinion, responses were on a five-point rating scale i.e. strongly agree to strongly disagree. Category percentage, weighted average, chi-square test were conducted on the responses of each statement of the questionnaire to check whether responses on the statement significant or not.

5.2 Findings:

Findings of the study may classify in following two sections

- Findings from research statement
- Findings according to research objectives.

5.2.1 Findings from research statement:

1. Most of the teachers in Bangladesh have no basic knowledge on computer operating and even have no email account for communication.
2. Most of the teachers don't like to use blended teaching method and they preferred to teach using traditional teaching method.
3. Skills on blended teaching is most important for teachers.
4. Most of the polytechnic don't have the all facilities for blended teaching in Bangladesh.
5. Students and their instructors are not alert to use blended method in classroom.

6. The digital tools and online assets are not available. Sometimes the digital tools and online materials are very difficult to use in blended teaching.
7. Some of the learners or students are unaware of instructional technologies used in blended teaching.
8. The government of Bangladesh do not provide sufficient support for blended teaching.

5.2.2 Findings according to research objectives:

Objectives One: The results from the analysis showed that the benefits of blended teaching in government polytechnic institute are not much suit with the current situation of education systems of Bangladesh. Most of the polytechnic institutes of Bangladesh followed their old traditional teaching method which emphasized on traditional method then blended method. It was observed that Organizations of any size can optimize return on investment by saving costs while increasing engagement and retention by integrating blended learning.

Objectives two: It was observed from the analysis that the limitations of blended teachings are too much and not enough to continue blended teaching properly for different types of problems. The limitations of blended teaching should be eliminate to establish blended teaching learning method in polytechnic institute.

Objectives three: It was observed that the difficulties are faced by teachers are more than benefits of blended teaching and learning. It's very complicated to start using blended method in polytechnic institute without development of necessary equipment's. The strongest aspect of blended teaching is the chance to provide personalized training by every individual, catering to their learning needs.

5.3 Recommendation:

To successfully reduce the problems faced by teachers in polytechnic institution, Collaboration initiatives should be taken on by government of Bangladesh. Various reasons of the most emphasized collaboration objectives feature; the improvement of technical skills for using blended materials. The following collaboration initiatives of polytechnic institutes may consider to enhancing to increase skills in Bangladeshi government institutes. This is one of the fundamental steps through which future students can fully equipped with necessary blended skills required for the understanding the class properly. The government of Bangladesh should formulate the

policies on polytechnic institutes. The technology should be subservient to the function of teaching and the desired learning outcomes.(Singh & Reed, 2001) I think when content is properly integrated there's an interdependence between what goes on in the classroom and what goes on online. There needs to be an ahead-of-time accountability measure, such as a quiz, so that when students show up in class or when they show up online you have a way of knowing beforehand. Skills training may be required both to produce and to use elements of the blended learning content. Appropriate time and resources should be unambiguously ring-fenced in order to provide the necessary training if there is a skills-gap. Decisions made regarding production of content are most pertinent here, and a cost/benefit analysis should recommend whether to produce content in-house or to outsource to an e-learning provider.(Harris, Connolly, & Feeney, 2009)

5.4 Implication:

Blended learning interventions should be appropriately and thoroughly measured, evaluated by participants, and analyzed by the teaching and production team. Ideally, evaluation should take account of: Learning outcomes. Participants' learning styles/preferences, Motivation, Clarity of goals, content, Interaction, Perceived value and satisfaction, Effectiveness, Appropriate support, workload, and assessment, Access to resources, usability and design, How the 'blend' of learning worked, Confidence logs if possible, Evidence of meta-cognition.(Harris et al., 2009) When developing learning and training systems, it is essential to assess user acceptance. Feedback and evaluation from instructors and learners should be incorporated into development(Harris et al., 2009)

5.5 Limitation:

There are three basic limitations to the current study. Firstly, the data was collected through self-reports from respondents, such that there is the potential for self-response bias that may sway the true associations between variables, though this is common in all survey research. To limit this potential bias, combinations of positive and negative items were used in the instrument to ensure that true responses are received.

Secondly, the participants in this study were teachers from selected Polytechnic. To collect data from them, the time schedule and availability of experts need to be considered. Researcher need to describe each an every item to the respondent.

Thirdly, researcher distributes the questionnaire physically. For this reason, researcher need to get the permission of administration to conduct a cross-sectional survey.

Finally, the data in this research was collected using a cross-sectional survey, single administration design. The study collected its response from government polytechnic only. Farther study in future may consider response from more institution and conduct a comparative study between govt. and non-govt. institution.

5.6 Conclusion:

Finally, the examination of the influence of study method variables found that effect sizes did not vary significantly with study sample size or with type of design. It is reassuring to note that, on average, online learning produced better student learning outcomes than face-to-face instruction. (Harris et al., 2009) In conclusion, many important questions need to be asked prior to shifting from traditional face-to- face methods to a blended approach involving electronic delivery and learning. A consideration of the advantages and disadvantages of available approaches may be useful. It is clear that while blended learning has the potential to overcome several of the disadvantages of both traditional methods and e-learning it is important to recognize its limitations. Adequate time, resources and evaluation are critical. . It would be better if the number of polytechnic could be increased in order to generalize the results. Future research may also include a comparison of results in this study with larger sample size using institutional response.

Future Research Direction: In future the researcher may research to find the solutions of these problems faced by the teachers in blended teaching systems.

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APPENDIX

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
Department of Technical and Vocational Education
Board Bazar Gazipur – 1704 Dhaka Bangladesh

SURVEY QUESTIONNAIRE

Introduction:

Dear Respondent/Sir,

REQUEST FOR COMPLETION OF THIS QUESTIONNAIRE.

As a student of Master of Science in Technical Education with specialization in Electrical and Electronics Engineering of the Islamic University of Technology (IUT). I am conducting a research entitled **"Identifying major problems faced by Government Polytechnic Teachers to conduct lectures through blended teaching in Bangladesh".** In this endeavor I wish to collect data from teachers in government polytechnic in Bangladesh with the aim of identifying of the difficulties faced by teacher in using blended teaching and learning methods in their classroom.

Your response will be used only for this study purposes and your name identify will always be kept confidential.

Terminologies Used
TVET: Technical and Vocational Education Training

Section A: General Information

Please choose the best answer matched with to you and draw a mark on the letter (A, B, C, D or E)

1. Name (optional): …….
2. Institute: …….
3. Your present designation

A. Instructor

B. Junior Instructor

4. Department

A. ……..

5. Gender?

A. Male

B. Female

6. Email: ……. Cell: ……

Section B: Research Questions

Scale:

1. Strongly Agree
2. Agree
3. Moderate
4. Disagree
5. Strongly Disagree.

A) To determine benefits of blended-teaching context of the polytechnic education.

- What are the benefits of blended teaching and learning?

[Strongly Agree(SA),Agree(A),Moderate(M), Disagree(DA),Strongly Disagree(SDA]

	Benefits of blended Teaching	SA	A	M	DA	SDA
1	It's pretty common knowledge that, different people learn different things in different ways.					
2	Using multiple modalities dramatically reinforces engagement, learning and retention.					
3	Blended teaching and learning encourage demonstrating the effective application of newly learned skills to the workplace.					
4	People learn best when they have some control over their learning. Learners can control the pace of their learning.					

5	Organizations of any size can optimize return on investment by saving costs while increasing engagement and retention by integrating blended learning.					
6	Blended learning allows participants to work with instructors at the facility as well as take assistance from additional online resources while at home.					
7	The students can also avail the opportunity to communicate with their instructors using various online communication methods, receiving advice and support from the class.					
8	Blended teaching and learning strategy also offers a public forum from the experience of others and get solution without the assistance of an instructor.					
9	The strongest aspect of blended teaching is the chance to provide personalized training by every individual, catering to their learning needs.					
10	**Blended teaching provides personalized training experiences.**					

B) To determine the limitations of blended-teaching context of the polytechnic education.

- What are the Limitations of blended teaching and learning?

Limitations of blended teaching		SA	A	M	DA	SDA
1	**Ineffective use of learning technology tools can waste resources.**					
2	**Learners must have basic technology knowledge, skills and willingness to learn.**					
3	Purchasing the learning technology for blended learning program, such as devices and infrastructure setup, can be costly.					

4	Online learning libraries alone lack the engagement, practical exercise and personal feedback that optimize learning.					
5	Motivation is indeed a critical aspect of blended learning strategy.					
6	If learners encounter too many technical difficulties which cannot be easily fixed, the content may be abandoned completely.					
7	As blended learning mostly based on computer and websites, it requires operational knowledge for successful perseverance among the students.					
8	Most of the teachers in Bangladesh have no basic knowledge on computer operating and even have no email account for communication					

C) To identify difficulties faced by teachers in using blended-teaching during delivering the lecture in classroom.

- What are the difficulties faced by teachers in using blended-teaching and learning during content delivery in the classroom?

[Strongly Agree(SA),Agree(A),Moderate(M), Disagree(DA),Strongly Disagree(SDA]

S/No	Items	SA	A	M	DA	SDA
1	Blended learning often relies heavily on technology to deliver online learning experiences.					
2	The digital tools and online assets are not available.					
3	Sometimes the digital tools and online materials are very difficult to use.					
4	Maintenance cost is very high in T-L system.					

5	Blended teaching depend on tools that are sometimes not possible to collect.					
6	Internet speed is very low in blended teaching-learning systems.					
7	Technical skills on blended teaching-learning of both the instructors and the learners are good.					
8	The students and teachers are faced difficulties in accessing the course material for blended teaching and learning.					
9	Some of the learners or students are unaware of instructional technologies used in blended teaching.					
10	The technological tools are inadequate and irrelevance to the course material.					
11	Learners often have the preconceived notion that traditional classrooms are more effective.					

Thanks for your maximum cooperation
Kinds Regards

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