STUDY ON STUDENT ASSESSMENT SYSTEM OF SOME SELECTED ENGINEERING UNIVERSITIES IN BANGLADESH: THE CURRENT PRACTICES AND THE FUTURE PERSPECTIVES

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RECOMMENDATION OF THE BOARD OF EXAMINERS

It is recommended that this thesis prepared by Ousman Badjie, entitled **Study on Student Assessment System of some Selected Engineering Universities in Bangladesh: The Current Practices and the Future Perspectives** has been accepted as fulfilling the part of the requirement for the degree of Master of Science in Technical Education (M.Sc. T.E.) with specialization in Electrical and Electronics Engineering (EEE).

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DECLARATION

This is to testify that the work presented in this thesis is an original work of me, **Ousman Badjie,** under the supervision of **Dr. Md Abdallah Al Mamun,** Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), The Organization of Islamic Cooperation (OIC), Dhaka, Bangladesh. This work has not been submitted to any other institution for any other degree.

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DEDICATION

I dedicate this research work to the people who have given everything they had just to see me succeed and become a responsible man in life. People who hear my pain when everyone else ignores it and always makes me smile when I think I can't. People who wipe away the tears that the world makes me weep. These are nobody else but my beloved parents the backbone of my every success.

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ABSTRACT

Assessment in education ascertains the extent of achievement of the programme learning objectives by the students and the effectiveness of the delivery approaches and processes used by teachers in educational institutions. The assurances of quality assessment in engineering universities can result in the production of highly competent graduates for the labor market. This study investigates or explores the current assessment systems and practices of some selected engineering universities in Bangladesh through a conceptual analysis of teachers and students on the effectiveness of the current assessment systems and its future perspective. In this endeavor, this study depicts the differences in the perceptions of teachers and students regarding the effectiveness of the current assessment system and practices and its future perspectives. Through the quantitative approach, four (4) engineering universities were purposely selected for this study and responses were received from teachers and undergraduate students of six (6) disciplines (departments) at all levels. The responses of 557 and 131 students and teachers respectively were analyzed. The results indicate that there exists a statistically significant difference between the perception of teachers and students in the effectiveness and also in the future perspectives of the current assessment system and practices. Further analyses indicate that the effect sizes of the differences are large and moderate for the effectiveness and future perspectives of the assessment system and practices respectively. Students had a lower perception regarding the effectiveness and higher perception regarding the future perspectives of the assessment system and practices compared to teachers. Therefore, based on these outcomes engineering universities are recommended to consider the perceptions of their students and teachers, put more emphasis on quality and authentic assessment practices and train teachers in the use of appropriate teaching and assessment methodologies.

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LIST OF ACRONYMS

Abbreviations /Acronyms	Meaning
TVE	Technical and Vocational Education
IUT	Islamic University of Technology
OIC	The organisation of Islamic Cooperation
M.Sc. TE.	Master of Science in Technical Education
EEE	Electrical and Electronic Engineering
APL	Alignment with the Planned Learning
SCA	Student Consultancy in Assessment
AA	Authenticity in Assessment
TA	Transparency in Assessment
DA	Diversity in Assessment
FPA	Future Perspective of the Assessment
EAS	Effectiveness of the Assessment System
BAETE	Board Accreditation of Engineering and Technical Education
SPAQ	Students' Perception on Assessment Questionnaire
TPAQ	Teachers' Perception on Assessment Questionnaire
M	Mean
SD	Standard Deviation
SE	Standard Error
N	Number
CI	Confidence Interval
CSE	Computer Science and Engineering
TE	Textile Engineering
ME/MCE	Mechanical Engineering/ Mechanical and Chemical Engineering
CE	Civil Engineering
IPE	Industrial and Production Engineering
MD	Mean Difference
Sig	Significant
UB	Upper Bound
LB	Lower Bound
Min	Minimum
Max	Maximum
df	Degree of Confidence
ST	Statistics
TM	Trimmed Mean
ENQA	European Association for Quality Assurance
HE	Higher Education

CHAPTER I

1 INTRODUCTION

1.1 Background

As we are living in a dynamic world, where the life of every human being is prone to changes, and the key factors that result in these unceasing changes in the lives of people today are the rapid changing of engineering and technology. Engineering and technology in this era are indispensable in the social, economic, political and edifying life of people. To assure the constant sustenance of the positive development and minimizing or eradicating the negative impacts of engineering and technology, well-trained experts in various engineering and technical disciplines are needed.

The need for competent engineers proliferates day by day especially in a developing country like Bangladesh. The providers of engineering education (engineering universities) are facing endless challenges in competing to produce competent engineers as per the needs and demands of the marked national as well as globally. According to Mohd-Yusof, Helmi, Phang, & Mohammad (2015), "to be competitive and taking role of leadership today and in the future, engineering graduates must have world-class engineering education that equips them with the latest technical knowledge and tools, and have adequate understanding of the social, economic and political issues that affect their work" (p.1). Therefore, to ascertain the competency level of engineering graduates, engineering universities need to assess students' competency-based on standardized and unified assessment criteria for engineering education which are formulated by national or international recognized educational monitory and accreditation bodies, particularly for engineering education.

Assessment is used as a determinant to determine the level of progress, degree of competency and the extent of achievement of students, teachers and the educational institution in general. Engineering universities have different approaches in assessing their students, which becomes one of the factors that might lead to differences in the quality of graduates they produce. Therefore, this study has investigated or explored the current assessment system in some selected engineering universities of Bangladesh, the perceptions of teachers and students on the effectiveness and the future perspectives of the current assessment system specifically. Universities have significant differences in their

institutional and program goals and objectives, which have an influence on the ways they assess their students. The perception of teachers and students on the assessment modalities put in place by these universities are investigated, including what constitutes the effectiveness of the total assessment process.

Furthermore, the objectives of any educational programme should be defined based on the domains of learning or sometimes called elements of competency namely; cognitive (knowledge), psychomotor (skills) and affective (attitude) domains (Raihan, Shamim, Clement, & Lock, 2013). To determine the level of achievement of any educational programme, the assessment must be aligned with the stipulated objectives of that programme. The assessment items should also be designed based on the mentioned domains of learning in order to have a valid and reliable assessment. Therefore, in this study, the perception of teachers and students concerning the total assessment system was compared to determine their level of discernment on the effectiveness and the future perspectives of the current assessment practices. Assessment effectiveness was measured on five scales: i) alignment with the planed learning (APL), ii) authenticity of the assessment (AA), iii) student consultation on the assessment (SCA), iv) transparency of the assessment (TA) and diversity of the assessment (DA). The future perspective of the assessment (FPA) was also measured as a separate scale of its own see *table 5*. However, this entire study focused on undergraduate engineering students of six (6) disciplines in four (4) engineering universities (IUT), (DUET), (BUTEX) and (AUST). These engineering universities were purposely selected based on their unique nature and ways of operations.

1.2 Problem Statement

Assessment in education is to determine the extent of achievement of the whole educational process, which is quite vital for the improvement of the learning of students. Within this educational process, assessment plays a key role in defining the success of the curriculum and the educational system as a whole. However, there exists little research in understanding the insights of the assessment system, specifically in the field of engineering in higher educational institutions. Therefore, a concentrated investigation is warranted to address the gap that exists in the literature. In this study, a deliberate investigation was conducted to bring to perspective the current assessment practices in some selected engineering universities in Bangladesh through navigating into the perception of teachers and students.

1.3 Objectives of the Study

The main objective of this study was to investigate or explore the current assessment systems and practices of some selected engineering universities in Bangladesh through conceptual analysis of teachers and students on the effectiveness of the current assessment systems and its future perspective. The specific objectives of the study were to:

- Compare the perception of teachers and students on the effectiveness of the current assessment practices in the selected engineering universities of Bangladesh.
- Compare the perception of teachers and students about the need for improving the assessment system and practices in the selected engineering universities of Bangladesh.

1.4 Hypothesis

This research tests the following hypothesis to achieve the above objectives of this study:

- There will be no difference between the perception of teachers and students about the effectiveness of the assessment system in the selected engineering universities in Bangladesh.
- There will be no difference between the perception of teachers and students about the future perspective (need for improvement) of the current assessment system and practices in the selected engineering universities in Bangladesh.

1.5 The significant of the Study

For every developing country which includes Bangladesh, the need for skilled engineering graduates is increasing day by day. According to H. Chowdhury, Alam, Biswas, Islam, and Islam (2013, p.864), "the educational institutions, employers, and professional organizations have a keen interest in the quality of education received by engineering graduates who aspire to be internationally mobile especially in today's globalized economy". Assessment is an important component in that educational process, it tells the teacher how prepared the students are for their next level in learning and for the world of work. A well-articulated assessment system is one of the criteria for the accreditation of engineering programs established by the Board of Accreditation for Engineering and Technical Education (BAETE) in Bangladesh (Board of Accreditation for Engineering and Technical Education, 2019). This study has delved into the culture of assessment practices in the selected

engineering education of Bangladesh, which can be used to determine the credibility of engineering graduates and the extent of achievement of programme objectives.

As stated earlier, the objective of every educational programme is to be defined based on the three (3) domains of learning and assessment has to address the achievement level of these domains. At an appreciable level, the student needs to be developed in all the domains of learning. Therefore, this study has given information about the perception level of teachers and students regarding the alignment, authenticity, diversity, and transparency, etc of the current assessment practices in engineering universities and this information can be used to propose improvement measures.

The perception of teachers and students regarding the assessment systems is quite important however, most universities tend to ignore it. In 2010, at New Zealand University, two second-year students expressed concerns due to the persistent grading system; they were no longer enjoying their university experiences. As a result, a pilot study was carried out to explore both student and lecturer experiences regarding the grading process. It was observed that most students were assessed and graded frequently and all their learning was molded in some way by this practice which leads to a lot of negative impact on their lives as a student (Harland, McLean, Wass, Miller, & Sim, 2015). Therefore, this study portrayed the perception of teachers and students of engineering Universities which can serve as a reference to determine the intensity of the assessment load.

In today's globalized world the movement of people is triggered by many factors among which are educational and the searching for greener pasture. "Engineering education has become an integral part of this globalization as engineering graduates from a country can undertake employment in another country through permanent or temporary relocation" (H. Chowdhury et al., 2013, p.864). Therefore, engineering programmes in Bangladesh need to be responsive to the demands of the global market. To ascertain this responsiveness, assessment systems of engineering universities should be aligned with the global objectives for engineering programmes. The system also needs to accommodate students of different capabilities. Therefore, in this study, the extent and need for diversification in the assessment systems of engineering universities were investigated.

After the completion of high school education, students aspiring for higher education join colleges or universities. For students to get admitted into the right programme at the right universities, pre-admission guidance and counseling services are needed (Kochhar, 1984). The findings of this study will serve as a source of information on the assessment system of

engineering universities for guidance and counseling experts in rendering the pre-admission services.

Finally, the outcome of this study may elicit the need for teacher training qualifications to be a requirement for the application of teaching professions.

1.6 Delimitations of the Study

- Despite the limited respondents compared to the real population, the researcher makes sure that responses were received from students and teachers of all the engineering departments, gender, academic year and teaching positions. This also will decrease biasedness that might occur due to the sampling technique implemented.
- For the students and teachers to willingly participate in this study in their good numbers without being bordered about any legal implications, permission was sought from the academic registrars of the universities.
- The analysis methods indicate the differences in the perceptions of the participants however, the researcher further analyzed to depict the magnitude of this difference.
- Due to limited resources (time and money) only four (4) engineering universities were selected for this study however, these universities were carefully selected based on their embodiment of some unique characteristics which may not be collectively found in some other engineering universities.
- Due to the insufficient and untimely funding of this study by the authority (IUT), the researcher took the initiative to finance the entire activities of the study and subsequently request a reimbursement which was not 100 percent.

CHAPTER II

2 REVIEW OF RELATED LITERATURE

This chapter depicts the findings, recommendations and gaps that were portrayed by earlier studies related to the different aspects of this study. Scholars in this field of research have vividly expressed the need for further investigations in the assessment practices educational institutions as it is the final stage of determining the level of progress in any educational system.

Engineering Education is a discipline that when paid attention to can contribute immensely to the total development of any country. According to Lashari, Alias, Akasah, and Kesot (2012), engineers play an important role in the progressive development of a nation. Therefore, establishing an operative engineering education is of paramount importance, where the duty of the engineering educators will be to ensure that the anticipated educational goals are achieved. Some of the ultimate goals and objectives of engineering education are to create thinkers and innovators, individuals who will give immediate, long term and diverse solutions to the pressing problems, people who will transform abstract ideas into concrete and tangible things and create new ideas and knowledge in the domain of engineering.

The employers of engineering graduates are always yearning for high-quality training of students. On that note, continuous research, innovations, and arguments are going on in different aspects within the educational setting which includes assessment systems in universities. “The assessment of students is an activity central to the role of any professional in further and higher education and is an area that is the subject of constant innovation and debate” (Falchikov, 2013, p.2).

2.1 Definition of Assessment

According to Jogan (2019, p.549), “Assessment is like a yardstick which measures teacher and students’ performances”. “Assessment, therefore, is at the heart of education and the administrative functions tend to be a prime motivator for student learning”(Harland et al., 2015, p.2). According to Raihan (2013, p.2), “The purpose of assessment should find out what the students know about not to find what they didn’t know”. Therefore, Assessment is

used as a determinant to determine the level of progress, degree of competency and the extent of achievement of students, teachers and the educational institution in general.

In recent years, educational quality and quality assessment have received a great deal of attention at Higher Educational Institutions in Bangladesh. Most of these institutions face severe resource constraints and find it challenging to improve education quality by improving input facilities (F. Chowdhury, 2016). According to Ghaicha (2016, p.212), **"**at this age of accountability, it is acknowledged that assessment is a powerful lever that can either boost or undermine students learning". Regardless of the willingness of the government for enhancing the quality of education in higher education institutions, the present situation of many of these institutions in Bangladesh is quite dissatisfying. With few exceptions, most of these institutions in Bangladesh have a large influx of students every year but yet failed to provide high-quality education. Students of higher educational institutions are not mastering basic skills and lack creative thinking, analytical abilities and have low achievement in the practical work sphere (F. Chowdhury, 2016). Currently, most of the teachers at higher educational institutions in Bangladesh provide large teaching content to the students that are just for memorization purposes (F. Chowdhury, 2016). School and public policies require instructors to engage in a type of assessment designed to meet the purpose of gathering more information and making decisions about their students (Ghaicha, 2016).

The Board of Accreditation of Engineering and Technical Education (BAETE) of Bangladesh, specifically requires that students should acquire the following graduate attributes:

> (a) Engineering knowledge, (b) Problem analysis, (c) Design/development of solutions, (d) Investigation, (e) Modern tool usage, (f) The engineer and society, (g) Environment and sustainability , (h) Ethics, (i) Individual work and teamwork**,** (j) Communication, (k) Project management and finance and (l) Life-long learning (Board of Accreditation for Engineering and Technical Education, 2019).

These graduate attributes are minimum requirements for every engineering graduate, which was enacted by BAETE in Bangladesh and the assessment system of every engineering programme should be geared to testing the achievement level of these attributes. According to Raaper (2018, p.3), "the European Association for Quality Assurance (ENQA) emphasizes that students should be assessed by published and consistent criteria, regulations and procedures". Therefore, the above graduate attributes are almost in line with the international standard as BAETE is among the provisional members of the Washington

Accord (H. Chowdhury et al., 2013). However, the question will now be, to what extent are the engineering universities adhering to these graduate attributes?

> With the increasing emphasis on classroom assessment, there is a growing movement towards balanced assessment systems. Local (within institution) assessment systems can provide more detailed information about individual students that can be used to improve instruction. These locally developed systems have many supporters and recommendations for their design but relatively little research on the validity and reliability of such assessment systems. In effect, there is little data to show whether teachers are aware of specific components, and applying them appropriately in the classroom, and if meeting the recommended standards. This crossroads, where standardized testing and classroom assessment blend with knowledge of other disciplines to contribute to the development of assessment systems, raises issues pertinent to regular classroom practices of assessment (Ghaicha, 2016, p.217).

2.2 Types of Assessment

Basically, discussions under this topic will be limited to three types of assessment namely formative, diagnostics and summative assessment.

2.2.1 Formative Assessment

This type of assessment is practiced during the instructional process, where the instructor or teacher monitors the progress of learning. Feedback is instant in formative assessment and it enhances the on-going learning and improves students' performance efficiently (El-Maaddawy, 2017). Feedback is an essential element in formative assessment and can be formally or informally given to students during learning. The teacher can also determine the achievement level of his or her teaching. Students are sometimes not graded in such an assessment however, the teacher uses the feedback to guide the students and also determine the effectiveness of the teaching approach. "Formative assessment would encourage self-learning and provide constructive feedback on students' performances. Teachers believe that formative assessment has a profound impact on student motivation and achievement" (Alotaibi, 2019, p.74). Therefore, with formative assessment teachers are constantly cognisant about the progress of the whole teaching and learning process.

However, there are factors that hinder the adoption of formative assessment by the teachers. These factors may include "internal factors, resource-related factors, contextual factors, and other external factors like educational policies" (Alotaibi, 2019, p.74). The impact of all these factors may be controlled starting by inculcating the wiliness into teachers to use different strategies in practicing formative assessment (Alotaibi, 2019), and by organising

training sessions specifically on the implementation of formative assessment because "Teachers' assessment literacy (AL) might influence their practices and syllabuses"(Mellati (Mellati & Khademi, 2018, p.1). Teachers may employ certain strategies like questions and answer sessions during classroom activities, giving of assignments individual and group-wise, giving of classroom quizzes on a specific aspect of the topic under consideration and having one to one discussions with the students, etc.

Figure 1 shows a formative assessment cycle where the student is placed at the center of the cycle indicating that the learner has an important role to play in every stage and both the learner and the teacher have feedback on the assessment process (Harlen, 2006). The judgment of the student's achievements is criterion-based as indicated in figure 2, meaning the student is assessed to determine whether the stipulated learning objectives are achieved or not, and not to award grades to the student. Decisions on the next level in learning are informed by the outcome of the assessment. For instants, if a student is found not competent in any of the given assessment tasks, which may lead to not achieving any of the stipulated objectives, the teacher has to refer to the assessment results in order to use a suitable method of delivery for better achievement of the student. The activities in the boxes of figure 1 represent a thinking process on what to engage in when the student is centered in the whole assessment process.

2.2.2 Diagnostic Assessment

This is an investigatory form of assessment where the teacher tries to diagnose the learning deficiencies and weaknesses of the students prior to the delivery of any new content. The teacher being cognisant of the learning capabilities of the student concerning any topic under discussion may help them to better organize the new content and carefully select the appropriate delivery approach that best suits the comprehension level of the students. Teachers may use pre-test, self-assessment, and interviews, etc.

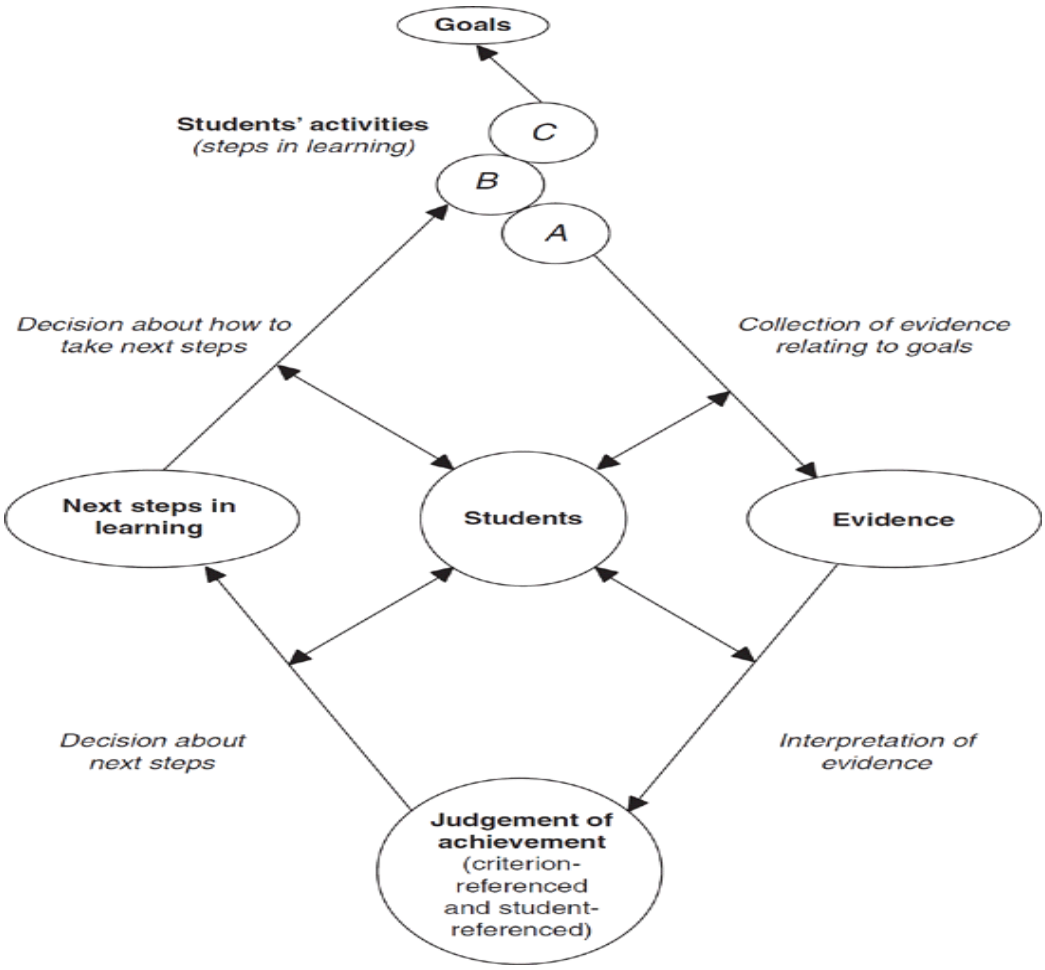


Figure 1: Formative Assessment Process Adopted from (Harlen, 2006)

"Self-assessment is a process by which a learner collects information about himself, and reflects on his/her Learning"(Gashi-Shatri & Zabeli, 2018, p.28). Therefore, in this form of diagnostic assessment, the student can identify his/her strengths and weaknesses. According to Gashi-Shatri & Zabeli (2018), self-assessment can help students continuously assess their level of progress in achieving specific learning goals. A Four-Step Model for Teaching Student Self-Evaluation according to Rolheiser & Ross (2013) and cited by Gashi-Shatri & Zabeli (2018, p.29) are:

- Involve the students in deciding which criteria they are being evaluated on.
- Ensure that students know the different levels of the evaluation criteria and how to produce work at the highest criterion level.
- Help students focus on their self-evaluations by giving feedback; provide examples of what their feedback could have looked like, be sure to praise the efforts they made.
- Help the students create plans of action to improve their performance (2018,p.29).

2.2.3 Summative Assessment

This type of assessment is conducted at the end of the teaching and learning process. As the name implies, it is the summing of the whole assessment scores of the students. According to El-Maaddawy (2017), it involves summing up of achievement at a particular point of time. After this assessment students are awarded grades for the next level in learning or certified for completion of certain units or levels in learning. Teachers use summative assessment to determine the extent of achievement of the stipulated learning objectives and also to evaluate the used teaching methods. Final examinations, final projects, and evaluation of portfolios, etc, can be forms of summative assessment.

2.3 Criteria of a Good Assessment

For an assessment process to serve its purpose the following criteria should be put into considerations: validity, reliability, objectivity, administrability, standardization, and economy of the assessment, etc (Hopkins, 1998).

The validity of an assessment deals with the extent to which the assessment serves its purpose. A valid assessment is considered to be an assessment that realistically measures the achievement level of the stipulated learning objectives. The validity of an assessment has some relations with the reliability of an assessment; however, the reliability of an assessment measures the consistency of the assessment results based on time, assessees and individual assessors. Every valid assessment must be reliable however, an assessment can be reliable while invalid. In that case, one may be deviating from the objective of the assessment be it in any context. An invalid assessment may not have any impact on the teaching and learning process (Hopkins, 1998).

The objectivity of an assessment process portrays how real the assessment is. The scores of an objective assessment should not vary from one assessor to the other, scoring should be free from personal judgments. Proper administering of an assessment process can also be one of the key components which may lead to good assessment. A well organized and planned assessment process, putting into consideration time, place and approach, may have a great impact on the assessment results (Hopkins, 1998).

Finally, standardization and economy of the assessment process are equally important. Standardization of an assessment looks into the ways the assessment is structured in terms of planning, difficulty level when considering the audience, time, place and the scoring of the assessments. An assessment needs to be economical in terms of time, money and effort.

2.4 Teachers' Assessment Literacy and Students' Involvement in Assessment Practices

Many theorists believe that the assessment literacy of teachers is limited because, most receive little or no training in classroom assessment (Ghaicha, 2016). It can be said that teachers need to undergo pre-service or in-service training on assessment where they will be trained on different assessment approaches and systems. According to Mellati & Khademi (2018, p.2), teacher "assessment literacy is the readiness of a teacher to design, implement, and discuss the assessment strategies, measurement tools, evaluation criteria, decision making milestones as well as formative and summative tests". This is why since the 1990s, teacher capacity building programs in several educational systems focused on the development of assessment literacy, including teacher skill to meet 21st century competencies in the design, adaptation and use of authentic assessment or performance assessment tasks (Ozan, 2019).

A mixed study method was conducted by Mellati & Khademi (2018), on teachers' assessment literacy and its impact on their current assessment practices and learners' writing outcomes. In this study, 10 male instructors and 75 male second-year students were selected as participants. The instructors were divided into two equal number of groups, where five of them had high assessment literacy and the other five had less assessment literacy. The students were also divided into two groups, where group 1 and 2 consists of 35 and 40 students respectively. The five instructors with the highest assessment literacy were allocated to group1 and the other five instructors with the lowest assessment literacy were allocated to group2. The researcher subject all the students to pretest and posttest on writing competency. The scores were analyzed quantitatively and it indicates that there exists a "statistically significant difference between the two intervention groups on writing posttest scores F (1, 67) = 57.640, P = .00, partial eta squared = .46 which is a large value".

The results from the qualitative data analyzed depicted that;

> there is a significant difference between the classroom practices of assessment literate instructors and assessment illiterate instructors. The statements confirmed that instructors with low degree of assessment literacy intended to use traditional classroom activities; it means that due to lack of assessment knowledge they were not confident enough to experience new methods and pedagogical learning and assessment tasks and not flexible in choosing various activities, so there were not responsive to the learners' learning(p.13).

The researcher also stressed on teachers' assessment practices based on the research findings that it enhances the quality of their teaching as well as the learner outcomes.

According to El-Maaddawy (2017, p.1), "student-centered learning requires the involvement of students not only in the learning activities but also in the assessment process". As students are key in any assessment process; El-Maaddawy (2017), suggests that effective learning requires students to engage in considerable meaningful assessment tasks and they should focus on the immediate assessment task but also be prepared for lifelong learning. The researcher further mentioned that sustainable assessment tasks need to be 'authentic'.

2.5 Authenticity, Fairness and Transparency in Assessment Practices

An authentic assessment can be defined as an assessment that simulates a real-work experience, for example engaging students in performing tasks and in conditions that resemble a real working environment and evaluating their ability to apply knowledge or perform those tasks in a real working situation (El-Maaddawy, 2017). The ultimate objective of any education is to build minds that will perform at an appreciable level in their immediate social and economic environments. According to El-Maaddawy (2017, p.2), "authentic assessment can help students to develop skills needed in real-life situations, however, it is insufficient to form independent and self-regulated learners".

A study which aims at 'investigating the effect of authentic assessment on the attitudes of prospective teachers towards academic achievement and attitudes towards educational measurement and the opinions of prospective teachers on authentic assessment', was conducted by Ozan (2019), in the faculty of education at the state university in Turkey. The results of the investigation depicted that "authentic assessment significantly increased the academic achievement and attitude towards the educational measurement of prospective teachers and also it's an approach that can serve to provide cooperation between the theory and practice which is a major problem in the field of teacher training in Turkey"(p. 1).

Zlatkin-Troitschanskaia (2019), carried out research in Germany on 'Ethics and Fairness in Assessing Learning Outcomes in Higher Education' where it was suggested at the end of the study that, "when using established and scientifically validated tests in HE practice, it is essential to be cautious and to avoid taking only quick, superficial glances at test scores and hastily interpreting the results" (p.13). The researcher further mentioned that in developing tests, especially for educational purposes, validity, reliability, and fairness must be put into

higher considerations. The American Educational Research Association (AERA, 2014), established the standard criterion for the fairness of assessment or test and it was cited by Zlatkin-Troitschanskaia (2019), as follows:

(A) Equitable treatment of all test-takers during the testing process,
(B) Absence of measurement bias,
(C) Access to the constructs measured and
(D) Valid individual test score interpretations for the intended use(s).

From the above criterions, it can be explicitly stated that the relationship between assessment assessees and assessors should not have any influence on the assessment proceedings. However, recent research has shown that the power that academics have in controlling the assessment process has raise concerns and triggered questions regarding the obliqueness in the assessment process (Raaper, 2018).

A research was conducted by Koul, Fisher, & Earnest (2006), which aims at investigating the relationships among students' perceptions of their assessment tasks, classroom learning environments, academic efficacy and attitude to science in years eight, nine and ten. Part of the specific aims was also to develop and validate a five scales instrument for data collection which was named as *Students Perceptions of Assessment Questionnaire (SPAQ)* and attitude to science and academic efficacy of the students. The researcher administered the questionnaire to almost 1,000 students after which multiple correlations analysis was conducted between the five scales on the SPAQ and students' attitudes to science to find the association among the scales and subsequently regression analysis to find which of the scale has highly contributed to this effect. It was found that all the scales of the SPAQ, were positively associated and statistically significant. However, the regression results depicted that Congruence with Planned Learning, Authenticity, Transparency and Diversity were positively and significantly associated; compared to Student Consultation which was negatively and significantly associated with attitude to science. The same results were experienced between the five scales on the SPAQ and academic efficacy. The researcher further analyzed the difference by gender where it found that with the exclusion of the scale of Academic Efficacy there exist no statistically significant differences between female and male students and male students had higher perception level than female due to the difference in mean value (Koul et al., 2006).

Dhindsa, Omar, & Waldrip (2007), also conducted a study where the aims "were to determine the reliability and validity of the Students' Perception of Assessment Questionnaire (SPAQ) in evaluating the upper secondary science students' perception of the

assessment process" (p.1263). The questionnaire was administered to 1,028 upper secondary science students from four districts of Brunei. The analysis results showed that Congruence with Planned Learning (CPL) and Transparency in Assessment (TA) was highly perceived by the students, this means that students established that their assessment is aligned with the planned learning and that transparency exists in the whole assessment process. This was followed by their perception in Assessment Applied Learning (AAL) and Transparency in Assessment (TIA) However, the students had an extremely low perception of Student Consultations compared to all the other four scales (Dhindsa et al., 2007). These results are somehow contrary to what is found in the study of Assessment practices: Student's and teachers' perceptions of classroom assessment by Mussawy (2009), where Authenticity of the Assessment (AA) has the highest perception followed by Congruence with the Planned Learning (CPL) and subsequently Students Capability (SC). Students exhibit low perception in the scale of Students Consultation on Assessment (SCA) and the lowest perception was achieved in the scale of Transparency in Assessment (TA). However, the average mean score of each of the scales in the study of Mussawy (2009), was more than that of the average mean scores found in the results of Dhindsa, Omar, & Waldrip (2007).

2.6 Alignment with the Planned Learning and Diversity of the Assessment Practices

An assessment process may be considered valid when it is aligned with the planned learning objectives. According to Ali (2018, p.76), "the alignment of assessment is necessitated in order to fulfill the short term learning outcome, but also achieve the longer term". The researcher further suggests that assessment should be a continuous process throughout the whole semester in a university and scoring criteria must be aligned across all courses.

According to research findings on the assessment and evaluation of engineering students' learning by essay test based on the cognitive domain of Bloom's at the Islamic University of Technology (IUT) conducted by Raihan (2013), states that, more emphasis on the sub-domains under cognitive domain is given to remembering than applying, analyzing, evaluating and creating in the question papers of IUT. However, in the field of engineering, the teacher should deliver the instructions in such a way that the students will be challenged to demonstrate their own creativity. Students should have some psychomotor learning objectives besides the cognitive levels. On that basis the research findings the researcher further suggests that the true assessment of the students learning should be based on the

three (3) domains of learning: "(i) Cognitive domain: (development of intellectual abilities and skills), (ii) Affective domain (development of attitudes, beliefs, and values), and (iii) Psychomotor domain (coordination of physical movements and performance)" (Raihan et al., 2013, p.7). Among the recommendations made by the researcher was that future work is necessary for developing the engineering teachers' training program on grading or scoring the students' performance effectively.

In 2010, at New Zealand University where two second-year students expressed concerns about not being able to enjoy their university experience due to the frequent grading culture. This triggered a research exercise and it was observed that students were excessively assessed and graded and all their study and learning were molded in some way by this practice (Harland et al., 2015). Due to the numerous grading, the students had no time for extra-curricular activities, they missed classes to cope with assessment loads, and they felt stressed about the lack of coordination of the assessment task. However, students expressed a preference for having many small internal-graded assessments and felt that large assessments were too high stakes. None wanted to revert to a final examination that carries 100% of marks (Harland et al., 2015). The lecturers also pointed out that due to the constant grading practices,

> they did not know how many assessments each student was subject to as there was little communication between lecturers, departments, and programs; however, they were also reluctant to reduce the number of assessments, despite experiencing high marking loads. This is because the assessment was being used to control students' behavior and resulted in competition between teachers and departments. Lecturers felt that they were under student pressure to give marks for any submitted course work, even when they thought this might not be appropriate. It was recognized that overall grades might not reflect overall performance when small marks were given for tasks (Harland et al., 2015, p.3).

Subsequently, a similar study was carried out in 2013 in the same university and it was found out that, most of the academics accord that current assessment practices limit students from fully realizing their potential as learners, and they the academics wanted smaller assessment loads because the high volume of graded work left virtually no time for formative feedback. However, one lecturer suggested the idea that frequent assessment was the perfect preparation for a challenging world in which students would continue to be assessed, judged and accountable throughout their lives. Students also expressed that their studies are within the realms of the syllabus they will be assessed on (Harland et al., 2015).

This means that they don't have the freedom to read beyond the realms of the prescribed syllabus.

According to Ali (2018), in this era where students have different learning styles, capabilities and disabilities and from the perspective of equal opportunities and diversity, the method of delivery and assessment should be inclusive.

2.7 Future Perspectives for the Effectiveness of Assessment Practices

Based on the above findings and suggestions made by researchers in the aspects of assessment being aligned with the planned learning, assessment being authentic and transparent, students being consulted in assessment proceedings, assessment being inclusive to accommodate students of diverse capabilities and social backgrounds and teacher assessment literacy, it can be noted that there is a need for improvement. On that regard, Stitt-Bergh, Kinzie, & Fulcher (2018), suggest the five elements be considered in the assessment for learning improvement:

1. The aspect of student learning targeted for improvement.
2. Scope of the learning improvement initiative (e.g., course, program, university).
3. Changes in curriculum and/or pedagogy, or experience meant to cause learning improvement.
4. Measures and multiple forms of evidence from at least two points in time to evaluate improvement.
5. Evaluation and interpretation of improvement evidence. (p. 28)

The synopsis of the findings and recommendations articulated above from previous related studies gives an insight into the assessment practices and trends in different educational systems and domains of different countries. However, this study has focused on investigating the perception of students and teachers regarding the effectiveness of the current assessment system and practices and its future perspectives in some selected engineering universities of Bangladesh.

CHAPTER III

3 METHODOLOGY

The methodology used in this research was the quantitative approach. Through this approach, an appreciable amount of data was collected from two types of participants (teachers and students) in four (4) engineering universities of Bangladesh. Information about the population, sample size, data collection instruments, method and the data analysis techniques employed to affirm or reject the above-stipulated hypothesis are discussed subsequently in this chapter.

3.1 Conceptual Framework of the Study

This study explores the perceptions of teachers and students of some selected engineering universities of Bangladesh on the effectiveness of the current assessment practices. Effectiveness of assessment practices was measured based on five (5) scales of measurement developed by (Waldrip, Fisher, & Dorman, 2008) during their process in developing and validating a questionnaire for students' perception of the assessment process.

Furthermore, the perceptions of these participants on the future perspectives of the assessment system were also investigated to determine the suggestions and recommendations they have for the improvement of the effectiveness of the assessment practices. In this study, assessment is limited to class tests/quizzes, assignments, mid-semester examinations, and final semester examinations. Figure 2 depicts the framework for this study.

3.2 Design of the study

Bangladesh has more than seven (7) engineering universities both public and private inclusive. In this study four (4) engineering universities were specifically selected and these are:

Firstly, the Islamic University of Technology (IUT) a subsidiary organ of the Organisation of Islamic Cooperation (OIC), this university (IUT) was selected in this study due to its heterogeneity in terms of students and teachers. The university consists of more than two hundred (200) international students from about twenty (20) countries and faculties from

almost four countries. Secondly, Dhaka University of Engineering and Technology (DUET), a public university established to train only professional engineers and diploma graduates from Polytechnique Institutions from Bachelor of Science degree (BSc) to the degree of philosophy (Ph.D.) in more than four engineering disciplines. Thirdly, Bangladesh University of Textile Engineering (BUTEX), also a public university established to offer textile engineering programmes. Finally, Ahsanullah University of Science and Technology (AUST), one of the best private engineering university in Bangladesh. This university was

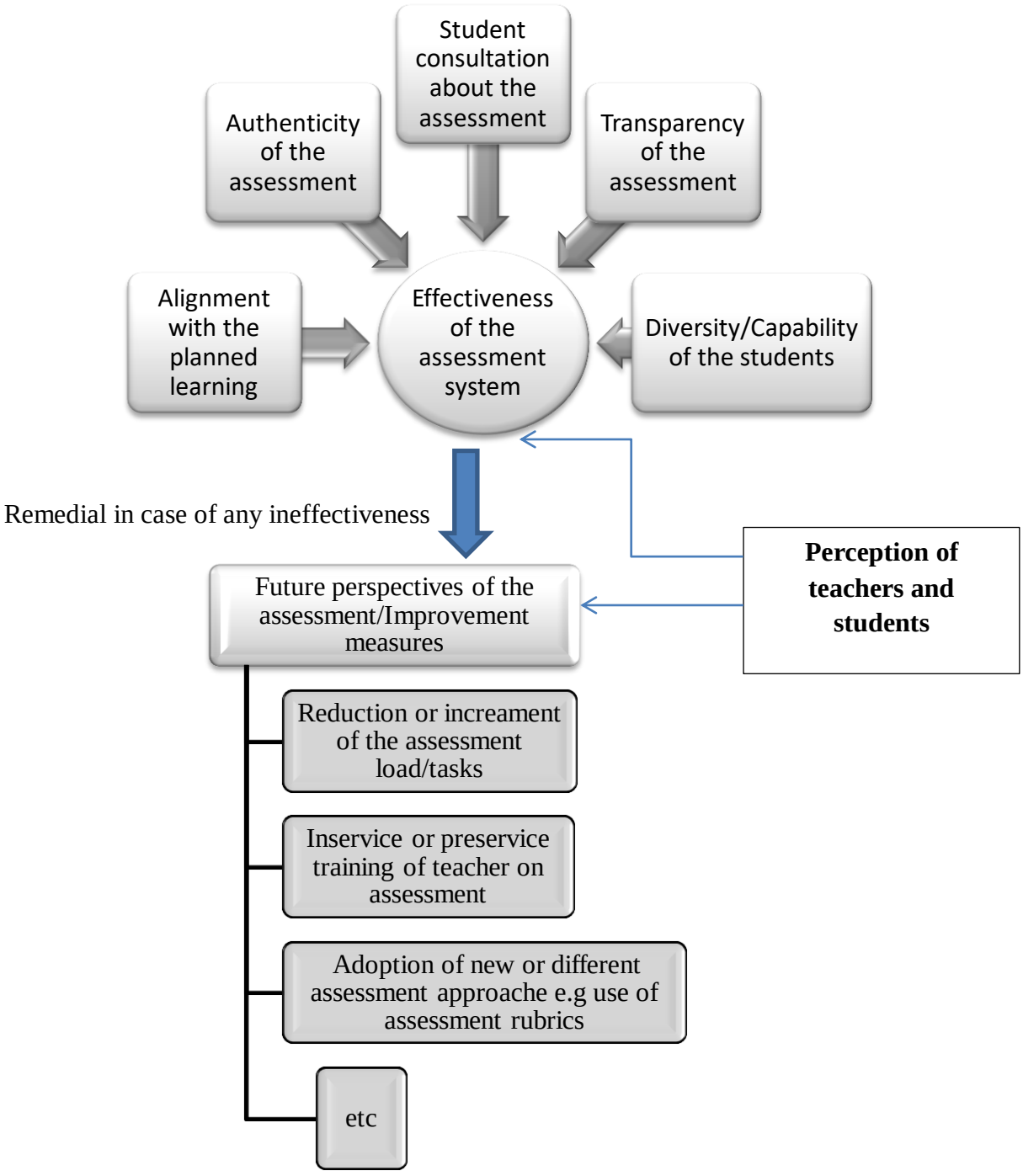


Figure 2 Conceptual Framework of the Study

selected simply because the perceptions of faculties and students of the private engineering universities regarding assessment practices also count a lot in reaching a sincere conclusion in this study. All these are located in the Dhaka Division of Bangladesh.

The students and faculties of six (6) common engineering departments (EEE, CSE, ME, CE, TE and IPE) were accessed in DUET and AUST and only four (4) departments (EEE, CSE, MCE and CE) were accessed in IUT. However, respondents from BUTEX were considered under the textile engineering department (TE), as the university is specifically established to offer textile engineering programmes.

3.3 Population

The population for this study comprises of all the teachers and students of the engineering Universities in Bangladesh. The teachers and undergraduate students of the selected universities in Tables 1 and 2 were considered as the target population in this study. It also indicates the number of teachers and students of each engineering university.

Table 1: Number of students and teachers in the selected engineering university in Bangladesh

No	Name of Public Engineering Universities	No. of Students	No. of Teachers
1	Bangladesh University of Textile Engineering (BUTEX)	2391	324
2	Dhaka University of Engineering Technology (DUET)	2853	210
	Name of Private Engineering University		
1	Ahsanullah University of Science and Technology (AUST)	6878	447

Source: Bangladesh Bureau of Educational Information and Statistics (2017)

Table 2: International Engineering University

No	Name of The Engineering Universities	No. of Students	No. of Teachers
1	Islamic University of Science and Technology (IUT)	2382	242

Source: Islamic University of Technology (2019)

3.4 Sampling

The sampling technique used in this research was cluster sampling and participants were randomly selected in each cluster. In order to make a reliable investigation and generalizable conclusion data was collected from the teachers and students of each engineering department considering the year level and positions of students and teachers respectively.

From the four (4) universities, at least fifty (50) teachers and two hundred (200) undergraduate students in each engineering university was the proposed sample size. Therefore, the total number of teachers and students should have been 200 and 800 respectively. However, Table 3 shows the response rate after the analysis has been conducted.

Table 3: Numbers of respondents as per university

No	University	No. of Students	No. of Teachers
1	AUST	143	59
2	BUTEX	178	22
3	DUET	113	33
4	IUT	123	17
	Total	557	131

3.5 The Instrument for Collecting Data

The instrument adopted for this study was *Students Perceptions of Assessment Questionnaire (SPAQ),* developed and validated by Koul, Fisher, & Earnest (2006), and Waldrip, Bruce G Fisher, Darrell L Dorman, Jeffrey P (2008), in their respective studies to develop a tool to assess student perception on assessment practices which was carried out at different periods. In their studies, they all statistically confirm the validity and reliability of the instrument. To further ascertain the validity and reliability of the same instrument, Dhindsa, Omar, & Waldrip (2007), conducted a study to subject the instrument (SPAQ) to a validity and reliability test were they confirmed that the instrument was valid and reliable as stated by the developers in their studies. Mussawy (2009), adopted the same instrument (SPAQ) for a study on 'Assessment Practices: Student's and Teachers' Perceptions of Classroom Assessment', were the Cronbach's Alpha reliability result was .890. Based on

the above confirmations, SPAQ was used with little modifications to assess the perception of teachers and students on the current assessment practices and their future perspectives. However, the questionnaire for teachers was named *Teachers Perceptions Questionnaire (TPAQ).* Appendix C and D give the nature of the questionnaires.

Each of the questionnaires consists of thirty-one (31) items. The first four (4) items sought demographic information whilst the rest of the items explore the perceptions of the participants. The instruments contain six (6) rating scales as indicated in Table 5. The items are close-ended with a Likert scale of 1 – 5 as depicted in Table 4

3.6 Data Collecting Procedure

The data source for this study was humans i.e. (teachers and students). After the adoption and little modification on the survey questionnaires (SPAQ and TPAQ), eight hundred (800) copies were made for students and two hundred (200) copies for teachers. The same questionnaires were also developed using Google Form.

Permission was sought formally from all the academic registrars of the selected universities before any data collection. After permission was granted it was put to every participant that participation in the study is voluntary and they can withdraw at any moment during the study. With the permit letter, first-hand data was collected from students and teachers. Some of the students and teachers were guided in completing the questionnaire upon their request. The link to the Google form was provided to some teachers and students who were not in a position to respond through the hard copy questionnaire. The links were also shared in some social media platforms created by the targeted respondents for their academic correspondence.

Table 4: Likert scale

Scale	Value
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Disagree	5

Table 5: Scales of measurement

Scales		Description	Sample Item for SPAQ	Sample Item for TPAQ
Effectiveness of the Assessment System and Practices	Alignment with planned learning	The extent to which assessment tasks align with the goals, objectives, and activities of the learning program.	My assessment in engineering courses tests what I understand.	My assessment in engineering courses is to test what the student understands.
	Authenticity	The extent to which assessment tasks feature real-life situations that are relevant to the learner.	I find engineering department assessment tasks are relevant to what I do outside of school.	My assessment tasks are relevant to what the student will do outside of school.
	Student Consultation	The extent to which students are consulted and informed about the forms of assessment tasks being employed.	In the engineering department, I am clear about the types of assessments being used.	I always made it clear to students about the types of assessments I am going to use.
	Transparency	The extent to which the purposes and forms of assessment tasks are well-defined and clear to the learner.	I am told in advance when I am being assessed.	I told my students in advance when they will be assessed.
	Diversity	The extent to which all students have an equal chance at completing assessment tasks.	I can complete the assessment tasks by the given time.	My students can complete the assessment tasks at the given time.
Future Perspectives		The perception of teachers and students on the suggested future areas of improvement in assessment practices.	All the teachers must undergo pre-service or in-service training on how to assess their students.	All the teachers must undergo pre-service or in-service training on how to assess their students.

3.7 Data Analysis Techniques

The data analysis methods used in analyzing the collected data were descriptive analysis, internal consistency reliability test, independent t-test and one-way ANOVA. These analyses were done using the statistical package for social science (SPSS) software.

As the participants in this study were students and teachers, the following demographic information was collected: Gender, Department and University of each participant. Information about the current Year and Position of students and teachers respectively were also collected.

Responses were received from 571 and 135 respondents (students and teachers respectively). The questionnaire of 14 students and 4 teachers were not considered during analysis due to their incompletion of the questionnaires. The omission of these incomplete questionnaires has no major significant effect, as the remaining data were somehow sufficient for the purpose of this study.

3.8 Ethics and Safety in the Study

In this study, ethical issues and preventive measures were taken to make sure that all the participants involved in the study were safe by all means. The university authorities were informed about the objectives and significance of the outcomes of this study prior to data collection in their universities. Permission was sought from these selected engineering universities to allow access to the teachers and students of their respective universities. On the front page of these questionnaires, an introduction about the study was explicitly explained and the consent of the respondents was sought to voluntarily participate in the study. Assurance about the confidentiality of the information was given to the participants and that it will be only used for the purpose of the study.

CHAPTER IV

4 ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the results and interpretations of the analyzed data received from the respondents regarding their perceptions of the current assessment system and practices in engineering universities in Bangladesh. A descriptive analysis was carried out to depict the frequency and percentage distributions of the participants based on their demographic information. An internal consistency or reliability test of items and the normality of the data compared to the normal distribution were also carried out. Finally, comparative analyses were done to reject or accept the above hypotheses by comparing means and using Independent t-test and One - Way ANOVA to determine the existence of a difference between variables and their significance. The effect size of the difference and the probability of rejecting the null hypotheses were also computed.

4.1 Reliability of the Instruments

Both instruments were subjected to a reliability test by testing internal consistency or reliability (Cronbach alpha reliability coefficient) for all the items. The results indicate high reliability for both SPAQ and TPAQ as shown in Table 6.

Table 6: Reliability values of the instruments

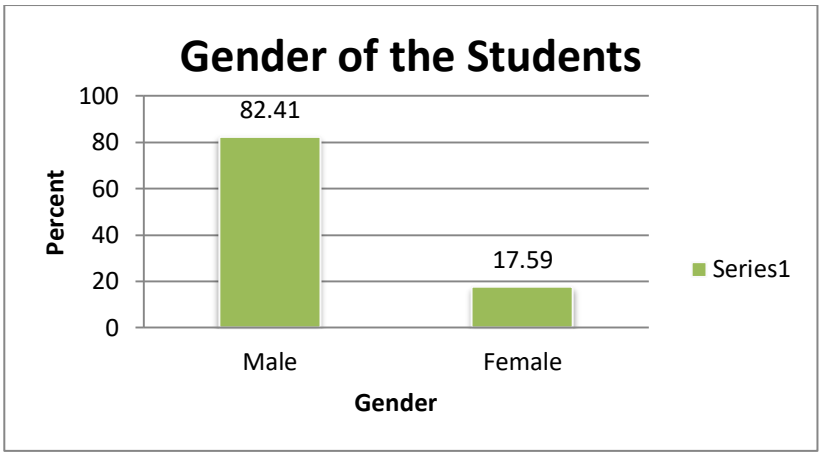
Reliability Statistics		
Instruments	**Cronbach's Alpha**	**N of Items**
Students -SPAQ	.840	27
Teachers- TPAQ	.825	27

4.2 Descriptive Analyses

4.2.1 Students' information

The responses of 557 students were analyzed, there was no missing value in the responses of these students. About 82% and 18% of the respondents were male and female respectively. Responses were received from students of all the year levels (first to fourth) however, about 68% of the respondents were in their third and fourth year. Out of the six (6)

engineering departments, 35% of the respondents were in the Textile Engineering (TE) department. This is evident because among the four (4) engineering universities where the sample data were collected for the purpose of this study includes a university specifically established for textile engineering (TE) (BUTEX) and 32% of the total respondents (students) were from the same university. Figures 3 gives a more descriptive description.



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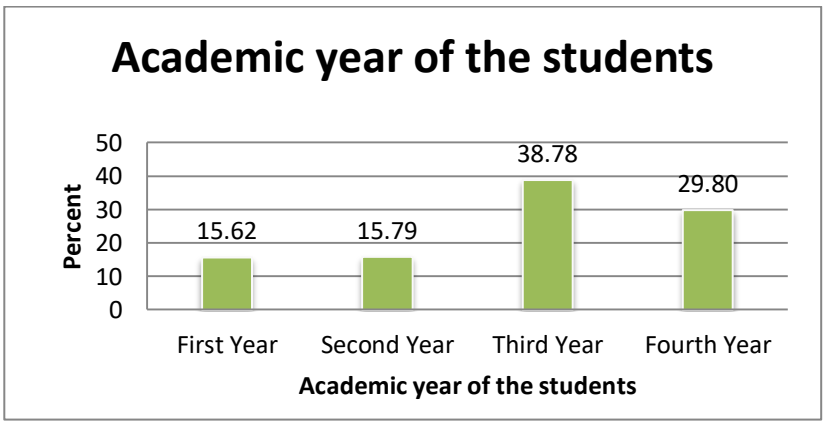

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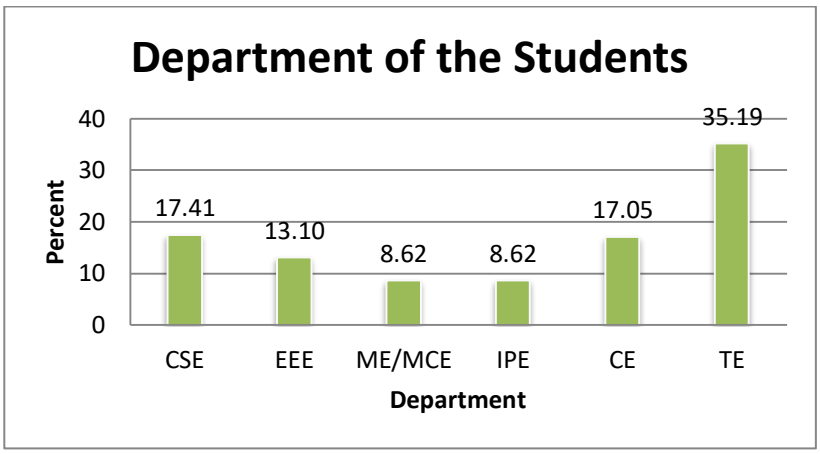

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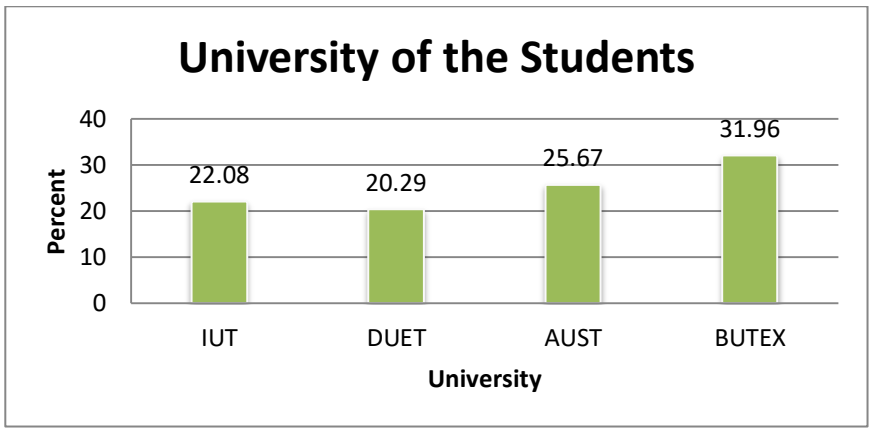

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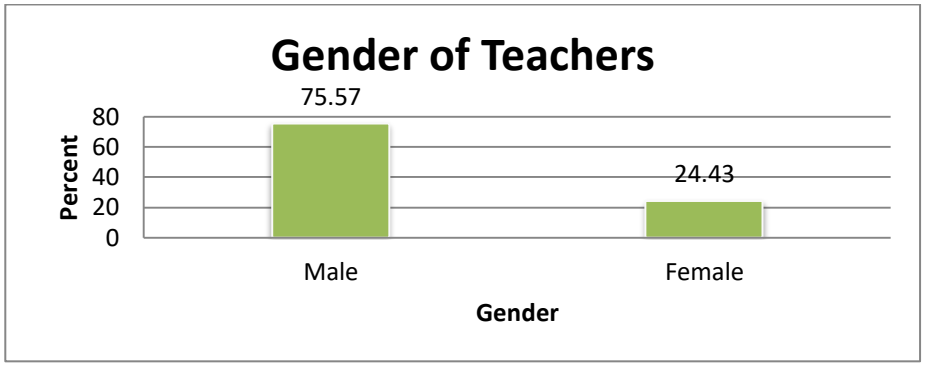
Figure 3: Demography information of the Students

4.2.2 Teachers' Information

The responses of 131 teachers were analyzed with no missing values in their responses. About 76% of the respondents (teachers) were male and 24% were female. Among the four (4) engineering universities selected for this study, 45% of the respondents are from AUST, 25% from DUET, 17% from BUTEX and 13% from IUT. The current position of 58% of the respondents were lecturers and about 27% are assistant professors while 8% were associate and full professors. The highest percentage of respondents (24%) were faculties of textile engineering department TE. More descriptive explanations are given in Figure 4.



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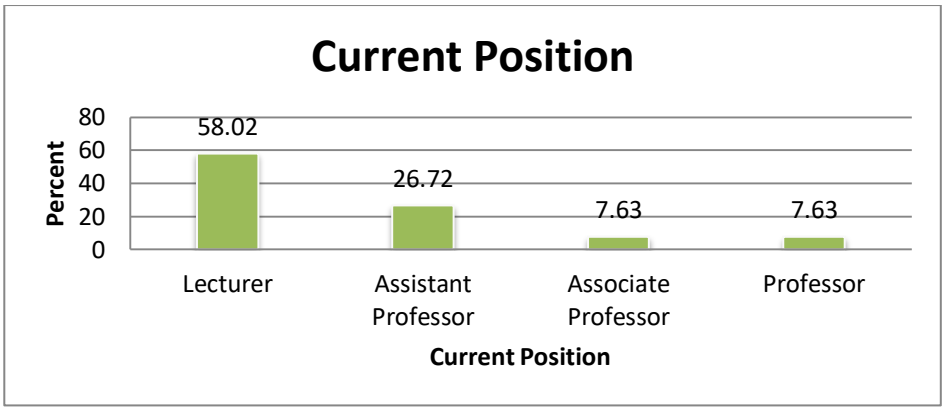

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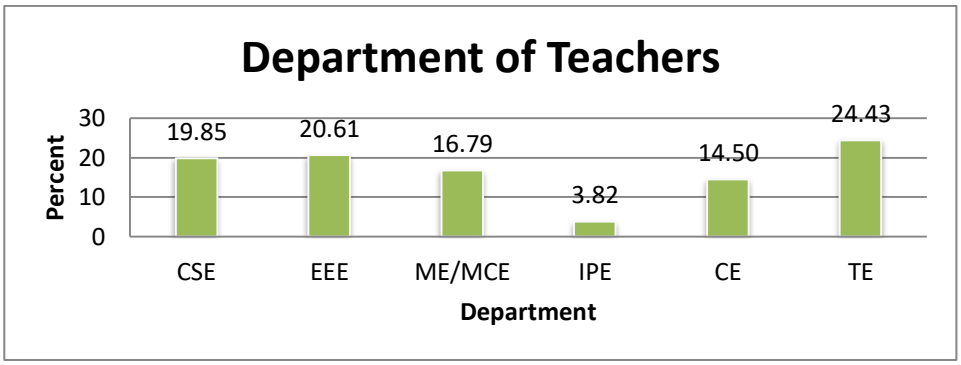

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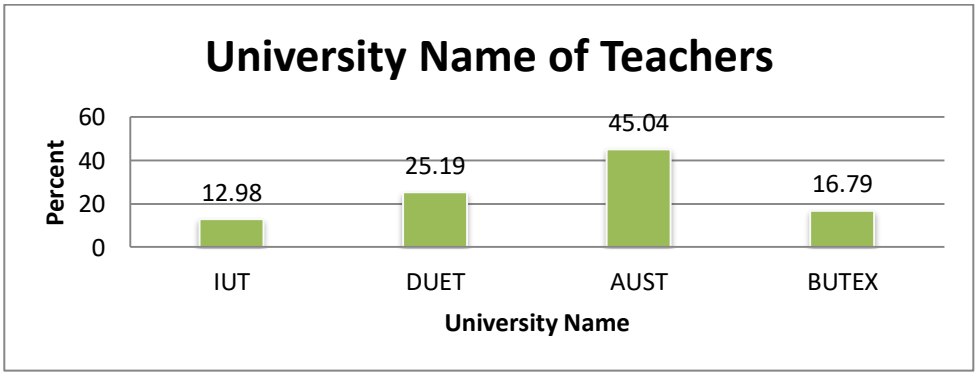

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Figure 4: Demographic Information of Teachers

4.3 Nature of the Data Compared to a Normal Distribution

4.3.1 The Nature of the Data from the Students

The test of normality (SW) indicates a statistically significant difference from a normal distribution based on the fact that the significant values (0.000) of each scale are less than 0.05. The scales of TA and FPA have the highest mean of 21.98 and 21.15 respectively compared to the mean of the remaining four (4) scales which are having a slight difference among them. TA has the highest SD (4.37) compared to the other scales. There exists no significant difference between the 5% trimmed mean and the original mean of each scale. This also means that 95% of the cases in this study are distributed within the upper and lower bounds.

Table 7: Natures of the students' data on the six (6) scales

Descriptive Statistics									
Scales	**Min**	**Max**	**M**	**5% TM**	**SD**	**95% CI**		**Skewness**	**Kurtosis**
						LB	**UB**		
APL	4	20	14.84	14.89	2.55	14.62	15.05	-0.37	0.24
AA	4	20	13.67	13.75	3.32	13.40	13.95	-0.36	-0.22
SCA	4	20	14.37	14.52	3.36	14.09	14.65	-0.61	0.12
TA	6	30	21.98	22.08	4.37	21.61	22.34	-0.37	-0.18
DA	4	20	12.70	12.69	3.49	12.41	12.99	0.07	-0.63
FPA	6	25	21.15	21.36	3.06	20.90	21.41	-0.92	1.09

Table 8 indicates that the frequency distribution in each scale was skewed negatively meaning, the scores of most of the respondents were above average. However, with the exception of scale DA which was skewed positively at a value of 0.074 and quite close to the skewness value of a normal curve (0). Describing the term kurtosis in relation to the values in Table 4:2, it was realized that the frequency distribution of each scale was peaked (leptokurtic) than the normal curve. This means that their value of kurtosis is less than that of the normal curve (0.263) and the scores of most of the respondents are centered closely on the mean. Unlike the kurtosis of FPA which is flatter (platykurtic) than that of the normal curve at a value of 1.09, which also signifies that the scores of few respondents are near to the mean. For better visualization, Figure 5 shows a Box Plot for each of the scales. The blue boxes depicted the range of the middle 50% of the scores on each scale and the

horizontal black line indicates the average score. The 12 outliers are however genuine ones and they were maintained for further analysis.

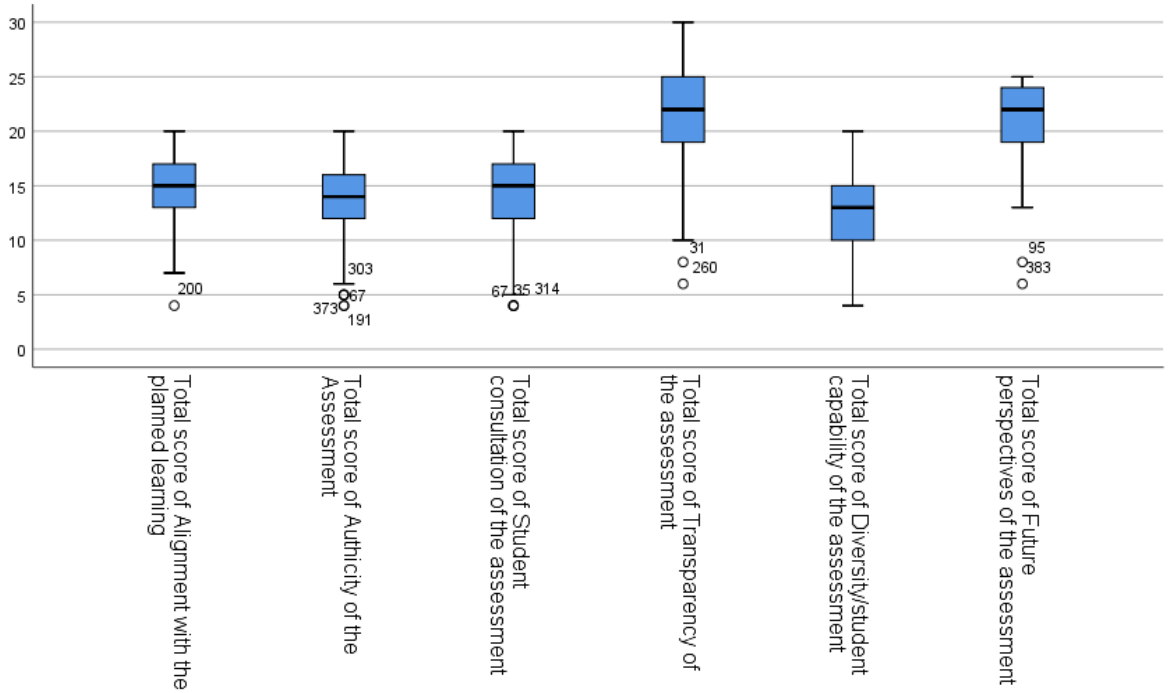


Figure 5: Box Plots for the Six (6) Scales for Students

However, in this study, the effectiveness of the assessment systems (EAS) and practices were determined based on the sum of the scores for the five scales (APL, AA, SCA, TA and DA). Therefore, the descriptive nature of the data when the scores of the five scales were summed together as the scale for the effectiveness of the assessment system (EAS) and practices and Table 4:3 and figure 4:4 give more details.

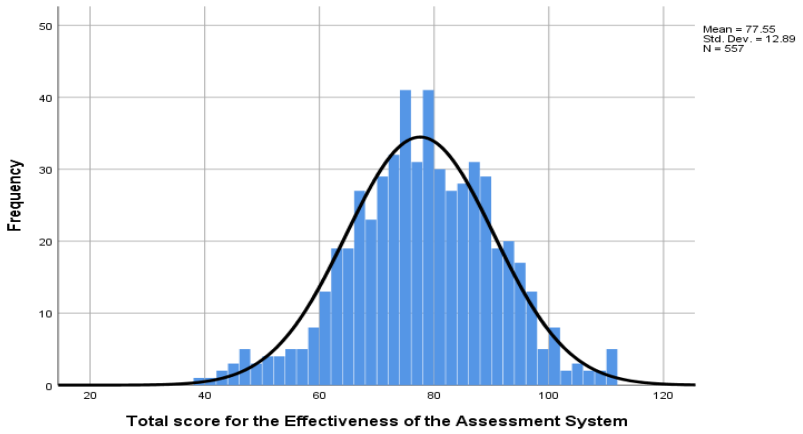
Table 8: Nature of the data for the effectiveness of the assessment system

Descriptive Statistics

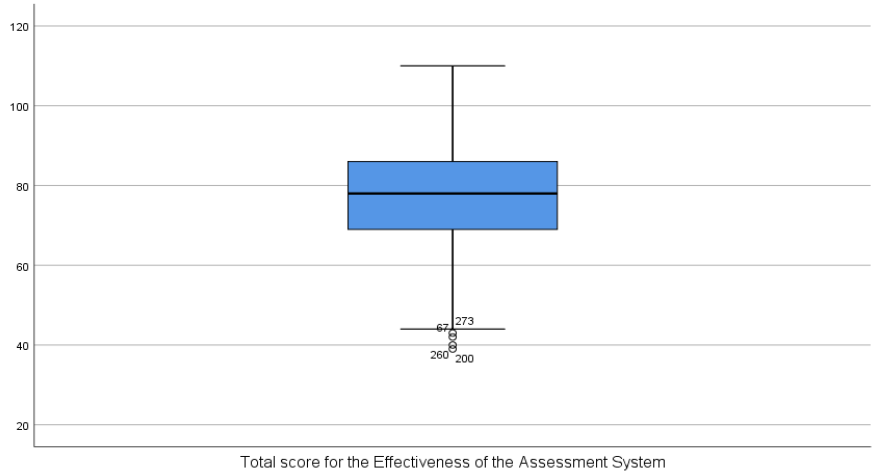
Scale	Min	Max	M	5% TM	SD	95% CI		Skewness	Kurtosis
						LB	UB		
EAS	39	110	77.55	77.74	12.89	76.48	78.63	-.179	.132

In Table 9, the test of normality has shown that there exists a significant difference between the distribution of the scores on this scale (EAS) and normal distribution. The mean has a slight increment after the 5% trimming. The distribution is negatively skewed and is slightly

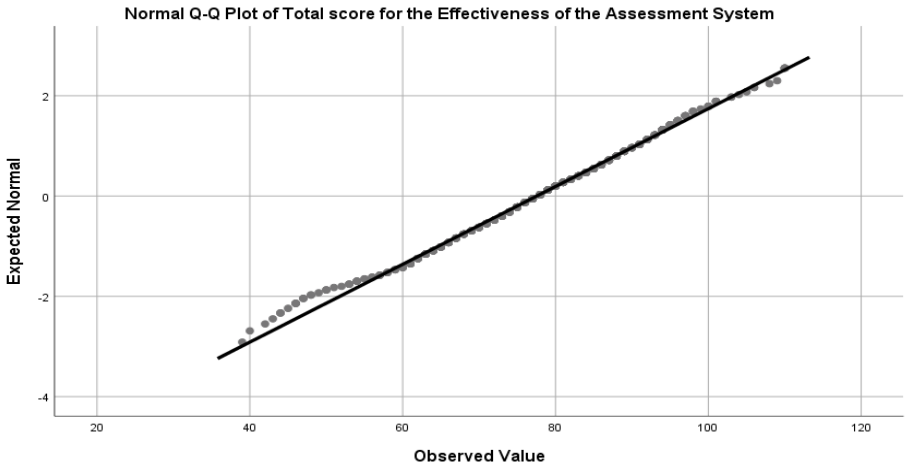
peaked (leptokurtic) than the normal curve. Figure 6 shows the frequency distribution curve, the Box Plot and the Q-Q Plot.



(a)



(b)



(c)

Figure 6: Frequency Distribution Graphs for EAS of Student Data

4.3.2 The Nature of the Data from Teachers

The normality test (SW) indicates that there is a statically significant difference compared to a normal distribution. Scale TA has the highest score and eventually the highest mean. The 5% trimmed mean and the original mean are almost the same. With the 95% confidence interval, it was concluded that most of the scores were above average except for the scores of scale APL, which is slightly skewed positively. The kurtosis values of scale APL, DA and FPA indicate that the majority of the scores were centered close to the mean, while that of the remaining scales is platykurtic. More details can be seen in Table 4:4.

Table 9: Natures of the teachers' data on the six (6) scales

Descriptive Statistics									
Scale	**Min**	**Max**	**M**	**5% TM**	**SD**	**95% CI**		**Skewness**	**Kurtosis**
						LB	**UB**		
APL	10	20	15.20	15.19	2.051	14.84	15.55	.075	-.548
AA	8	20	15.43	15.53	2.499	15.00	15.86	-.555	.309
SCA	6	20	16.26	16.43	2.556	15.82	16.70	-.974	1.803
TA	16	30	25.97	26.19	3.113	25.43	26.51	-.832	.466
DA	6	20	14.18	14.22	2.495	13.74	14.61	-.303	.248
FPA	13	25	20.10	20.18	2.814	19.61	20.59	-.433	-.558

Figure 7 shows the box plot of each scale and there are 10 genuine outliers in total somehow below the minimum score.

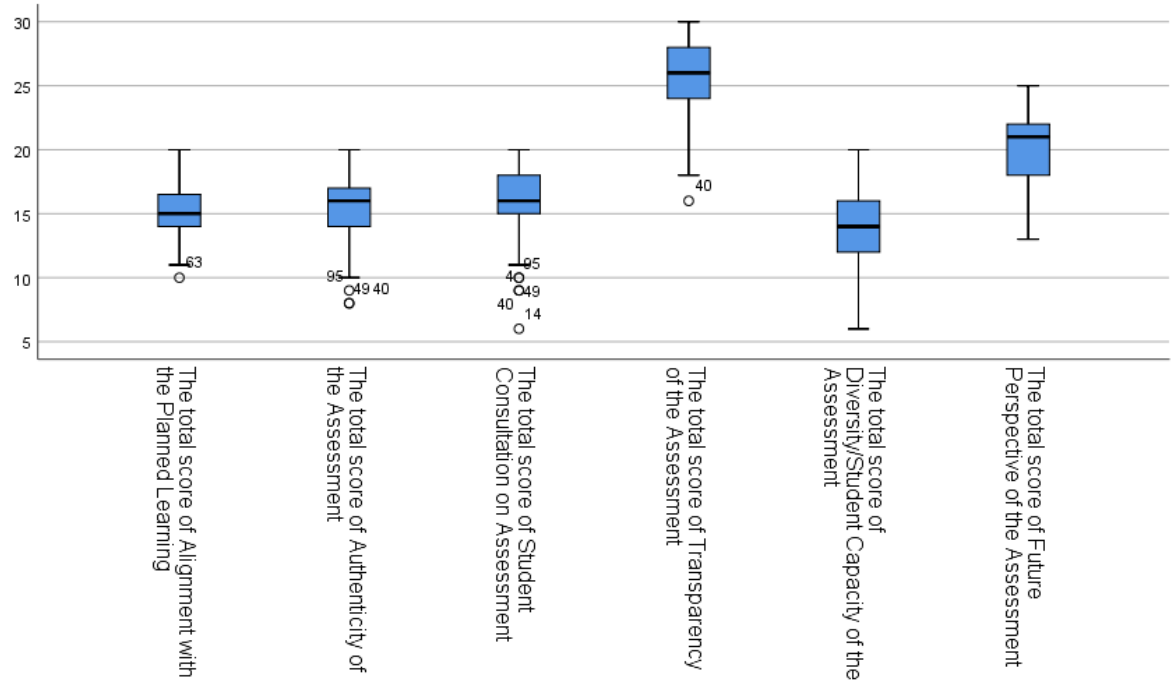
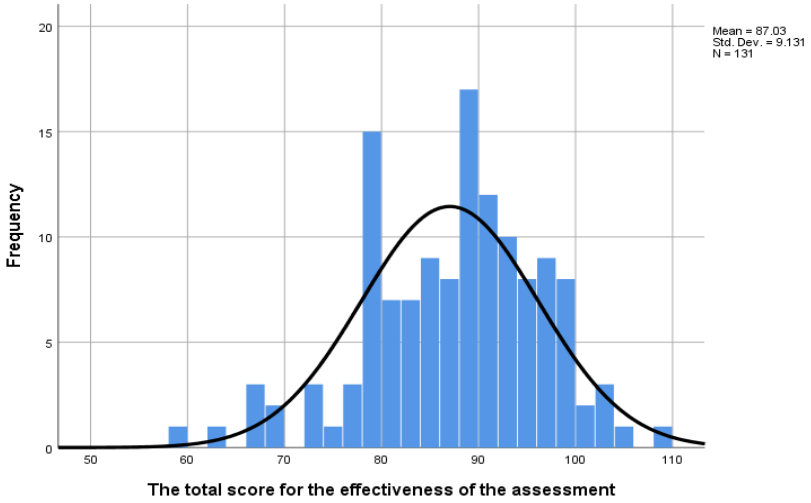


Figure 7: Box Plots for the Six (6) Scales for Teachers

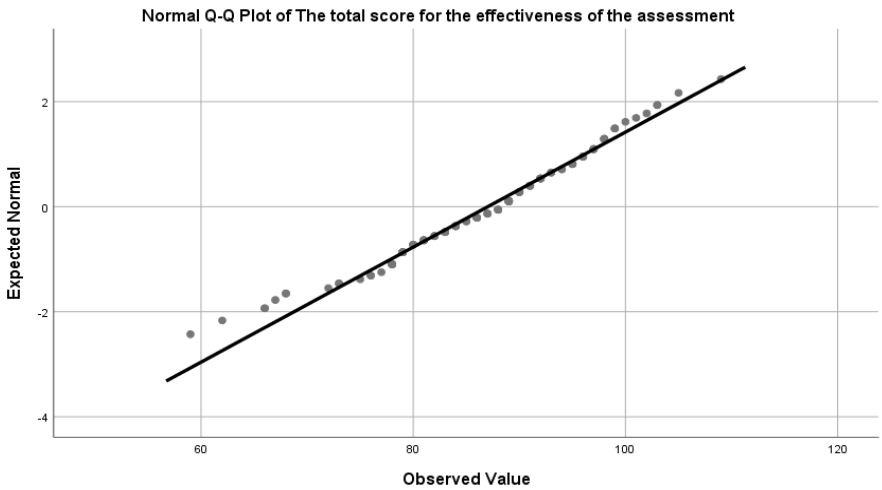
To determine the effectiveness of the assessment system and practices, the scores of the five scales (APL, AA, SCA, TA and D) are summed together. Table 11 indicates that from the normality test, there is no significant difference with the normal distribution. The 5% trimmed mean almost equates to the original mean. The distribution is skewed negatively and the kurtosis value indicates that the distribution is platykurtic. Figure 8 gives a graphical view of the nature of distribution for the data.

Table 10: Nature of the data for the effectiveness of the assessment system

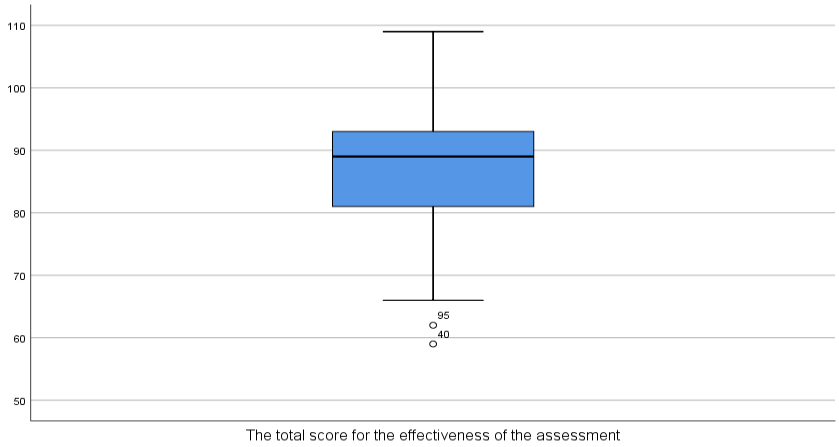
Descriptive Statistics									
Scale	**Min**	**Max**	**M**	**5% TM**	**SD**	**95% CI**		**Skewness**	**Kurtosis**
						LB	**UB**		
EAS	59	109	87.03	87.34	9.13	85.45	88.61	-.475	.338



(a)



(b)



(c)

Figure 8: Frequency Distribution Graphs for EAS of Teachers Data

4.4 Average Scale – Item Mean Scores

For the purpose of interpreting and reporting the analyzed data, the average scale – item means scores were computed for further analysis.

4.4.1 Comparison of Average scale-item means of the Six Scales

The perception of the teacher is higher than that of the students in all the scales except the scale of future perspectives of the assessment (FPA) as portrayed in figure 9. Students had higher perceptions regarding the FPA of the assessment system and practices in selected engineering universities. All items under the scale of FPA sought for the perception of students and teachers regarding the measures to take for further improvement of the assessment system and practices. Therefore, both participants had an almost equal perception in item #24 and #25 *see Appendix A and B*. The mean scores of the participants in these items indicate a higher perception compared to the rest of the items under the scale of FPA. This indicates that teachers need to have a pre-service or in-service training on assessment and the assessment should test the ability of students to apply what has been learned in real-life situations.

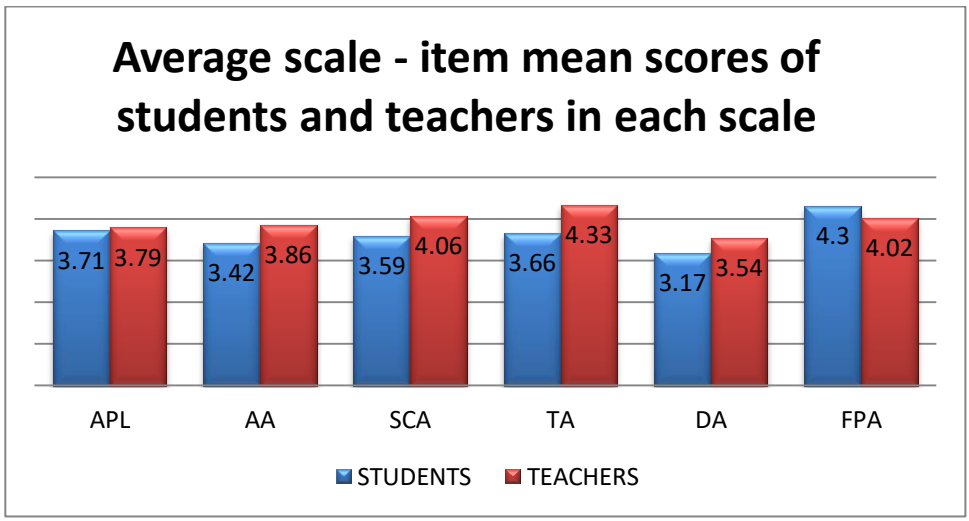


Figure 9: Average Scale – Item Mean Score for each Scale

Transparency in the assessment (TA) system and practices had the highest average mean score among the six scales for teachers. Students had less perception on this particular scale (TA) compared to teachers. The mean scores (4.63) of item #17 on TPAQ indicate that

teachers had a higher perception that their relationship with the students has no influence on the assessment scores awarded to them. However, students had a mean score of (3.71) which can also indicate that there exists a connection between their assessment scores and their relations with the teachers when compared to the mean scores of the rest of the items in that scale (TA).

There is a slight difference between the average mean scores of the participants on the scale of alignment with the planned learning (APL). Compared to the other five scales, both participants had a moderate perception regarding alignment between the assessment and the planned learning objectives. The mean scores of item #1 and #2 on the SPAQ and TPAQ depict that students and teachers had highly perceived assessment as a test to determine the level of understanding and not the level of memorization. However, some students still have the perception that the assessment practices are somehow geared to test what they had memorized whilst most of the teachers expressed the contrary to this regard.

The authenticity of the assessment (AA) also falls among the moderately perceived scales like (APL) and (SCA) in the case of both participants. The mean scores (4.13) of item #6 on this scale shows that teachers had a higher perception that their assessment tests the ability of students to apply their knowledge in real-life situations. However, students had a lesser mean score (3.44) indicating low perception compared to teachers.

Student consultation on the assessment (SCA) scale focused on the flow of information and the involvement of students in issues related to assessment practices. From the descriptive statistics of each item under this scale (*see Appendix B*), teachers express high perceptions regarding informing students about the assessment modalities. However, they show low perception in the involvement of students in participating in decision making concerning assessment.

Finally, the lowest perceived scale among the six scales is the diversity or students' capability (DA/SCA) in the assessment system and practices. Both participants have perceived that minimal consideration is given to inclusiveness in the assessment practices compared to the other scales. Item #21 of the TPAQ, teachers expressed high perception that they gave an assessment task to their students that suite their abilities and they gave them options whenever they are confused about an assessment task. However, students expressed low perception in this regard. *See Appendix A and B* for more descriptive details.

4.4.2 Comparison of Average Scale – Item Mean Scores of Teachers and Students on EAS

Figure 10 shows the perception level of teachers and students concerning the effectiveness of the assessment system (EAS). It was realized that teachers have a higher perception than students, however, the extent of concern for further improvement expressed by the students was higher than that of the teachers as indicated in figure 9.

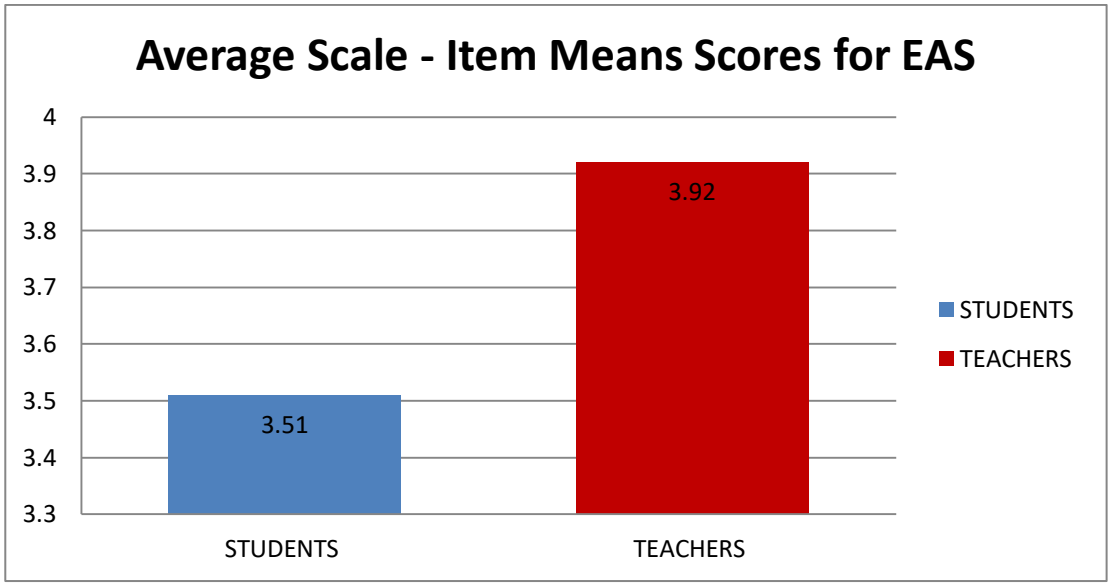


Figure 10: Average Scale – Item Mean Scores for Teachers and Students in EAS

4.5 The Difference in Perceptions Based on the Demographic Information of Participants

4.5.1 The difference in Students' Perceptions Based on Gender

4.5.1.1 Effectiveness of the Assessment System (EAS)

An independent t-test was carried out to establish if there exists any significant difference between the mean of EAS test scores of male and female students in the selected engineering universities of Bangladesh. The results of Levene's test F (555) = .288, p = .592, indicating that the variance of male and female are assumed to be approximately equal. Thus, the standard t-test result was used as indicated in Table 11.

It was confirmed that there exists a statistically significant difference between the mean scores of EAS for male (N = 459, M = 3.46, SD = .584) and female (N = 98, M = 3.76, SD = .538), t (555) = 4.748, p = .000 students. To determine the magnitude of difference and the effect size for the mean in EAS test scores for males and female the formula for eta squared (t^2/t^2+(n1+n2-2)) was used. The result indicates that the effect size, ŋ^2 (.04) <

.06, was moderate and 4% of the variance in EAS scores was explained by gender. The observed power was .997. The 95% confidence interval was .178 to .430.

Table 11: Average scale – item Mean Scores for Students in EAS and FPA

Scale	Gender	N	Mean	SD	t	df	Sig	MD	ŋ^2	95% CI	
										UB	LB
EAS	Male	459	3.46	.58	4.748	555	.000	.304	.04	.430	.178
	Female	98	3.76	.53							
FPA	Male	459	4.23	.61	-.296	555	.768	-.02		.114	-.154
	Female	98	4.21	.64							

Note : Significant at p = 0.05

4.5.1.2 Future Perspectives of the Assessment System (FPA)

Table 11 depicts the results from an independent t-test to determine if there exists any significant difference between the mean of FPA test scores of male and female students in the selected engineering universities in Bangladesh. The results of Levene's test F (555) = .000, p = .997, indicating that the variance of male and female are assumed to be approximately equal. Thus, the standard t-test result was used.

It was established that there exists no statistically significant difference between the mean scores of FPA for male (N = 459, M = 4.23, SD = .61) and female (N = 98, M = 4.21, SD = .64), t (555) = -.296, p = .768 student. The 95% confidence interval was -.154 to .114.

4.5.2 The difference in Students' Perceptions Based on their Departments

4.5.2.1 Effectiveness of the Assessment System (EAS)

A one-way between departments ANOVA was performed to compare the perceptions of students within the six (6) departments regarding the EAS. The equal variance was not assumed as a result welch robust test of equality of means indicates F (5, 191.624) = 2.759, p = .020. There was a statistically significant difference in the perceptions of students of the six (6) departments regarding the EAS (F (5, 191.624) = 2.759, p = .020). The magnitude of the difference in the means and the effect size was moderate (partial eta squared = .03) which indicate that 3% of the variance in EAS scores was explained by department. The observed power was equal to .860. Post hoc comparison using the Games – Howell test

indicate that the mean score for the department of CSE (N = 97, M = 3.42, SD = .646, 95% CI = 3.291, 3.552) was significantly different from the department of CE (N = 95, M = 3.709, SD = .599, 95% CI = 3.587, 3.831), p = .020. The department of CE also differ significantly from TE (N = 196, M = 3.46, SD = .559, 95% CI = 3.538, 3.514), p = .011. The department of EEE (N = 73, M = 3.513, SD = .663, 95% CI 3.358, 3.668), MCE/ME (N = 48, M = 3.52, SD = .523, 95% CI = 3.371, 3.675) and IPE (N = 48, M = 3.49, SD = .391, 95% CI = 3.383, 3.610) were not significantly different from each other neither were they with the department of CSE, CE and TE. Table 12, 13 and 14 gives more details.

Table 12: Descriptive comparison of students' perceptions of EAS based department

Department	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
CSE	97	3.42	.646	.065	3.291	3.552	1.87	5.00
EEE	73	3.51	.663	.077	3.358	3.668	1.70	5.00
ME/MCE	48	3.52	.523	.075	3.371	3.675	2.08	4.43
IPE	48	3.49	.391	.056	3.383	3.610	2.58	4.40
CE	95	3.71	.599	.061	3.587	3.831	2.08	5.00
TE	196	3.46	.559	.039	3.381	3.539	1.90	4.95
Total	557	3.51	.587	.024	3.462	3.560	1.70	5.00

Table 13: ANOVA, Effect Size and Robust Test of Equality of Means Results

EAS	Sig.	ŋp^2	Robust Tests of Equality of Means		
			ST	df1	df2
Welch	.020		2.759	5	191.624
Effect Size		.03			

Note : Significant at p = 0.05

Table 14: Games – Howell Post hoc comparison test between departments with a significant difference

Departments	Mean Difference	SE	Sig.	95% Confidence Interval	
				LB	UB
CSE vs CE	-.28782*	.089	.020	-.5468	-.0289
CE vs TE	.24943*	.073	.011	.0382	.4607

Note : Significant at p = 0.05

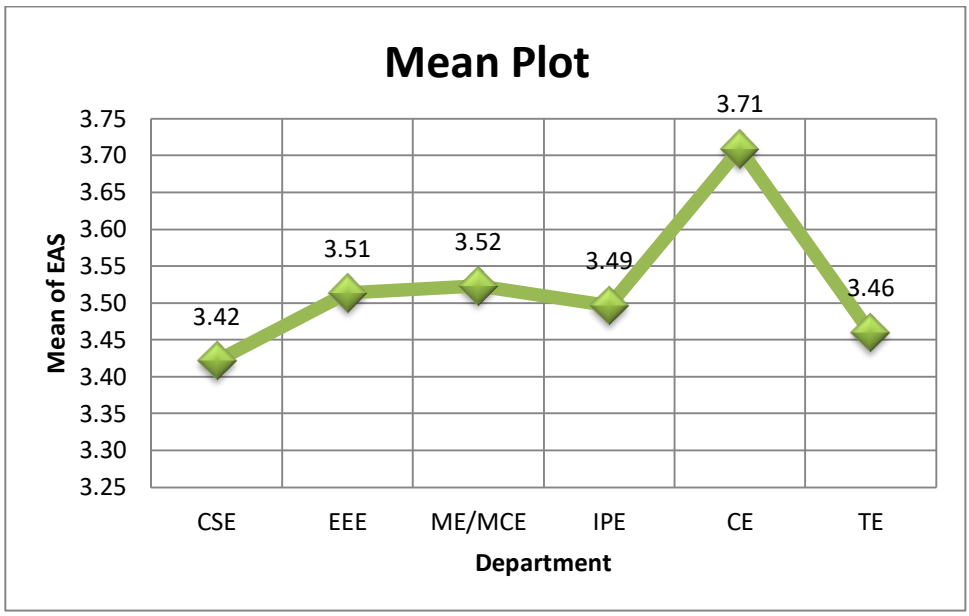


Figure 11: Mean Plots for EAS per Department

4.5.2.2 Future Perspectives of the Assessment System (FPA)

A one-way between departments ANOVA was performed to compare the perceptions of students within the six (6) departments regarding the FPA. Equal variance was not assumed as a result welch robust test of equality of means indicates F (5, 191.898) = 2.466, p = .034. There was a statistically significant difference in the perceptions of students of the six (6) departments regarding the FPA (F (5, 551) = 2.466, p = .034). The magnitude of the difference in the means and the effect size was moderate (partial eta squared = .02) which indicate that 2% of the variance in FPA scores was explained by department. The observed power was equal to .692.Post hoc comparison using the Fisher LSD indicate that the mean score of the department of IPE (N = 48, M = 4.07, SD = .535, 95% CI = 3.91, 4.22), was a statistically significant different from the department of CSE (N = 97, M = 4.31, SD = .675, 95% CI = 4.18, 4.45), p = .022 and CE (N = 95, M = 4.32, SD = .503, 95% CI = 4.22, 4.42), p = .018. The department of TE (N = 196, M = 4.17, SD = .675, p = .018. 95% CI = 4.07, 4.26), also differ significantly from the department of CE (N = 95, M = 4.32, SD = .503, 95% CI = 4.22, 4.42), p = .041. The department of EEE (N = 73, M = 4.23, SD = .615, 95% CI = 4.0, 4.38) and MCE/ME (N = 48, M = 4.31, SD = .391, 95% CI = 4.19, 4.42) were not significantly different from each other neither were they with the department of CSE, CE, IPE and TE. Table 16, 17 and 18 gives more details.

Table 15: Descriptive comparison of students' perceptions of FPA based department

Department	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
CSE	97	4.31	.675	.069	4.18	4.45	1.60	5.00
EEE	73	4.23	.615	.072	4.09	4.38	2.60	5.00
ME/MCE	48	4.31	.391	.057	4.19	4.42	3.20	5.00
IPE	48	4.07	.535	.077	3.91	4.22	3.00	5.00
CE	95	4.32	.503	.052	4.22	4.42	3.20	5.00
TE	196	4.17	.675	.048	4.07	4.26	1.20	5.00
Total	557	4.23	.612	.026	4.18	4.28	1.20	5.00

Table 16 Robust Test of Equality of Means and Effect size Results

FPA	ŋp^2	Sig.	Robust Tests of Equality of Means		
			ST	df1	df2
Welch		.034	2.466	5	195.898
Effect Size	.02				

Note : Significant at p = 0.05

Table 17: Fisher LSD Post hoc comparison test between departments with a significant difference

Departments	Mean Difference	SE	Sig.	95% Confidence Interval	
				LB	UB
CSE vs IPE	.24674*	.10745	.022	.0357	.4578
CE vs IPE	.25544*	.10782	.018	.0436	.4672
CE vs TE	.15578*	.07612	.041	.0063	.3053

Note : Significant at p = 0.05

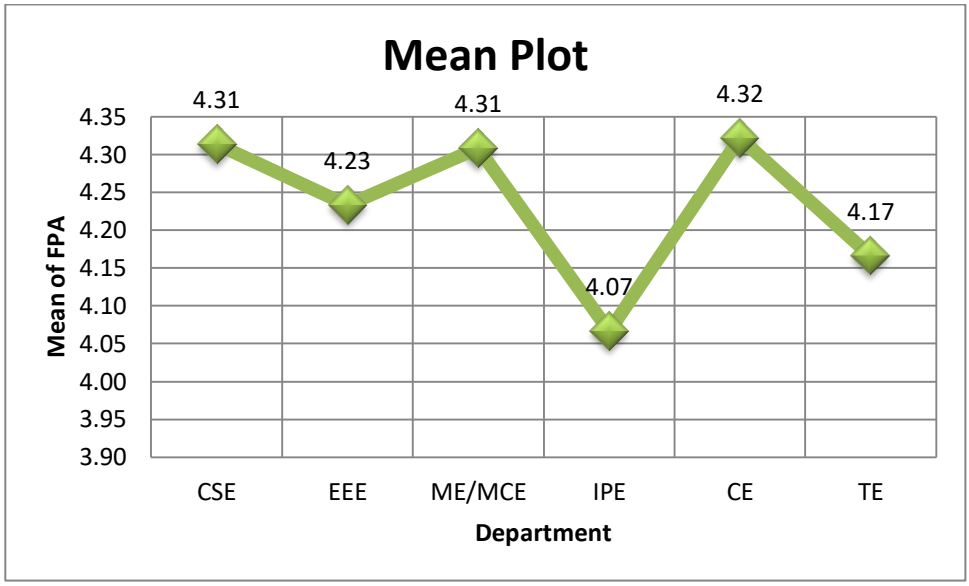


Figure 12 Mean Plots for FPA per Department

4.5.3 The difference in Students' Perception Based on Levels (Year)

4.5.3.1 Effectiveness of the Assessment System (EAS)

A one-way between departments ANOVA was performed to compare the perceptions of students in the first year to the fourth year regarding the EAS. Equal variance was assumed based upon result of Levene's test F (3, 553) = 2.245, p = .082. There was a statistically significant difference in the perceptions of students in different year levels regarding the EAS (F (3, 553) = 3.260, p = .021). The magnitude of the difference in the means and the effect size was moderate (partial eta squared = .02) which indicates that 2% of the variance in EAS scores was explained by year levels. Observed power was equal to .747. Post hoc comparison using the Tukey HSD test indicate that only the mean score for the first year (N = 87, M = 3.66, SD = .629, 95% CI = 3.52, 3.79) was significantly different from fourth year (N = 166, M = 3.44, SD = .552, 95% CI = 3.35, 3.52), p = .024. The second-year (N = 88, M = 3.44, SD = .569, 95% CI = 3.32, 3.56) and third-year (N = 216, M = 3.54, SD = .593, 95% CI 3.47, 3.62), were not significantly different from each other neither were they with first and fourth year. Table 17, 18 and 19 give more details.

Table 18: Descriptive comparison of students' perceptions of EAS based Year levels

Level (Year)	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
First Year	87	3.66	.629	.067	3.52	3.79	2.35	5.00
Second Year	88	3.44	.569	.061	3.32	3.56	2.08	5.00
Third Year	216	3.54	.593	.040	3.46	3.62	1.70	5.00
Fourth Year	166	3.43	.552	.043	3.35	3.52	1.90	5.00
Total	557	3.51	.587	.025	3.46	3.56	1.70	5.00

Table 19: ANOVA, and Test of homogeneity of variance

EAS	Sum of Squares	df	Mean Square	F	Sig.	ŋp^2	Test of Homogeneity of Variances		
							Levene ST	df1	df2
Between Groups	3.329	3	1.110	3.26	.021				
Within Groups	188.216	553	.340						
Total	191.545	556							
Based on Mean					.082		2.245	3	553
Effect size						.02			

Note : Significant at p = 0.05

Table 20: Tukey HSD Post hoc comparison test between year levels with a significant difference

Level (Year)	Mean Difference	SE	Sig.	95% Confidence Interval	
				LB	UB
First Year vs Fourth Year	.21935*	.077	.024	.020	.418

Note : Significant at p = 0.05

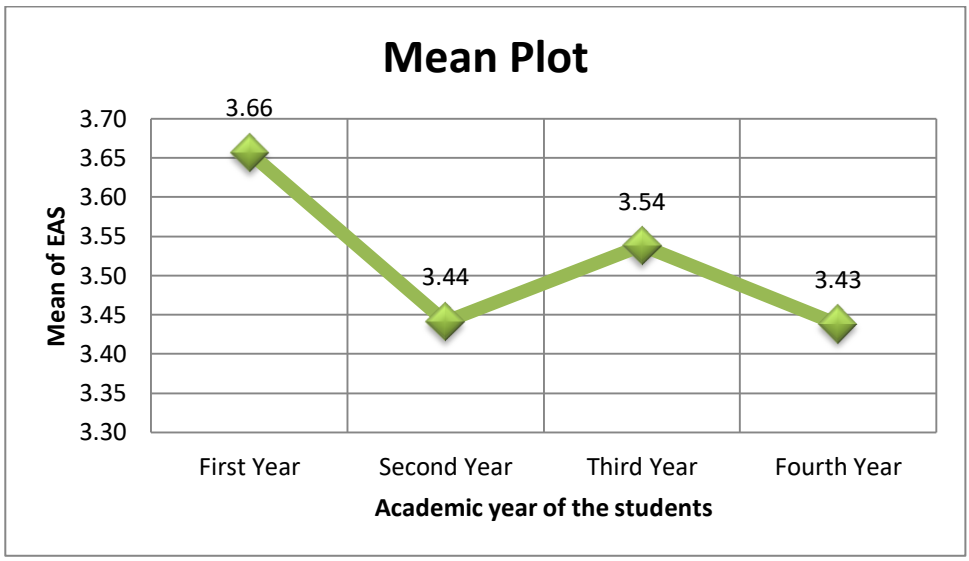


Figure 13 Mean Plots for EAS per Year Level

4.5.3.2 Future Perspectives of the Assessment System (FPA)

A one-way between departments ANOVA was performed to compare the perceptions of students from the first to the fourth year regarding the FPA. Equal variance was assumed based upon result of Levene's test F (3, 553) = 1.151, p = .328. There was a statistically significant difference in the perceptions of students in different year levels regarding the FPA (F (3, 553) = 2.883, p = .035). The magnitude of the difference in the means and the effect size was moderate (partial eta squared = .02) which indicates that 2% of the variance in FPA scores was explained by year levels. Observed power was equal to .689. Post hoc comparison using the Tukey HSD test indicate that only the mean score for the fourth year (N = 166, M = 4.31, SD = .591, 95% CI = 4.224, 4.405) was significantly different from second year (N = 88, M = 4.08, SD = .581, 95% CI = 3.961, 4.207), p = .035. The first year (N = 87, M = 4.19, SD = .711, 95% CI = 4.042, 4.345) and third-year (N = 216, M = 4.24, SD = .588, 95% CI 4.163, 4.321), were not significantly different from each other neither were they with the second and fourth year. Tables 20, 21 and 22 give more details.

Table 21: Descriptive comparison of students' perceptions of FPA based on Year levels

Level (Year)	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
First Year	87	4.19	.711	.076	4.042	4.345	1.20	5.00
Second Year	88	4.08	.581	.062	3.961	4.207	2.60	5.00
Third Year	216	4.24	.588	.040	4.163	4.321	1.60	5.00
Fourth Year	166	4.31	.591	.046	4.224	4.405	2.60	5.00
Total	557	4.23	.612	.026	4.180	4.282	1.20	5.00

Table 22: ANOVA and Test of homogeneity of variance results

FPA	Sum of Squares	df	Mean Square	F	Sig.	ŋp^2	Test of Homogeneity of Variances		
							Levene ST	df1	df2
Between Groups	3.205	3	1.068	2.883	.035				
Within Groups	204.904	553	.371						
Total	208.109	556							
Based on Mean					.328		1.151	3	553
Effect size						.02			

Note : Significant at p = 0.05

Table 23: Tukey HSD Post hoc comparison test between year levels with a significant difference

Level (Year)	Mean Difference	SE	Sig.	95% Confidence Interval	
				LB	UB
Fourth Year vs Second Year	.2307*	.0806	.022	.0235	.3462

Note : Significant at p = 0.05

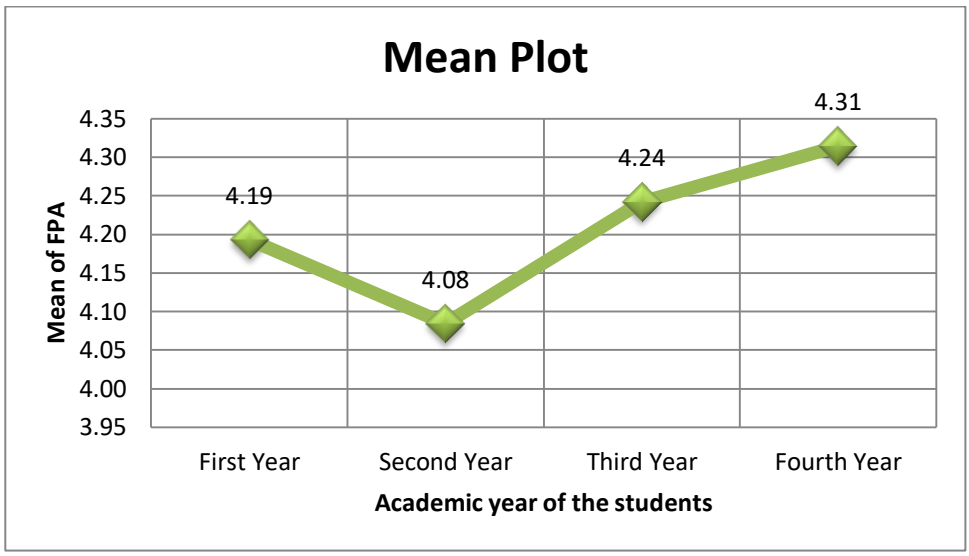


Figure 14 Mean Plots for FPA per Year Level

4.5.4 The Difference in Teachers' Perceptions Based on Gender

4.5.4.1 Effectiveness of the Assessment System (EAS)

An independent t-test was carried out to establish if there exists any significant difference between the mean of EAS test scores of male and female teachers in the selected engineering universities in Bangladesh. The results of Levene's test F (129) = .383, p = .537, indicating that the variance of males and females were assumed to be approximately equal. Thus, the standard t-test result was used as indicated in Table 23.

It was confirmed that there exists no statistically significant difference between the mean scores of EAS for male (N = 99, M = 3.91, SD = .411) and female (N = 32, M = 3.96, SD = .430), t (129) = .628, p = .531. The 95% confidence interval was .114 to -.221.

Table 24: Comparisons by gender (for teachers)

Scale	Gender	N	Mean	SD	t	df	Sig	MD	95% Confidence Interval (CI)	
									UB	LB
EAS	Male	99	3.91	.411	.628	129	.531	.053	.114	-.221
	Female	32	3.96	.430						
FPA	Male	99	4.01	.572	.492	129	.624	.056	.284	-.171
	Female	32	4.06	.541						

Note : Significant at p = 0.05

4.5.4.2 Future Perspectives of the Assessment System (FPA)

Table 23 shows the results of an independent t-test to determine if there exists any significant difference between the mean of FPA test scores of male and female students in the selected engineering universities in Bangladesh. The results of Levene's test F (129) = .036, p = .851, indicating that the variance of males and females were assumed to be approximately equal. Thus, the standard t-test result was used.

It was established that there exists no statistically significant difference between the mean scores of FPA for male (N = 99, M = 4.01, SD = .572) and female (N = 32, M = 4.06, SD = .541), t (129) = .492, p = .624 student. The 95% confidence interval was -.171 to .284.

4.5.5 The difference in Teachers' Perceptions Based on Department

4.5.5.1 Effectiveness of the Assessment System (EAS)

A one-way between departments ANOVA was performed to compare the perceptions of teachers within the six (6) departments regarding the EAS. The equal variance was assumed based upon result of Levene's test F (5, 125) = .059, p = .998. There was no statistically significant difference in the perceptions of teachers of the six (6) departments regarding the EAS (F (5, 125) = 1.371, p = .240). Post hoc comparison using the Tukey HSD test indicate that the mean score for the department of CSE (N = 26, M = 4.05 SD = .409, 95% CI = 3.88, 4.21) , EEE (N = 27, M = 3.94, SD = .390, 95% CI = 3.78, 4.09), ME/MCE (N = 22, M = 3.90, SD = .464, 95% CI = 3.70, 4.11), IPE (N = 5, M = 3.61, SD = .441, 95% CI 3.07, 4.16), CE (N = 19, M = 3.80, SD = .402, 95% CI = 3.61, 4.00) and TE (N = 32, M = 3.93, SD = .397, 95% CI = 3.78, 4.07) were not significantly different from each other. Table 24 and 25 gives more details.

Table 25: Descriptive comparison of Teachers' perceptions of EAS based on departments

Department	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
CSE	26	4.05	.409	.080	3.88	4.21	3.05	4.97
EEE	27	3.94	.390	.075	3.78	4.09	3.10	4.50
ME/MCE	22	3.90	.464	.099	3.70	4.11	2.68	4.65
IPE	5	3.61	.441	.197	3.07	4.16	2.95	4.08
CE	19	3.80	.402	.092	3.61	4.00	3.08	4.40
TE	32	3.93	.397	.070	3.78	4.07	2.95	4.77
Total	131	3.92	.415	.036	3.85	3.99	2.68	4.97

Table 26: ANOVA and Test of homogeneity of variance results

EAS	Sum of Squares	df	Mean Square	F	Sig.	Test of Homogeneity of Variances		
						Levene ST	df1	df2
Between Groups	1.165	5	.233	1.371	.240			
Within Groups	21.233	125	.170					
Total	22.398	130						
Based on Mean					.998	.059	5	125

Note : Significant at p = 0.05

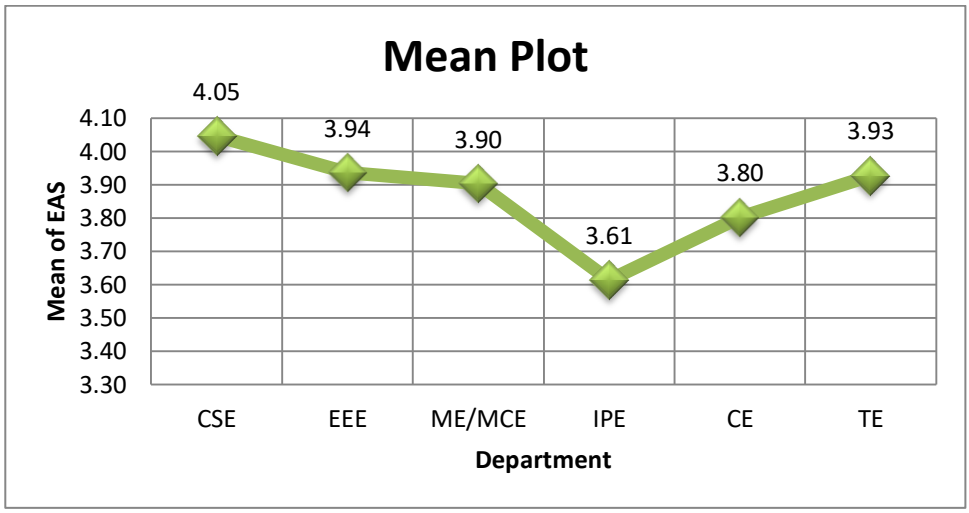


Figure 15: Mean Plot for EAS per Department

4.5.5.2 Future Perspectives of the Assessment System (FPA)

A one-way between departments ANOVA was performed to compare the perceptions of teachers within the six (6) departments regarding the FPA. Equal variance was not assumed as a result welch robust test of equality of means indicates F (5, 33.477) = 2.602, p = .043. The magnitude of the difference in the means and the effect size was large (partial eta squared = .070) which indicates that 7% of the variance in FPA scores was explained by

department. The observed power was equal to .628. There was a statistically significant difference in the perceptions of teachers of the six (6) departments regarding the FPA (F (5, 33.477) = 2.602, p = .043). Post hoc comparison using the Games – Howell test indicate that the mean scores of the department of TE (N = 32, M = 4.02, SD = .420, 95% CI = 4.04, 4.35), was significantly different from the department of CE (N = 19, M = 3.75, SD = .511, 95% CI = 3.50, 3.99), p = .032. The department of CSE (N = 26, M = 3.98, SD = .614, 95% CI = 3.74, 4.23), EEE (N = 27, M = 3.96, SD = .652, 95% CI 3.69, 4.21), MCE/ME (N = 22, M = 4.06, SD = .587, 95% CI = 3.80, 4.32) and IPE (N = 5, M = 4.28, SD = .303, 95% CI = 3.90, 4.66), were not significantly different from each other neither from the departments of TE and CE. Table 26, 27 and 28 gives more details.

Table 27: Descriptive comparison of Teachers' perceptions of FPA based on departments

Department	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
CSE	26	3.98	.614	.120	3.74	4.23	3.00	5.00
EEE	27	3.96	.652	.126	3.69	4.21	2.60	4.80
ME/MCE	22	4.06	.587	.125	3.80	4.32	2.60	4.80
IPE	5	4.28	.303	.137	3.90	4.66	3.80	4.60
CE	19	3.75	.511	.117	3.50	3.99	2.80	4.80
TE	32	4.02	.420	.074	4.04	4.35	3.20	5.00
Total	131	4.02	.563	.049	3.92	4.12	2.60	5.00

Table 28: Robust Test of Equality of Means Results

FPA	Sig.	ŋp^2	Robust Tests of Equality of Means		
			ST	df1	df2
Welch	.043		2.602	5	33.477
Effect Size		.070			

Note : Significant at p = 0.05

Table 29: Games – Howell Post hoc comparison test between departments with a significant difference

Departments	Mean Difference	SE	Sig.	95% Confidence Interval	
				LB	UB
TE vs CE	.446*	.139	.032	.026	.867

Note : Significant at p = 0.05

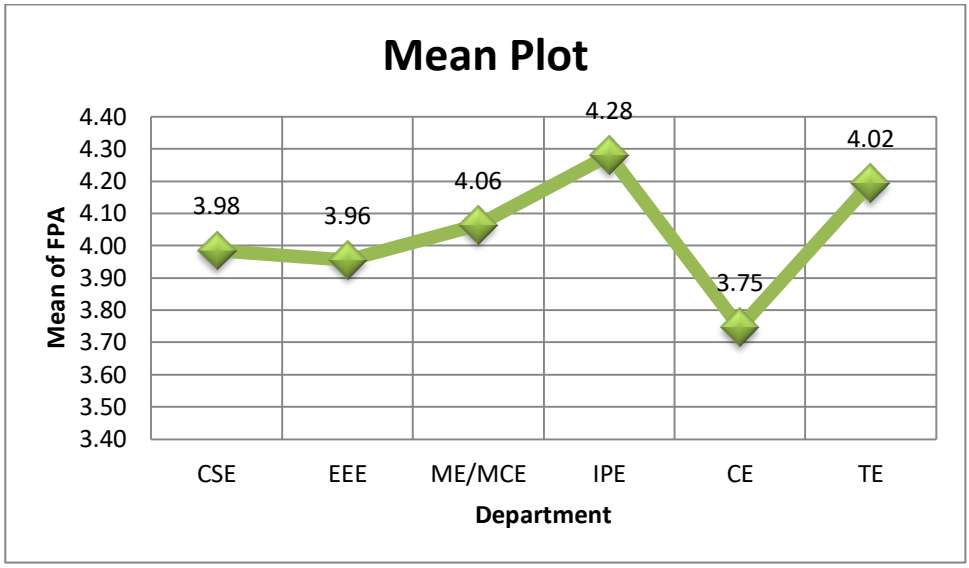


Figure 16: Mean Plot for FPA per Department

4.5.6 The difference in Teachers' Perceptions Based on their Current Position

4.5.6.1 Effectiveness of the Assessment System (EAS)

A one-way between departments ANOVA was performed to compare the perceptions of teachers of different positions regarding the EAS. The equal variance was assumed based upon result of Levene's test F (3, 127) = .458, p = .712. There was no statistically significant difference in the perceptions of teachers of different positions regarding the EAS (F (3, 127) = .195, p = .900). Post hoc comparison using the Tukey HSD test indicate that the mean score for the positions of Lecturer (N = 76, M = 3.92, SD = .406, 95% CI = 3.83, 4.01), Assistant Professor (N = 35, M = 3.90, SD = .395, 95% CI = 3.77, 4.04), Associate Professor (N = 10, M = 3.89, SD = .409, 95% CI = 3.60, 4.18) and Professor (N = 10, M = 4.01, SD = .587, 95% CI 3.59, 4.43), were not significantly different from each other.

Table 30: Descriptive comparison of Teachers' perceptions of EAS based on their positions

Current Position	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
Lecturer	76	3.92	.406	.047	3.83	4.01	2.75	4.97
Assistant Professor	35	3.90	.395	.067	3.77	4.04	2.95	4.42
Associate Professor	10	3.89	.409	.129	3.60	4.18	3.05	4.45
Professor	10	4.01	.587	.186	3.59	4.43	2.68	4.77
Total	131	3.92	.415	.036	3.85	3.99	2.68	4.97

Table 31: ANOVA and Test of homogeneity of variance results

EAS	Sum of Squares	df	Mean Square	F	Sig.	Test of Homogeneity of Variances		
						Levene ST	df1	df2
Between Groups	.103	3	.034	.195	.900			
Within Groups	22.295	127	.176					
Total	22.398	130						
Based on Mean					.712	.458	3	127

Note : Significant at p = 0.05

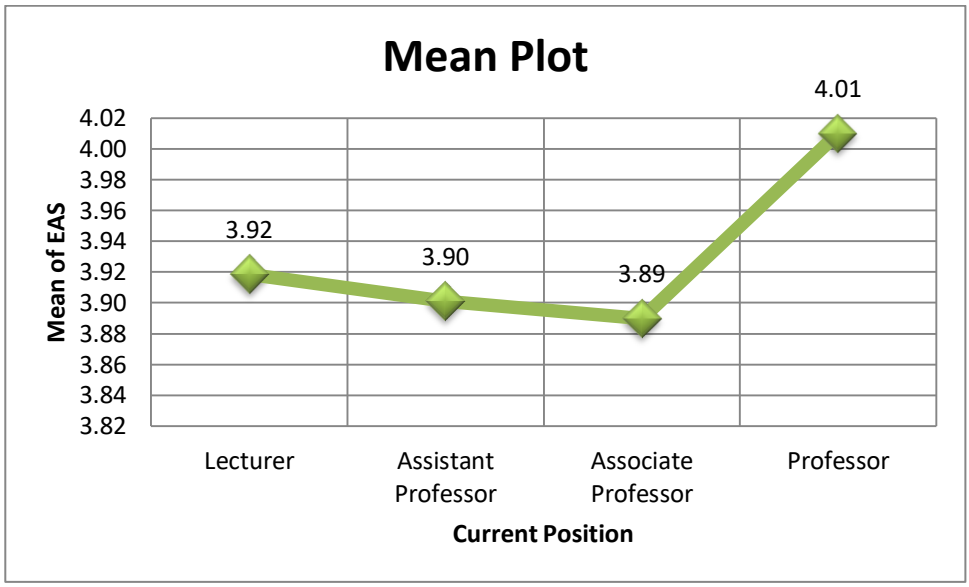


Figure 17: Mean Plot for EAS for Positions of Teachers

4.5.6.2 Future Perspectives of the Assessment System (FPA)

A one-way between departments ANOVA was performed to compare the perceptions of teachers of different positions regarding the FPA. The equal variance was assumed based upon result of Levene's test F (3, 127) = 1.121, p = .343. There was no statistically significant difference in the perceptions of teachers of different positions regarding the FPA (F (3, 127) = .123, p = .946). Post hoc comparison using the Tukey HSD test indicate

that the mean score for the positions of Lecturer (N = 76, M = 4.03, SD = .596, 95% CI = 3.89, 4.17), Assistant Professor (N = 35, M = 3.98, SD = .477, 95% CI = 3.81, 4.14), Associate Professor (N = 10, M = 4.08, SD = .509, 95% CI = 3.72, 4.44) and Professor (N = 10, M = 4.00, SD = .693, 95% CI = 3.50, 4.49), were not significantly different from one another.

Table 32: Descriptive comparison of Teachers' perceptions of FPA based on their positions

Current Position	N	M	SD	SE	95% Confidence Interval		Min	Max
					LB	UB		
Lecturer	76	4.03	.596	.068	3.89	4.17	2.60	5.00
Assistant Professor	35	3.98	.477	.081	3.81	4.14	3.00	4.80
Associate Professor	10	4.08	.509	.161	3.72	4.44	3.00	4.80
Professor	10	4.00	.693	.219	3.50	4.49	2.60	4.80
Total	131	4.02	.563	.049	3.92	4.12	2.60	5.00

Table 33: ANOVA and Test of homogeneity of variance results

FPA	Sum of Squares	df	Mean Square	F	Sig.	Test of Homogeneity of Variances		
						Levene's ST	df1	df2
Between Groups	.120	3	.040	.123	.946			
Within Groups	41.069	127	.323					
Total	41.188	130						
Based on Mean					.343	1.121	3	127

Note : Significant at p = 0.05

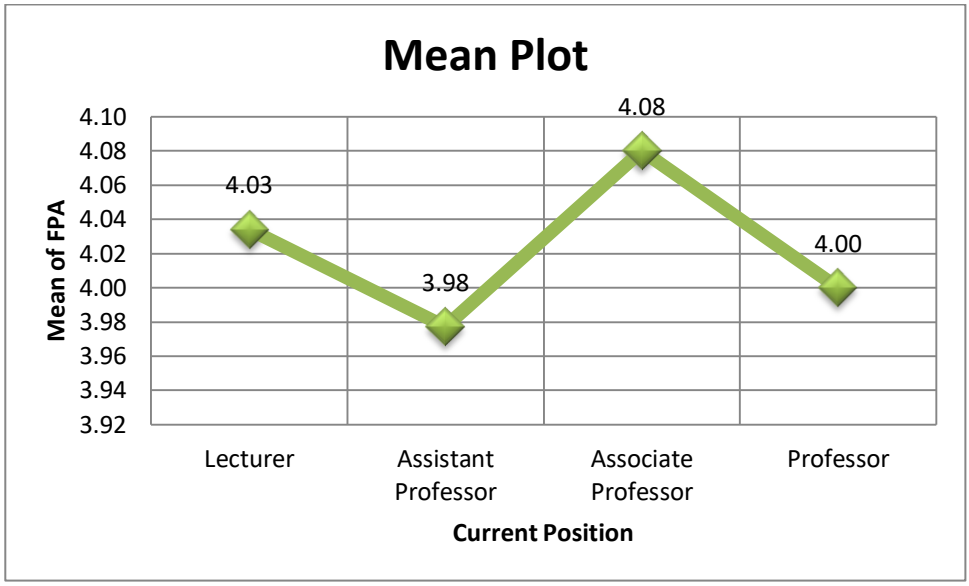


Figure 18: Mean Plot for FPA for Positions of Teachers

4.6 Overall Comparison of the Perception of Students and Teachers

4.6.1 Effectiveness of the Assessment System (EAS)

An independent t-test was carried out to determine if there exists any difference between the mean of EAS test scores of students and teachers in the selected engineering universities in Bangladesh. The results of Levene's test F (267.20) = 15.482, p = .000, indicating that the variance of students and teachers were not assumed to be approximately equal. Thus, the equal variance not assumed t-test result was used as indicated in Table 34.

It was confirmed that there exists a statistically significant difference between the mean scores of EAS for teachers (N = 131, M = 3.92, SD = .415) and students (N = 557, M = 3.51, SD = .587), t (267.20) = 9.264, p = .000. To determine the magnitude of difference or the effect size for the mean in EAS test scores for teachers and students, the formula for eta squared (t^2/t^2+(n1+n2-2)) was used. The result indicates that the effect size, ŋ^2 (.11) >.06, was large and 11% of the variance in EAS scores was explained by the participant. The observed power was equal to 1.000. The 95% confidence interval was .321 to 494. Based on the large significant difference, the null hypothesis was rejected.

Table 34: Comparison between Participants

Scale	Participant	N	Mean	SD	t	df	Sig	MD	ŋ^2	95% CI	
										UB	LB
EAS	Teacher	131	3.92	.415	9.264	267.20	.000	.407	.11	.494	.321
	Student	557	3.51	.587							
FPA	Teacher	131	4.02	.563	3.605	686	.000	.211	.02	.326	.096
	Student	557	4.23	.612							

Note : Significant at p = 0.05

4.6.2 Future Perspectives of the Assessment System (FPA)

To determine if there exists any difference between the mean of FPA test scores of students and teachers in the selected engineering universities in Bangladesh an independent t-test was conducted. The results of Levene's test F (686) = .338, p = .561, indicating that the variance of students and teachers was assumed to be approximately equal. Thus, the standard t-test result was used as indicated in Table 33.

It was confirmed that there exists a statistically significant difference between the mean scores of FPA for teachers (N = 131, M = 4.02, SD = .563) and students (N = 557, M = 4.23, SD = .612), t (686) = 3.605, p = .000. To determine the magnitude of difference or the effect size for the mean in FPA test scores for teachers and students, the formula for eta squared (t^2/t^2+(n1+n2-2)) was used. The result indicates that the effect size, ŋ^2 (.02) <.06, was moderate and 2% of the variance in FPA scores was explained by the participant. The observed power was equal to .950. The 95% confidence interval was .096 to .326. Based on the moderate significant difference the null hypothesis was rejected.

CHAPTER V

5 DISCUSSION, LIMITATIONS AND RECOMMENDATIONS

This chapter brought to perspective the findings and implications of this study. It also depicts and compares the similarities and dissimilarities of the with other earlier studies which are directly or indirectly related to this study. Limitations surrounding this study are highlighted with some recommendations that were made on the basis of the findings in this study for the improvement of the assessment system and practices and also to inform and give directions for future research.

5.1 Discussions on Findings related to Hypothesis 1/ Objective 1

This study reveals the perception of teachers and students of the selected engineering universities of Bangladesh concerning the assessment system and practices. Six (6) scales of measurement (APL, AA, SCA, TA, DA and FPA) were used to determine the overall perception of teachers and students regarding the assessment system and practices and its future perspectives. In the descriptive analysis result shown in figure 9 depicts that teachers had a higher perception than students in the first five (5) scales (APL, AA, SCA, TA and DA). Their highest mean score (4.33) was on the scale of transparency in assessment (TA). This signifies that the teachers perceived TA to be the most observed in the assessment system and practices of the selected engineering universities compare to APL, AA, SCA and DA. Students had a perception of TA compared to teachers. Students believed that their relations with the teachers have an impact on the assessment scores whilst teachers express contrary to this regard.

Students perceived alignment with the planned learning (APL) to be the most observed in the assessment practice with a mean score of (3.71). However, this result was contrary to that found in the study of Mussawy (2009), where students perceived the authenticity of assessment (AA) as the most observed in the assessment practices with a mean score of (3.60). Findings also indicate that both teachers and students believe that the current assessment practices highly assess the understanding of the students compared to their memorization of the content. However, according to Mussawy (2009), in his study on assessment practices student and teacher perception of classroom assessment, revealed that

students perceived assessment as a tool to determine their level of memorization of the delivered learning content which is contrary to the findings of this study.

The scale for the diversity of the assessment (DA) has the lowest mean score in the case of both teachers and students compared to the other four scales as indicated in figure 9. This implies that both participants perceived that less consideration has been given to inclusiveness in the current assessment system and practices compared to the four scales (APL, AA, SCA and TA). This result is again contrary to the one found in the study of Mussawy (2009), where TA was perceived as the lowest considered practice in the assessment system by the students. This may have a great impact on the effectiveness of the assessment practice as students have diverse capabilities and disabilities in the ways they learn. According to Ali (2018, p.77), "to observe assessing students with special needs there is a need to think different types of assessment and identify where there is scope to be flexible". Therefore, the findings of this study forecast that there is a need for inclusiveness in the current assessment practices.

The difference in the perception of students and teachers regarding the authenticity of the assessment (AA) practices in this study shows a gap in achieving effective assessment. Students expressed low perception compared to teachers on the AA which implies that some students believe that there are some lapses in ascertaining authenticity in the assessment practices and the need for improvement is obvious.

Furthermore, the findings in this study have shown that student consultation on the assessment (SCA) practices have been perceived by both the students and teachers as the second most observed practice in the current assessment system of the engineering universities of Bangladesh. However, the findings found in the study of Mussawy (2009), depict that SCA was the third most considered practice in the assessment practices.

In this study, the extent of perception for the effectiveness of the current assessment system (EAS) was determined by the sum of the average scale-item mean scores of the five scales (APL, AA, SCA, TA and DA) as shown in figure 19. Figure 10 indicates that teachers had a higher perception regarding the effectiveness of the current assessment system and practices than students. However, the future perspective of the assessment system (FPA) was highly perceived by students than teachers as depicted in figure 9. This indicates that students are yearning for more improvement in the current assessment system and practices in the selected engineering universities in Bangladesh. Findings under this scale (FPA) have

indicated that both participants expressed nearly equal perception of the need to provide in-service and pre-service training for teachers on assessment methods and techniques.

Figure 19: Elements of the Effectiveness of the Assessment Practices

The results of this study were to be used to test the null hypothesis that, there will no difference between the perception of teachers and students regarding the effectiveness of the current assessment system and practices. Independent t-test results indicated that there exists a statistically significant difference in the perception of teachers and students regarding the effectiveness of the current assessment with $p = .000$. Thus the null hypothesis was rejected. Further analyses were conducted to determine the magnitude of this difference or the effect size and it was revealed that the difference is large with an eta squared value of .11. This implies that 11% of the variance in EAS scores was explained by participants. The probability of rejecting the null hypothesis is 1.00 meaning there is a 100% chance of rejecting the null hypothesis. However, as stated earlier teachers had a higher perception than students concerning the EAS. The huge difference in their perception signifies that students are less satisfied with the current assessment system practices compared to the teachers and they are yearning for better practices that are manifested through their perception concerning the FPA.

5.1.1 Findings Based on Gender of the Participants

It was revealed that there exists a significant difference in the perception of male and female students regarding the effectiveness of the assessment system (EAS). The magnitude of this was moderate as the eta squared value shows .04. This indicates that 4% of the variance in EAS scores was explained by gender. Female students had a higher perception than male students, meaning they considered the current assessment system to be effective than the male students. For the case of the teacher, findings indicate that there exists no statistically significant difference in the perception of male and female teachers regarding EAS.

5.1.2 Findings Based on Department of the Participants

Comparison within the six engineering departments (disciplines) revealed that only students in the department of civil engineering (CE) differ significantly from the students in the department of computer science and engineering (CSE) and textile engineering (TE) in their perception regarding the EAS as indicated in Table 12 - 17. The effect size of these differences was moderate at a partial eta squared of .03, which means that 3% of the variance in EAS scores was explained by the departments. There exist no significant differences between the teachers of the six departments regarding EAS.

5.1.3 Findings Based on the Year level of the Students and Position of the Teachers

The comparison of students' perceptions based on their year level depicts that the first-year students significantly differ from the fourth-year students in their perception regarding the EAS. The effect size of these differences was moderate at a partial eta squared of .02, which means that 2% of the variance in EAS scores was explained by the students' year level. However, first-year students expressed the highest perception about the EAS compared to the students of the second, third and fourth years.

The comparison of the perceptions of teachers' in the position of Lecturer, Assistant Professor, Associate Professor and Professor indicates no statistically significant difference in the perceptions regarding EAS. However, Professors had the highest perception of EAS.

5.2 Discussions on Findings related to Hypothesis 2/ Objective 2

The hypothesis 2 predicts that there will be no difference between the perception of teachers and students about the future perspective (need for improvement) of the assessment current system and practices in the selected engineering universities in Bangladesh. The results of this study indicate that there exists a statistically significant difference in the perception of teachers and students regarding the future perspectives of the current assessment system and practices with $p = .000$. Again the null hypothesis was rejected. In determining the magnitude of this difference, it was discovered that the effect size was moderate with an eta squared value of .02. This indicates that 2% of the variance in FPA scores was explained by participants. The probability value for the rejected null hypothesis was .950 which indicates that there is 95% chance of rejecting the null hypothesis. It was realized that students had

the highest perception in the FPA than teachers as indicated in Table 34. This indicates their eagerness for change in the current assessment system and practices. The students expressed that assessment should test their ability to apply what they have learned to real life. Both participants have expressed their concern regarding teacher training on assessment methods and techniques. Teacher assessment literacy is considered to have a significant impact on learners (Mellati & Khademi, 2018). Knowledge in assessment gives teachers the necessary information regarding the effectiveness of their approach (pedagogy/andragogy) and the curriculum materials. According to Mellati & Khademi (2018), "superficial knowledge about the assessment procedure may affect teachers' judgment and decisions that they make". Therefore, teacher assessment literacy should be one of the focal points of teacher training programmes.

5.2.1 Findings Based on Gender of the Participants

It was revealed that there exist no significant differences in their perceptions concerning the future perspectives of the assessment FPA as depicted in Table 11. However, the male students expressed higher perception regarding the need for improvement of the assessment practices compared to the female students. Similarly, for the case of the teacher, findings indicate that there exists no statistically significant difference in the perception of male and female teachers regarding FPA.

5.2.2 Findings Based on Department of the Participants

Comparison within the six engineering departments (disciplines) revealed that students in the department of industrial and production engineering (IPE) differ significantly from the department of CSE and CE whilst the department of TE also differs from CE. The effect size of these differences was also moderate with a partial eta squared value of .02 which means that 2% of the variance in FPA scores was explained by the department. Comparing the effect size or the magnitude of the differences in the perception of students in EAS and FPA reveals that, the perception of most of the students regarding the FPA in these six departments was corroborated and there exist fewer differences compared to their perception in EAS. This depicts that the majority of the students perceived that more improvement is needed in the current assessment practices.

Teachers in the department of TE differ significantly from the department of CE with a large effect size of .07. This indicates that 7% of the variance in FPA scores was explained

by the department. This finding shows that almost all the teachers believe that the current assessment system and practices are effective and few expressed the need for further improvement which is contrary to the perception of the students. It was clear that only the students and teachers of the department of CSE, CE, TE and IPE were having differences in their perceptions regarding the FPA and EAS Tables 25 – 29 gives more details.

5.2.3 Findings Based on the Year level of the Students and Position of the Teachers

The comparison of students' perceptions based on their year level depicts that the second-year students differ from the fourth-year students in their perception regarding the FPA. This difference had an effect size of a partial eta squared of .02. This implies that 2% of the variance in FPA scores was explained by the year level. The magnitude of the differences in both EAS and FPA were equal however, first-year students expressed the highest perception about the EAS compared to the students of second, third and fourth year. As the fourth-year students have more experience regarding the current assessment system and practices, they had the highest perception of the FPA. This indicates the belief of fourth-year students that the current assessment system and practices need to be enhanced. Table 18 – 20 gives more details on the report of the statistical analysis.

The comparison of the perceptions of teachers' in the position of Lecturer, Assistant Professor, Associate Professor and Professor indicates no statistically significant difference in the perceptions regarding FPA. However, Professors had the highest perception in EAS while lecturers had the highest in the FPA.

5.3 Limitations and Implications of the Study

Sufficient funding is the backbone of any quality and reliable research activity. The limited and untimely funding of this study was one of the major challenges that limit the scope and quality of this study.

In quantitative research, the number of respondents in a given population has a great impact on the validity and reliability of the study results. Therefore, the limited respondents in this study compared to the real population on which the results of the study are to be generalized may have an impact on the quality of this study.

The analysis of the data in this study was limited to finding out the differences and the magnitude of those differences in the perceptions of teachers and students about the current assessment system and practices in the selected engineering universities in Bangladesh.

There are more than five (5) public and private engineering universities in Bangladesh however, this study was limited to only four (4) engineering universities. Out of these four (4) universities, two (2) were public and the other two (2) were the private and international universities respectively.

The scope of this was also limited due to the available time and recent literature that were directly related to the study. Quality research requires sufficient time and substantive background study, however, the time allocated for this study was not sufficient enough and the accessibility of recent studies that are directly related to this study was also a challenge.

Finally, this study was limited to only undergraduate students of the selected engineering universities.

5.4 Recommendations

Based on the outcome of this study the researcher proposed recommendations that might be observed for valid and reliable assessment practice in engineering education.

As no two students alike diversity in the assessment system should be observed to provide inclusiveness in the assessment practices. Students have different learning styles therefore, teachers should design assessment tasks bearing in mind these learning styles.

Engineering universities should assess students on criterion reference-based. Assessment for grading and ranking students is making teachers and even students to ill-conceived the main objective of the assessment. By implementing the criterion reference-based approach every student will be assessed to determine his/her competency level in performing the desired task.

Engineering universities should introduce a constructive alignment approach in their instructional delivery and assessment. By aligning assessment with the instructional content and delivery methods teachers will be able to easily determine the achievement level of students and also the teaching and learning process.

Capacity building on assessment methods and techniques is of paramount importance. Engineering universities should provide in-service or pre-service training on methods, techniques and ethics in teaching and assessment.

Students being the focal point in the assessment for learning, they should be consulted in the formulation of modalities regarding assessment. The students should be informed about the laws governing their assessment in every stage during their priode of study.

Authenticity and transparency in assessment should be given high consideration. Assessment approaches should communicate with the learning objectives. Assessment should not be used as a tool to punish or force students to submit to the will of teachers and authorities. The student should be timely informed about their performance in an assessment for their self-evaluation. There should be a link between policymakers, stakeholders, teachers, and researchers to exactly know what happens in the classroom as far as assessment is concerned.

5.5 Conclusion

The above discussions brought to perspective the perception of teachers and students of the selected engineering universities in Bangladesh, regarding the effectiveness of the assessment system and practices and its future perspectives. It has been realized that students perceived the effectiveness of the assessment system and practices to be deficient and there is a need for further improvement compared to the perception of the teachers. Future research will be necessary to determine the specific areas of improvement.

6 Reference

AERA, A. (2014). NCME.(2014). *Standards for educational and psychological testing*, 11-31.

Ali, L. (2018). The Design of Curriculum, Assessment and Evaluation in Higher Education with Constructive Alignment. *Journal of Education and e-Learning Research, 5*(1), 72-78.

Alotaibi, K. A. (2019). Teachers' Perceptions on Factors Influence Adoption of Formative Assessment. *Journal of Education and Learning, 8*(1), 74-86.

Bangladesh Bureau of Educational Information and Statistics. (2017). Number of University, Teacher and Student.

Board of Accreditation for Engineering and Technical Education, B. (2019). Program Outcomes and Assessment. from http://www.baetebangladesh.org/poa.php

Chowdhury, F. (2016). Employment of Active Learning at HEIs in Bangladesh to Improve Education Quality. *International Education Studies, 9*(10), 47.

Chowdhury, H., Alam, F., Biswas, S. K., Islam, M. T., & Islam, A. S. (2013). Quality assurance and accreditation of engineering education in Bangladesh. *Procedia Engineering, 56*, 864-869.

Dhindsa, H. S., Omar, K., & Waldrip, B. (2007). Upper secondary Bruneian science students' perceptions of assessment. *International Journal of Science Education, 29*(10), 1261-1280.

El-Maaddawy, T. (2017). Innovative assessment paradigm to enhance student learning in engineering education. *European Journal of Engineering Education, 42*(6), 1439-1454.

Falchikov, N. (2013). *Improving assessment through student involvement: Practical solutions for aiding learning in higher and further education*: Routledge.

Gashi-Shatri, Z. F., & Zabeli, N. (2018). Perceptions of students and teachers about the forms and student self-assessment activities in the classroom during the formative assessment. *Journal of Social Studies Education Research, 9*(2), 28-46.

Ghaicha, A. (2016). Theoretical Framework for Educational Assessment: A Synoptic Review. *Journal of Education and Practice, 7*(24), 212-231.

Harland, T., McLean, A., Wass, R., Miller, E., & Sim, K. N. (2015). An assessment arms race and its fallout: high-stakes grading and the case for slow scholarship. *Assessment & Evaluation in Higher Education, 40*(4), 528-541.

Harlen, W. (2006). On the relationship between assessment for formative and summative purposes. *Assessment and learning*, *2*, 95-110.

Hopkins, K. D. (1998). *Educational and psychological measurement and evaluation*: ERIC.

Islamic University of Technology. (2019). Registrar Office from http://www.iutoic-dhaka.edu/registrar_office

Jogan, S. N. (2019). " Assessment for Learning or of Learning: A Perception of Trainees". *Online Submission*, *9*(1), 549-554.

Kochhar, S. (1984). *Guidance and counselling in colleges and universities*: Sterling Publishers Pvt. Ltd.

Koul, R., Fisher, D., & Earnest, J. (2006). *Using student perceptions in development, validation, and application of an assessment questionnaire.* Paper presented at the Sharing wisdom for our future. Environmental education in action: Proceedings of the 2006 Conference of the Australian Association of Environmental Education.

Lashari, T. A., Alias, M., Akasah, Z. A., & Kesot, M. J. (2012). An affective-cognitive teaching and learning framework in engineering education. *Journal of Engineering Education, 1*(1), 11-24.

Mellati, M., & Khademi, M. (2018). Exploring Teachers' Assessment Literacy: Impact on Learners' Writing Achievements and Implications for Teacher Development. *Australian Journal of Teacher Education, 43*(6), 1.

Mohd-Yusof, K., Helmi, S. A., Phang, F. A., & Mohammad, S. (2015). Future Directions in Engineering Education: Educating Engineers of the 21st Century. *ASEAN Journal of Engineering Education, 2*(1), 8-13.

Mussawy, S. A. J. (2009). Assessment practices: Student's and teachers' perceptions of classroom assessment.

Ozan, C. (2019). Authentic Assessment Increased Academic Achievement and Attitude towards the Educational Measurement of Prospective Teachers. *International Journal of Evaluation and Research in Education, 8*(2), 299-312.

Raaper, R. (2018). Students as consumers? A counter perspective from student assessment as a disciplinary technology. *Teaching in Higher Education*, 1-16.

Raihan, M. A., Shamim, R. H., Clement, C. K., & Lock, H. S. (2013). A Study on Assessment & Evaluation of Engineering Students'learning by Essay Test Based on the Cognitive Domain of Bloom's. *International Journal of Advances in Engineering & Technology*, *6*(1), 1.

Stitt-Bergh, M., Kinzie, J., & Fulcher, K. (2018). Refining an Approach to Assessment for Learning Improvement. *Research & Practice in Assessment, 13*, 27-33.

Waldrip, B. G., Fisher, D. L., & Dorman, J. P. (2008). *Students' perceptions of assessment process: questionnaire.* Paper presented at the Proceedings of the 5th International Conference on Science, Mathematics and Technology Education 2008.

Zlatkin-Troitschanskaia, O., Schlax, J., Jitomirski, J., Happ, R., Kühling-Thees, C., Brückner, S., & Pant, H. (2019). Ethics and Fairness in Assessing Learning Outcomes in Higher Education. *Higher Education Policy*, 1-20.

APENDDIX – A

DESCRIPTIVE STATISTICS OF SPAQ

Descriptive Statistics					
Items	**N**	**Min**	**Max**	**M**	**SD**
1. My assessment in engineering courses tests what I understand.	557	1	5	3.70	.938
2. My assessment in engineering department tests what I memorize.	557	1	5	3.57	1.024
3. My assignments/tests are about what I have done in class.	557	1	5	3.80	1.056
4. I am assessed on what the teacher has taught me.	557	1	5	3.77	1.002
5. I find engineering department assessment tasks are relevant to what I do outside of school.	557	1	5	3.22	1.155
6. Assessment in the engineering department tests my ability to apply what I know to real-life problems.	557	1	5	3.44	1.179
7. Assessment in the engineering department examines my ability to answer everyday questions	557	1	5	3.25	1.087
8. I can show others that my learning has helped me do things.	557	1	5	3.76	1.006
9. In the engineering department, I am clear about the types of assessments being used.	557	1	5	3.65	1.027
10. I am aware of how my assessment will be marked.	557	1	5	3.76	1.089
11. My teacher does explain to me how each type of assessment is to be used.	557	1	5	3.69	1.163
12. I can have a say in how I will be assessed in the engineering department through the assessment system	557	1	5	3.26	1.198
13. I am told in advance when I am being assessed.	557	1	5	3.81	1.047
14. I am told in advance on what I am being assessed.	557	1	5	3.71	1.032
15. I am clear about what my teacher wants in my assessment tasks.	557	1	5	3.67	1.058
16. I know how particular assessment tasks will be marked.	557	1	5	3.61	1.090

17. My relation with the teacher does not have any influence on my assessment scores.	557	1	5	3.71	1.319
18. I am always provided with feedback from the teacher on my assessment.	557	1	5	3.47	1.218
19. I can complete the assessment tasks by the given time.	557	1	5	3.78	1.085
20. I am given a choice of assessment tasks.	557	1	5	3.01	1.176
21. I am given assessment tasks that suit my ability.	557	1	5	3.10	1.242
22. When I am confused about an assessment task, I am given another option to answer it.	557	1	5	2.80	1.307
23. The current assessment system and practices need to be improved.	557	1	5	4.46	.820
24. All the teachers must undergo pre-service or in-service training on how to assess their students.	557	1	5	4.31	.941
25. Assessment should test the ability to apply what has been learned in real-life situations.	557	1	5	4.47	.816
26. All the assessment and scoring must be guided by assessment rubrics*.	557	1	5	4.07	.903
27. The assessment load is too high and needs to be reduced.	557	1	5	3.85	1.112

APENDDIX – B

DESCRIPTIVE STATISTICS OF TPAQ

Descriptive Statistics					
Items	**N**	**Min**	**Max**	**M**	**SD**
1. My assessment in engineering courses is to test what the student understands.	131	2	5	4.34	.710
2. My assessment in the engineering department is to test what the students memorize.	131	1	5	2.80	1.098
3. My assignments/tests are about what the student has done in class.	131	1	5	3.77	.916
4. I assess what I taught to the student.	131	2	5	4.28	.777
5. My assessment tasks are relevant to what the student will do outside of school.	131	1	5	3.62	.964
6. My assessment tests the ability of the students to apply what they know to real-life problems.	131	1	5	4.13	.769
7. My assessment in the engineering courses examines the ability of the students to answer everyday questions.	131	2	5	3.70	.874
8. I can see in students that my assessment approach has helped them to do things.	131	2	5	3.98	.769
9. I always made it clear to students about the types of assessments I am going to use.	131	1	5	4.49	.716
10. I inform students how their assessment will be marked.	131	1	5	4.31	.851
11. I explained to my students how each type of assessment is to be used.	131	1	5	4.13	.854
12. My students have a say in how they should be assessed in the engineering department through the assessment system.	131	1	5	3.33	1.173
13. I told my students in advance when they will be assessed.	131	2	5	4.33	.769
14. I told my students in advance on what they will be assessed.	131	3	5	4.49	.625
15. My students are clear about what I want in each assessment task.	131	2	5	4.21	.744
16. I told my students how each particular assessment tasks will be marked.	131	1	5	4.02	.890
17. My relationship with the students does not have any influence on the assessment scores I give.	131	1	5	4.63	.768

18. I always provide students with feedback after assessing them.	131	1	5	4.29	.940
19. My students can complete the assessment tasks at the given time.	131	1	5	3.82	.818
20. I give a choice to my students on assessment tasks.	131	1	5	3.18	1.041
21. I give assessment tasks to students that suit their ability.	131	1	5	3.95	.955
22. When students are confused about an assessment task, I give them another option to answer it.	131	1	5	3.23	1.280
23. The current assessment system and practices need to be improved.	131	1	5	4.00	.969
24. All the teachers must undergo pre-service or in-service training on how to assess their students.	131	1	5	4.34	.811
25. Assessment should test the ability to apply what has been learned in real-life situations.	131	2	5	4.46	.767
26. All the assessment and scoring must be guided by assessment rubrics*.	131	1	5	3.95	.910
27. The assessment load is too high and needs to be reduced.	131	1	5	3.34	1.115

APENDDIX – C

Students' Perception on Assessment Questionnaire (SPAQ)

ISLAMIC UNIVERSITY OF TECHNOLOGY
DHAKA, BANGLADESH
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION (TVE)

Dear Student,

My name is Ousman Badjie, I am currently pursuing a Master of Science degree in Technical Education with specialisation in EEE at the Islamic University of Technology, Board Bazar, Gazipur.

As part of my programme requirements, I am currently conducting research titled **Study on Student Assessment System of Selected Engineering Universities in Bangladesh: The Current Practice and the Future Perspectives.** The objective of this study is to explore the current assessment system and practices in engineering universities in Bangladesh. In this endeavor, I wish to seek your opinions on the current assessment system and practices and the future perspectives.

Your responses will be highly valuable as it will inform the university administrators, regulatory bodies and teachers of your perception on the current assessment practices and corrective measures might be put in place when necessary.

Your participation in this study is voluntary. Your confidentiality and anonymity are assured. The data collected will be used for academic purpose only. The report on this study might be presented in formats of a thesis, journal articles or conference presentations. This survey will require approximately 10 minutes of your time. You also have the right to quit from being a participant at any time during the study.

Thank you for your interest and participation in this study. I genuinely appreciate your time.

Sincerely Yours,

Ousman Badjie,
Student ID: 171031202,
Department of Technical and Vocational Education
E-mail: ousmanbadjie2@iut-dhaka.edu
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WhatsApp: +220342

Students'
Perceptions on Assessment Questionnaire (SPAQ)

This questionnaire aims to explore your perceptions as a student who is currently pursuing an undergraduate degree in the field of engineering at either of the following universities: DUET, IUT, AUST and BUTEX. Please read the following statements carefully and circle the number in front of the item that applies to your perspective. In these items **5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree**

Note: Assessment in this questionnaire mean: Classroom Quizzes, Assignments, Mid Semester Exams and Final Semester.

Demographic Information (Please circle)											
1	Gender			Male			Female				
2	Programme:			Email:							
3	Semester					1	2	3	4	5	6	7	8
4	University Name	BUTEX	IUT	AUST	DUET						
Alignment with planned learning: The extent to which assessment tasks align with the goals, objectives, and activities of the learning program.											
5	My assessment in engineering courses tests what I understand.					5	4	3	2	1	
6	My assessment in engineering department tests what I memorize.					5	4	3	2	1	
7	My assignments/tests are about what I have done in class.					5	4	3	2	1	
8	I am assessed on what the teacher has taught me.					5	4	3	2	1	
Authenticity: The extent to which assessment tasks feature real-life situations that are relevant to the learner.											
9	I find engineering department assessment tasks are relevant to what I do outside of school.					5	4	3	2	1	
10	Assessment in the engineering department tests my ability to apply what I know to real-life problems.					5	4	3	2	1	
11	Assessment in the engineering department examines my ability to answer everyday questions					5	4	3	2	1	
12	I can show others that my learning has helped me do things.					5	4	3	2	1	
Student Consultation: The extent to which students are consulted and informed about the forms of assessment tasks being employed.											
13	In the engineering department, I am clear about the types of assessment being used.					5	4	3	2	1	
14	I am aware of how my assessment will be marked.					5	4	3	2	1	
15	My teacher does explain to me how each type of assessment is to be used.					5	4	3	2	1	
16	I can have a say in how I will be assessed in the engineering department through the assessment system.					5	4	3	2	1	

Transparency: The extent to which the purposes and forms of assessment tasks are well-defined and clear to the learner.						
17	I am told in advance when I am being assessed.	5	4	3	2	1
18	I am told in advance on what I am being assessed.	5	4	3	2	1
19	I am clear about what my teacher wants in my assessment tasks.	5	4	3	2	1
20	I know how particular assessment tasks will be marked.	5	4	3	2	1
21	My relation with the teacher does not have any influence on my assessment scores.	5	4	3	2	1
22	I am always provided with the feedback by the teacher on my assessment.	5	4	3	2	1
Diversity: The extent to which all students have an equal chance at completing assessment tasks.						
23	I can complete the assessment tasks by the given time.	5	4	3	2	1
24	I am given a choice of assessment tasks.	5	4	3	2	1
25	I am given assessment tasks that suit my ability.	5	4	3	2	1
26	When I am confused about an assessment task, I am given another option to answer it.	5	4	3	2	1
Future Perspectives						
27	The current assessment system and practices need to be improved.	5	4	3	2	1
28	All the teachers must undergo pre-service or in-service training on how to assess their students.	5	4	3	2	1
29	Assessment should test the ability to apply what has been learned in real-life situations.	5	4	3	2	1
30	All the assessment and scoring must be guided by assessment rubrics*.	5	4	3	2	1
31	The assessment load is too high and needs to be reduced.	5	4	3	2	1

* **Assessment rubrics:** this is a tool used to interpret and grade students' work against criteria and standards. Rubrics are sometimes called "criteria sheets", "grading schemes", or "scoring guides".

Thanks you for your genuine response.

Sincerely Yours,
Ousman Badjie,
Student ID: 171031202,
Department of Technical and Vocational Education
E-mail: ousmanbadjie2@iut-dhaka.edu
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APENDDIX – D

Teachers' Perception on Assessment Questionnaire (TPAQ)

ISLAMIC UNIVERSITY OF TECHNOLOGY
DHAKA, BANGLADESH
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION (TVE)

Dear Sir/Madam,

My name is Ousman Badjie, I am currently pursuing a Master of Science degree in Technical Education with specialisation in EEE at the Islamic University of Technology, Board Bazar, Gazipur.

As part of my programme requirements, I am currently conducting research titled **Study on Student Assessment System of Selected Engineering Universities in Bangladesh: The Current Practice and the Future Perspectives.** The objective of this study is to explore the current assessment system and practices in engineering universities in Bangladesh. In this endeavor, I wish to seek your opinions on the current assessment system and practices and the future perspectives.

Your responses will be highly valuable as it will inform the university administrators and regulatory bodies of your perception on the current assessment practices and corrective measures might be put in place when necessary.

Your participation in this study is voluntary. Your confidentiality and anonymity are assured. The data collected will be used for academic purpose only. The report on this study might be presented in formats of a thesis, journal articles or conference presentations. This survey will require approximately 10 minutes of your time. You also have the right to quit from being a participant at any time during the study.

Thank you for your interest and participation in this study. I genuinely appreciate your time.

Sincerely Yours,
Ousman Badjie,
Student ID: 171031202,
Department of Technical and Vocational Education
E-mail: ousmanbadjie2@iut-dhaka.edu
Mobile: 01908123016,
WhatsApp: +220342639

Teachers'
Perceptions on Assessment Questionnaire (TPAQ)

This questionnaire aims to explore your perceptions as a faculty who is currently teaching undergraduate degree courses in the field of engineering at either of the following universities: DUET, IUT, AUST and BUTEX. Please read the following statements carefully and tick the number in front of the item that applies to your perspective. In these items **5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree.**

Note: Assessment in this questionnaire mean: Classroom Quizzes, Assignments, Mid Semester Exams and Final Semester.

Demographic Information (Please Tick)										
1	**Current Position**	Lecture	Assistant Professor		Associate Professor		Professor			
2	**University Name**		BUTEX	IUT	AUST	DUET				
	Email:									
Alignment with planned learning: The extent to which assessment tasks align with the goals, objectives, and activities of the learning program.										
3	My assessment in engineering courses is to test what the student understands.						5	4	3	2	1
4	My assessment in the engineering department is to test what the students memorize.						5	4	3	2	1
5	My assignments/tests are about what the student has done in class.						5	4	3	2	1
6	I assess what I taught to the student.						5	4	3	2	1
Authenticity: The extent to which assessment tasks feature real-life situations that are relevant to the learner.										
7	My assessment tasks are relevant to what the student will do outside of school.						5	4	3	2	1
8	My assessment tests the ability of the students to apply what they know to real-life problems.						5	4	3	2	1
9	My assessment in the engineering courses examines the ability of the students to answer everyday questions.						5	4	3	2	1
10	I can see in students that my assessment approach has helped them to do things.						5	4	3	2	1
Student Consultation: The extent to which students are consulted and informed about the forms of assessment tasks being employed.										
12	I always made it clear to students about the types of assessment I am going to use.						5	4	3	2	1
13	I inform students how their assessment will be marked.						5	4	3	2	1
14	I explained to my students how each type of assessment is to be used.						5	4	3	2	1
15	My students have a say in how they should be assessed in the engineering department through the assessment system.						5	4	3	2	1

Transparency: The extent to which the purposes and forms of assessment tasks are well-defined and clear to the learner.						
16	I told my students in advance when they will be assessed.	5	4	3	2	1
17	I told my students in advance on what they will be assessed.	5	4	3	2	1
18	My students are clear about what I want in each assessment tasks.	5	4	3	2	1
19	I told my students how each particular assessment tasks will be marked.	5	4	3	2	1
20	My relationship with the students does not have any influence on the assessment scores I give.	5	4	3	2	1
21	I always provide students with feedback after assessing them.	5	4	3	2	1
Diversity: The extent to which all students have an equal chance at completing assessment tasks.						
24	My students can complete the assessment tasks on the given time.	5	4	3	2	1
25	I give a choice to my students on assessment tasks.	5	4	3	2	1
26	I give assessment tasks to students that suit their ability.	5	4	3	2	1
27	When students are confused about an assessment task, I give them another option to answer it.	5	4	3	2	1
Future Perspectives: The perception of teachers and students on the suggested future areas of improvement in assessment practices.						
28	The current assessment system and practices need to be improved.	5	4	3	2	1
29	All the teachers must undergo pre-service or in-service training on how to assess their students.	5	4	3	2	1
30	Assessment should test the ability to apply what has been learned in real-life situations.	5	4	3	2	1
31	All the assessment and scoring must be guided by assessment rubrics*.	5	4	3	2	1
32	The assessment load is too high and needs to be reduced.	5	4	3	2	1

* **Assessment rubrics:** this is a tool used to interpret and grade students' work against criteria and standards. Rubrics are sometimes called "criteria sheets", "grading schemes", or "scoring guides".