MASTER OF SCIENCE IN TECHNICAL EDUCATION

ELECTRICAL ENGINEERING

A STUDY ON THE RELEVANCE OF B.Sc.T.E CURRICULUM WITH THE OCCUPATIONAL TASKS OF TVET TEACHERS

BY

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THE ORGANIZATION OF ISLAMIC COOPERATION (OIC)

BOARD BAZAR, GAZIPUR, DHAKA-BANGLADESH

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Thesis Submitted in Partial Fulfillment of the Requirements of the Degree of Master of Science in Technical Education with Specialization in Electrical Engineering

DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
THE ORGANIZATION OF ISLAMIC COOPERATION (OIC)
DHAKA-BANGLADESH
SEPTEMBER, 2014

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The thesis title **"A Study on the Relevance of B.Sc.T.E Curriculum with the Occupational Tasks of TVET Teachers**" submitted by **Davut CICIOGLU, student No.123603** of academic year **2013-2014** has been found satisfactory and accepted as partial fulfillment of the requirement for the degree of Master of Science in Technical Education (EEE) in September 2014.

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DECLARATION

This is to certify that the work presented in this thesis is the outcome of the investigation carried out by Davut CICIOGLU under the supervision of Dr**.** Faruque A. Haolader**,** Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), The Organization of the Islamic Cooperation (OIC), Dhaka, Bangladesh.

It is hereby declared that this thesis which is submitted to the university for the degree of Master of Science in Technical Education (Electrical and Electronic Engineering) has not or never been submitted by me for a degree at any other university or educational establishment.

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DEDICATION

DEDICATED TO MY PARENTS
AND TO MY SERVICE BROTHERS

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TABLE OF CONTENTS

DECLARATION ..... **iii**

DEDICATION ..... **iv**

ACKNOWLEDGMENT ..... **v**

LIST OF TABLES ..... **ix**

LIST OF FIGURES ..... **x**

LIST OF ACRONYUMS ..... **xi**

ABSTRACT ..... **xii**

CHAPTER I **1**

INTRODUCTION **1**

1.1 Background of the Study 1

1.2 Statement of the problem 2

1.3 Objectives of the Study 2

1.4 Research Questions 2

1.5 Significance of the Study 2

1.6 Scope of The Study 3

1.6.1 Delimitations 3

1.6.2 Limitations 3

1.7 Assumptions 4

1.8 Definition of Terms 4

CHAPTER II **7**

REVIEW OF RELATED LITERATURE **7**

2.1 Introduction 7

2.1.1 The Concept of Curriculum 8

2.1.2 Curriculum as product 8

2.2 Curriculum Content Format……10
2.3 Determining Curriculum Content……...11
2.3.1 Introduction……11
2.3.2 Factors associated with determining curriculum content ……..12
2.3.3 Selecting a curriculum content determination strategy..……...……15
2.3.4 The educational setting……..15
2.3.5 The occupational setting……15
2.3.6 Content determination strategies……16
2.4 UNESCO and ILO Recommendations ……17
2.5 B.Sc.T.E Programme of IUT……19
2.5.1 B.Sc.T.E Curriculum of IUT.....…...20
2.5.2 Entry Requirements of B.Sc.T.E…….……..21
2.6 Relation between the Industry and the Polytechnic Institutes ……21
2.7 Research Studies on the Related Topic……...22
2.8 Occupational Tasks of TVET Teachers…..……..23
2.9 Analysis of the B.Sc.T.E Curriculum…….……..23
2.9.1 The structure of the curriculum…….……..24
CHAPTER III 26
RESEARCH METHODOLOGY 26
3.1 Introduction.....26
3.2 Design of the Study.....26
3.2.1 Population of the Study……26
3.2.2 Sampling of the Study……..26
3.2.3 Tools of Research……27
3.2.4 Data Collection Procedure……27
3.2.5 Methods of Data Analysis……27
CHAPTER IV..... 29
ANALYSIS AND INTERPRETATION OF DATA 29
4.1 Introduction.....…….29
4.2 The Distribution of credits and contact hours of subjects ……...29
4.3 Analysis and Interpretation of the Respondents' Response ……....31

CHAPTER V 44

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS..... 44

5.1 Summary……...44

5.2 Findings……....44

5.3 Conclusions……..……45

5.4 Recommendations and Future Work……45

5.4.1 Recommendations…….……..45

5.4.2 Future Works……...46

BIBLIOGRAPHY 47

APPENDIX A 49

APPENDIX B……79

LIST OF TABLES

Table 3.2.1 Population of the study…….……26
Table 3.2.2 Interpretation of the weighted average based on five point likert scale…..…..28
Table 4.2.1 The distribution of credits and contact hours of subjects…….……29
Table 4.3.1 the Responses of number of Respondents with Percentages and Weighted Average for Digital Techniques I &II …….....32
Table 4.3.2 the Responses of number of Respondents with Percentages and Weighted Average for Electrical Measurement & Instrumentation I &II……..……32
Table 4.3.3 the Responses of number of Respondents with Percentages and Weighted Average for Industrial Electronics I & II…….....…...33
Table 4.3.4 the Responses of number of Respondents with Percentages and Weighted Average for Instrumentation Engineering I & II……..……33
Table 4.3.5 the Responses of number of Respondents with Percentages and Weighted Average for Introduction to Microprocessors & Computer Programming…..34
Table 4.3.6 the Responses of number of Respondents with Percentages and Weighted Average for Control System Engineering……...34
Table 4.3.7 the Responses of number of Respondents with Percentages and Weighted Average for Advanced Electronics I & II …….....35
Table 4.3.8 the Responses of number of Respondents with Percentages and Weighted Average for Medical Electronics……35
Table 4.3.9 the Responses of number of Respondents with Percentages and Weighted Average for Educational Psychology……...….36
Table 4.3.10 the Responses of number of Respondents with Percentages and Weighted Average for Methods & Techniques of Teaching ……...36
Table 4.3.11 the Responses of number of Respondents with Percentages and Weighted Average for Educational Measurement and Evaluation……...36
Table 4.3.12 the Responses of number of Respondents with Percentages and Weighted Average for Principles of Vocational & Technical Education…….36
Table 4.3.13 the Responses of number of Respondents with Percentages and Weighted Average for Computer Aided Instruction…….....37
Table 4.3.14 the Responses of number of Respondents with Percentages and Weighted Average for Occupational Analysis & Course Construction……..37
Table 4.3.15 the Responses of number of Respondents with Percentages and Weighted Average for Curriculum Development, Administration and Supervision of TVE…….37
Table 4.3.16 the Responses of number of Respondents with Percentages and Weighted Average for History of Technical & Vocational Education……37
Table 4.3.17 the Responses of number of Respondents with Percentages and Weighted Average for Comparative Education…….38
Table 4.3.18 the Responses of number of Respondents with Percentages and Weighted Average for Instructional Technology and Communication Skill…….38
Table 4.3.19 the Responses of number of Respondents with Percentages and Weighted Average for Sociology of Education……..38

Table 4.3.20 the Responses of number of Respondents with Percentages and Weighted Average for Observation & Practice Teaching……..38
Table 4.3.21 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects……..39
Table 4.3.22 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects (contd.)……...…40
Table 4.3.23 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects (contd.).....…41
Table 4.3.24 the statistics of the responses Weighted Average (WA) of the participated teachers for Pedagogical Subjects ……42
Table 4.3.25 the statistics of the responses Weighted Average (WA) of the participated teachers for Pedagogical Subjects (contd.)……..43

LIST OF FIGURES

Figure 4.9.1 five category subjects of B.Sc.T.E program……....25
Figure 4.2.2 the distribution of credits and contact hours of subjects…….30
Figure 4.2.3 the contact hours distribution of subjects……....30
Figure 4.2.4 the Contact Hours Distribution of Subjects……..31

LIST OF ACRONYUMS

B.Sc.T.E	Bachelor of Science in Technical Education
BTEB	Bangladesh Technical Education Board
CAD	Computer-Aided Design
CAM	Computer-Aided manufacturing
CNC	Computer Numerical Control
DACUM	Developing a Curriculum
DTE	Diploma in Technical Education
DTE	Directorate of Technical Education
HRD	Human Resource Development
ILO	International Labor Organization
RPC	Rural Power Company
SPSS	Statistical Package for Social Science
SSC	Secondary School Certificate
UNESCO	United Nations Educational, Scientific and Cultural Organization
HSC	Higher Secondary School Certificate
ICT	Information and Communication Technology
DAE	Diploma of Associate Engineering
HDI	Human Development Index
NAVTTC	National Vocational and Technical Training Commission
TVET	Technical and Vocational Education and Training

ABSTRACT

A STUDY ON THE RELEVANCE OF B.Sc.T.E CURRICULUM WITH THE OCCUPATIONAL TASKS OF TVET TEACHERS

This study was aimed to study the relevance of B.Sc.T.E curriculum of IUT in specialization of Instrumentation and Control Technology with the occupational tasks of technical vocational education and training teachers. The total number of population was TVET teachers in Dhaka Mohila Polytechnic and M.Sc.T.E students of IUT those who are currently TVET teacher. The results show that the occupational tasks of TVET teachers are very similar with the subject content of B.Sc.T.E curriculum of IUT for specialization of Instrumentation and Control Technology. The Teachers of Dhaka Mohila Polytechnic were very cooperative and helpful in providing required information for completing this research work. The subject contents of B.Sc.T.E curriculum was found almost adequate to provide required and trained teachers for polytechnic institutions.

CHAPTER I

INTRODUCTION

1.1 Background of the Study

The Islamic University of Technology (IUT) a subsidiary organ of the Organization of Islamic Cooperation (OIC) has been established with the aim of developing human resources in the 57 member states of the OIC in the fields of engineering, technology, technical and vocational education. The main objectives include imparting engineering and technical knowledge at various levels, upgrading skills, conducting research and sharing specialized technical knowledge among the member states of the OIC (IUT Prospectus, 2003)

In order to achieve these objectives, IUT offers long regular courses at the undergraduate and postgraduate levels respectively. The Technical and Vocational Education (TVE) Department of IUT, which is solely concerned with the training of TVET teachers, offers academic courses of instruction at different levels ranging from diploma to master's degree. The programmes are: Master of Science in Technical Education (M.Sc.T.E) with specializations in Electrical & Electronic Engineering (EEE), Mechanical Engineering (MCE) and Computer Science and Engineering (CSE), Bachelor of Science and Diploma in Technical Education with specialization in above mentioned areas.

Technical and Vocational Education and Training (TVET) is increasingly seen for solving future problems. As the technology changes rapidly the curricula of technical educational programmes must be updated / reviewed in order to adjust to new technological conditions. The TVE Department intends to review the Bachelor of Science in Technical Education (B.Sc.T.E) curriculum. This study will try to find out whether the present curriculum of B.Sc.T.E program addresses the qualification requirements of TVET teachers in their occupation. TVET needs to fit the needs of the market, the goals of country for providing qualified trainers and teachers. These challenges require new approaches and initiatives to foster TVET and to focus on TVET teacher training as one particularly important area. Considering these tendencies the requirements for TVET are broadly based specialist knowledge, correlative thinking, the assumption of process responsibility, autonomy in doing the work, willingness to work flexibly in groups and readiness to undergo continuing training.

This of course has impacts on teachers, schools and the TVET system. The ongoing globalization and resulting changes in the education of skilled workers require a unique framework in TVET teacher training as well as a system of further education for teachers. Such a framework can be the basis of TVET teachers. Teachers are important factor in education reforms. Modern vocational education and training has shifted from preparing students for narrowly defined jobs to broader preparation for life in a volatile labor market. The quality of TVET in general is enhanced and the mobility of TVET teachers strengthened.

1.2 Statement of the problem

This study attempt to identify areas where changes, additions or deletions should have been made in content of curriculum of B.Sc.T.E in order to keep abreast of changing in occupational tasks of TVET teachers.

1.3 Objectives of the Study

The objectives of the study are:

Analyzing the current B.Sc.T.E curriculum of IUT and to find out the relevance of the curriculum content with the occupational tasks of TVET teachers.

1.4 Research Questions

The following research questions guided the researcher to collect the necessary data to achieve the objectives of the study.

1. What are the occupational tasks of TVET teachers?
2. Are the course contents adequate for the curriculum of Bachelor of Science in Technical Education (B.Sc.T.E) program?

1.5 Significance of the Study

The Technical and Vocational Education Department began its programmes in 1984 and offers programmes in technical education (combination of Technical and pedagogical courses). Since its establishment many changes have occurred in industries, social structures and the economic sectors in the OIC member countries.

Technical and vocational education plays an important role in the economic and social development of a country. Curriculum is one of the important elements for overall effectiveness of the education. So the content of curriculum should be designed in such a way that it must be relevant with the need of the society.

It is therefore expected that with these changes in society, many changes and developments should be also taken place in structure and quality of the curriculum of B.Sc.T.E programmes.

TVET teachers play an important role in preparing and qualifying citizens to meet the requirements for a qualified national labour force in various vocational and technical areas. This means that TVET teachers, trainers are given the opportunity to gain an internationally recognized bachelor degree which enhances their knowledge in a special vocational discipline and pedagogy.

1.6 Scope of the Study

1.6.1 Delimitations

Under B.Sc.T.E program there are some specializations. They are: Electrical Machine & Power Technology, Power System Technology, Switchgear & Protection Technology, Instrumentation and Control Technology, Radio & Television Technology.

It was so large to include all these specializations and limit of time did not allow analyzing each of them.

Therefore this study was delimited to analyze only the courses of specialization of Instrumentation and Control Technology.

And also only the subjects of Vocational Pedagogical Subjects and Technical Subjects were analyzed.

1.6.2 Limitations

This study though it was done for B.Sc.T.E curriculum of IUT because of time and difficulties of traveling to other countries limitation but the findings of this study can be considered for various faculties which offer B.Sc.T.E program.

Collecting of data was so difficult because Dhaka Mohila Polytechnic was far away from IUT and to make read the questionnaire, to the TVET teachers was not easy due to the inclusion of many subjects. So, too much time was required to collect data from the

population. So the researcher kept the study limited within the selected sample polytechnic.

1.7 Assumptions

The researcher assumed that the respondents will honestly provide reliable information that is required for the study.

1.8 Definition of Terms

Curriculum

A curriculum can be defined as the planned educational experiences offered by a school which can take place anywhere at any time (Todd, 1965).
Some argue that curriculum is as broad as all of the experiences undergone by learners wherever they are (Connelly & Clandinin, 1988; Taba, 1962). On the other hand end of spectrum are those which contend that the curriculum is narrowly defined as a set of objectives and activities, specific to each subject area that students work to achieve (Miller & Seller, 1985; Saylor & Alexander, 1974).

Course Curricula: Kerr defines curriculum as, 'all the learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school.' Course Curricula is the courses offered by an educational institution or a set of courses constituting an area of specialization. It is a set of all learning. It is systematized, well-organized and implemented. Curriculum should solve society's problems. Curriculum must be changed after every decade to meet the needs of the learners and be updated from now on what is the latest in education.

Relevance: Relevance is the degree of importance with the matter which is being conducted. Relevance of curriculum with the occupational tasks mean that the degree of relationship in technical vocational education of TVET teachers with their responsibilities or duties in teaching-learning process.

Occupation: Webster's dictionary defines an occupation "the principal business of one's life". It is the generally permanent execution of interconnected activities which is paid for and which predominantly takes up the capacity for work and the working time" (Raddatz & Schroter, 1999, p. 44).). It forms the life of a person and contributes essentially to

his/her self-realization and personal development. An occupation relates to a person and his/her role in the labor market.

The concept of an occupation has four main characteristics:

1) Individuality (inclinations, interests, and suitability of the individual).

2) Commerciality (income, economic interests).

3) Functionality (division of labor, qualifications, performance).

4) Dynamism (adaptation, further education, change of vocation) (Nolker, 1985, p. 36). Occupational standards need to be developed around occupations.

Occupational Task

Occupation is a job or profession. So occupational task refers the duties and responsibilities carried out by a person in a particular occupation. Occupational task of TVET teachers mean duties and responsibilities of teachers who work at TVET institutions. These duties have to be held in teaching-learning process in technical and vocational education by TVET teachers. In the Section 2.9 the occupational tasks of TVET teachers have been given in detail.

TVET Teachers

TVET teachers encompass teaching professionals who work in educational institutions providing both initial and continuing technical and vocational education and training. TVET teachers of Polytechnic are in charge of delivering the theoretical and practical knowledge and skills to the learners. They also have the main responsibility for the learner and their overall progress. TVET teachers usually work in TVET institutions such as polytechnic institute, technical school college etc Haolader Md. Faruque A. (2010).

Technical Subjects

The subjects those are directly related to technology in a particular occupation or a family of related occupations. These subjects usually provide the learners with theoretical and practical skills.

Sometimes technical subjects are called vocational subjects as they provide learners with the relevant professional/vocational skills. A vocational subject is an education programme which is centered on the teaching of a non-academic, manual trade, and such a subject is taught with the aim of teaching the student a specific skill. Vocational courses usually involve the student practicing the skills that they will be using in their work. One can take a vocational course in computer technology, electrical technology, and mechanical technology and so on.

Vocational Pedagogical Subjects

Vocational pedagogy is subject specific pedagogy which in the vocational teacher education curriculum is called special teaching method course. The course content consists of two main parts; first dealing with instructional design and the second one is teaching practice which trains student teacher in micro-teaching and mini-lesson. The concept of vocational pedagogy covers instructional strategy to teach vocational subjects in such a way that students learning experiences exist in work setting environment. This kind of instructional strategy must be school-based and work-based learning. The implementation of vocational pedagogy in vocational education is as a means of creating a learning environment that makes provision for student development of knowledge, manipulative skills, attitudes, and values in simulated and realistic work settings. Vocational subjects consist of manipulative skills and vocational related knowledge which the final objectives of the lessons are the application of those subjects in the world of work Bandung Indonesia (10-11 November 2010).

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews the literature that relates with Curriculum Development of Technical Education, analysis the curriculum of Bachelor of Science in Technical Education (B.Sc.T.E) with the different occupational tasks of TVET teachers.

The rapid technological developments has been witnessing in the early years of the twenty-first century, together with forces of globalization, are likely to lead to radical changes in the world of work. Indeed, the changing nature of work is already perceptible in both urban centers and in rural communities. It follows therefore that human development, of which education is such a vital part, must keep in step with these societal changes if people are to lead productive, peaceful and satisfying lives.

Technical and Vocational Education and Training (TVET) is an integral part of the Education for all initiative and through its orientation towards the world of work and the acquisition of skills play an essential role in promoting a country's economic growth and contributing to poverty reduction; ensuring the social and economic inclusion of marginalized communities. TVET assists learners acquire skills, knowledge and attitudes need to develop professional careers and enter the world of work as well as active citizenship and lifelong learning.

In recent trends, the concept is not to produce merely a technical person rather a social human being. If an engineer does not possess interpersonal skills it is hard for him to survive in the job market for long time. So an engineer must be technically sound and at the same time he must have good communication skills. These are to be grown up in the educational institutions. Engineering subjects can make their concepts technically sound and pedagogical subjects are necessary to build up their communication skill, interpersonal skill and administrative skills etc. which are very much necessary for a technical person.

2.1.1 The Concept of Curriculum

The quest for a definition of curriculum has compelled many educators. Obanya (1996) ascribed ambiguity and lack of precision to the term 'curriculum'. Kelly, A.V. (1983; 1999) observed, 'The curriculum field is by no means clear; as a discipline of study and as a field of practice, 'curriculum' lacks clean boundaries. Indeed, curriculum seems at times analogous to the blind men's elephant. It the pachyderm's trunk to some; its thick legs to others; pterodactyl-like flopping ears to some people; its massive, rough sides to other persons; and its rope-like tail to still others. The amorphous nature of the world curriculum has given rise over the years to many interpretations. Depending on their philosophical beliefs, persons have conveyed these interpretations, among others:

- Curriculum is that which is taught in school.
- Curriculum is a set of subjects.
- Curriculum is content.
- Curriculum is a programme of studies.
- Curriculum is a set of materials.
- Curriculum is a sequence of courses.
- Curriculum is a set of performance objectives.
- Curriculum is a course of study.
- Curriculum is everything that goes on within the school, including extra-class activities, guidance and interpersonal relationships.
- Curriculum is what is taught both inside and outside of school that is directed by the school.
- Curriculum is everything is planned by school personnel.
- Curriculum is a series of experiences undergone by learners in school.
- Curriculum is that which an individual learner experiences as a result of schooling.

2.1.2 Curriculum as product

The dominant modes of describing and managing education are today couched in the productive form. In the productive form education is most often seen as a technical

exercise. Objectives are set, a plan drawn up, and then applied, and the outcomes (products) measured.

It is the work of two America writers Franklin Bobbitt (1918:1928) and Ralph W. Tyler (1949) that dominate theory and practice within this tradition. In The Curriculum Bobbitt writes as follows;

The central theory [of curriculum] is simple. Human life, however varied, consists in the performance of specific activates. Education that prepares for life is one that preparers definitely and adequately for these specific activities. However numerous and diverse they may be for any social class they can be discovered. This requires only that one go out into the world of affairs and discover the particulars of which their affairs consist. These will show the abilities, attitudes, habits, appreciations and forms of knowledge that men need. These will be the objectives of the curriculum. They will be numerous, definite and particularized. The curriculum will then be that series of experiences which children and youth must have by way of obtaining those objectives from the work of Ralph W. Tyler (1918:42), in particular, has made a lasting impression on curriculum theory and practice. He shared Bobbitt's emphasis on rationality and relative simplicity. His theory was based on four fundamental questions:

1. What educational purposes should the school seek to attain?
2. What educational experiences can be provided that is likely to attain these purposes?
3. How can these educational experiences be effectively organized?
4. How can we determine whether these purposes are being attained? (Tyler 1949:1)

Like Bobbitt he also placed an emphasis on the formulation of behavioral objectives.

Since the real purpose of education is not to have the instructor performs certain activities but to bring about significant changes in the students' pattern of behavior. It becomes important to recognize that any statements of objectives of the school should be a statement of changes to take place in the students (Tyler 1949:44)

We can see how these concerns translate into a nicely-ordered procedure: one that sis very similar to the technical or productive thinking set out below.

- *Define target students and their needs:* Teachers and curriculum designers need to define those students for whom the curriculum is being developed. By first identifying particular students and their needs, curricula will be both more efficient as well as effective.

- *Identify instructional objectives:* After teachers and designers have defined the target students and their needs, they should state specific instructional objectives, including those in cognitive, affective and psychomotor domains.
- *Select the scope of subject content:* After objectives have been stated, teachers and designers must determine the subject matter or the content of the curriculum.
- *Organize sequence and structure:* Teachers and designers can not merely select subject content; they must also arrange content in a sequence or structure that will best accommodate targeted students' academic levels and interests.
- *Select presentation methods and media:* Following the arrangement of content, teachers and designers should select suitable media to present the planned sequence or structure of course content. Effective presentation methods are more likely to engage students in the learning process and thus to accomplish instructional objectives.
- *Design assessment activities:* Assessment is a crucial component of curriculum development; assessment of student learning, based on stated objectives, produces data with which one may determine the overall success of curriculum design and implementation.
- *Implement formative evaluation:* Before implementing a new curriculum, a series of formative evaluations should be conducted in order to identify and assess any weakness in the proposed curriculum. This allows teachers and designers to improve design before implementation and thus improve overall performance. The seven stages of curriculum design as outlined by Tyler (1949) and Taba (1962).

The attraction of this way of approaching curriculum theory and practice is that systematic and has considerable organizing power. Central to the approach is the formulation of behavioral objectives providing a clear notion of outcome so that content and method may be organized and the results evaluated.

2.2 Curriculum Content Format

A few reasons have been given for the need of change from the course outline format for curriculum content in higher education to one that should contain more details of the content, objectives and the use of sound theoretical basis for the selection and organization of content. Instead of the current elements of content, the themes we

advocate, objectives, topics, contents and evaluation/assessment guide. The theoretical basis for content selection is the use of any of four approaches. Details are in Ivowi (1995).

1. **Topical approach-** leads to many topics (much content) based on knowledge and experience. No clear relationship among content elements.
2. **Conceptual approach-** leads to less content clustering around major and sub-concepts and their interactions. Relatedness of content elements is emphasized.
3. **Thematic approach-** Being a combination of concepts (i.e subsuming of concepts) has most of the advantages of conceptual structure plus flexibility in terms of innovative ideas without necessarily being overloaded.
4. **Modular approach-** leads to complete units of instruction that provide employable skills.

The thematic approach is recommended for content selection. We are very familiar with the use of themes and sub themes at conferences, seminars and workshop; so generating appropriate themes for our courses should be fairly easy. As regards content organization, the spiral approach is recommended; and in fact, it is what is being used in higher institutions whereby courses are graded in order of difficulty or complexity. In the proposed format the following will feature: theme, topics, objectives, content and evaluation. The three additions here are themes performance objectives, content and assessment guide. The performance objectives are particularly important. Given the intellectual level of the students and their level of the students and their access to literature, this will give them direction in their studies and so make them to prepare more adequately for the courses. The assessment guide gives very specific and clear indication of the level at which a test should be pitched in a domain.

2.3 Determining Curriculum Content

2.3.1 Introduction

Determining curriculum content for vocational and technical education is very rewarding and still extremely frustrating. The rewarding aspect is the final product: content that may be actually used in the instructional environment to and vocational students in achieving their fullest potential. The frustrating aspect of determining curriculum content consists of identifying that which is truly relevant to both instructional and occupational settings.

2.3.2 Factors associated with determining curriculum content

In a typical educational setting, the curriculum developer is confronted with a variety of factors that may affect the task of determining what should actually be taught. Idealistically, the developer may have unlimited resources and flexibility to shape content in the ways he or she wants to, however real-world considerations often dictate the scope of the content determination process.

These factors include:

1. Time and money available
2. Internal and external pressure
3. Government content requirements
4. Skills needed by employers
5. Academic and vocational education content concerns
6. Level at which content will be provided

1. Time and money available:

Time becomes a critical element in the entire curriculum development process and is obviously a key concern when content is to be determined. The curriculum developer typically is not able to spend an unlimited amount of time deriving content to be taught. Instead, he or she is usually given a prescribed amount of time within which to establish content. This may be a day, a week, a month, or a year, but time is, nonetheless, a finite entity that affects the content determination process. The money a developer has at his or her disposal to use in the content determination process can, likewise, affect the scope of a particular effort. Time and money are often considered synonymous in education, since professional salaries constitute such a large portion of the overall budget.

When one is examining the ways content might be determined, money is a key factor, and since the amount actually available tends to dictate which content derivation strategy is used. Some strategies require no additional funds over what may be available in a typical educational institution's budget. Others require extensive travel or mailing to gather information and, consequently, demand that additional money be made available.

2. Internal and external pressure:

Another factor related to determining curriculum content consists of the subtle pressures exerted by individuals and group from within as well as outside the educational environment. Certain individuals or pressure groups may feel it is in the best interest of themselves or others to support inclusion of certain content in the curriculum. The reasons behind this sort of support may range from honest concern for students' welfare to political tactics. Regardless of the reason behind such pressure, the curriculum developer must recognize that in some cases the cause supported by certain individuals or groups may not be in the best interests of students. For example, emotional concern about content that might be included in a curriculum is no substitute for systematic content derivation. This is not to say that concern s of this type should be ignored. The contemporary curriculum developer must maintain an open mind and search for meaningful curriculum concerns that individuals and groups might process. Pressure in support of certain content might be exerted from within an educational environment by several sources. Administrators, vocational and technical Teachers, academic teachers, guidance counselors, students, and placement specialist may each feel that certain content must be included in a curriculum and strongly support that conviction. Pressure from outside the educational environment may emanate from areas such as business, industries, self-employed persons, professional organizations, unions, and advisory committees. Since every vocational curriculum must be responsive to the world of work, concerns from these areas cannot be ignored.

3. Government content requirements:

Curriculum content determination is seldom made solely by a curriculum developer teacher group. In numerous occupational areas there are content requirements specified that serve as a basic framework for curricula. These requirements, which may already be established at the government level, tend to limit the extent to which a curriculum developer can become involved in the content determination process.

4. Skills needed by employers:

In a basic sense, much of the vocational education curriculum content is aligned closely with employers' needs. This focus exists so the educational institution may provide its students with content that is work-place-relevant. In the determination of curriculum content, consideration must be given to future as well as current employer needs. This task is made easier through the use of content determination strategies that focus what workers may be doing in the future. However, more general views of the current and future workplace may be drawn from studies that focus on entire industries of businesses or employer at-large.

5. Academic and vocational education content concerns:

As noted earlier, employers currently need and will continue to need workers who can demonstrate facility in mathematics, science, and communication skills, and this need will continue to grow as workplace continues to become more and more complex. This situation, coupled with the overarching responsibility of education in prepare persons for both having and earning a living, presents educators with a thorny problem how to prepare students in terms of both the academic and the vocational education aspects of the curriculum. Integrating academic and vocational education essentially means that academic and vocational education content are brought together and taught together in such a ways that the content in each area become more relevant . by providing more relevant contexts for both academic and vocational education content it is anticipated that students will learn more and at a more rapid rate than under more-traditional instructional conditions .

6. Level at which content will be provided

A final factor related to curriculum content determination is the level at which that content will be provided. At the secondary level, students' educational needs tend to be more basic. Although some students may progress more rapidly to advanced studies in technical areas, the majority focuses on developing those academic or general and technical competencies associated with entry-level work at the post-secondary level, students are typically those who have completed high and have chosen to pursue education beyond that level. The postsecondary student is usually older and mature. Thus, content must focus on the needs of this type of

student. If this is the situation then the curriculum developers find themselves in, content needs to be identified that have high transferability to a number of occupations within a field.

2.3.3 Selecting a curriculum content determination strategy

The actual selection of a curriculum content determination strategy appears simple. However, the selection process can be quite complex with the degree of complexity dependent on variety of concerns of immediate concern to one who selecting a strategy are the aforementioned factors time and money available, internal and external pressure, government content requirements, and level of content that may impact on the content determination process. Each of these factors can affect the decision that is ultimately made, and therefore, all factors should be examined closely and information about them saved for future reference. Once the various factors associated with determining content have been examined, the developer may focus on three additional areas of concern, the educational setting, the occupational setting and the content determination strategies available. Each of these is discussed below.

2.3.4 The educational setting

The setting in which curriculum content will be implemented is most important study. This enables the curriculum developer to determine which aspects of the setting affect selection of one strategy over another. Although there are a multitude of questions one might ask about how the educational setting relates to curriculum content, some likely examples might be: what is the current educational philosophy of the school and attendance area? What support for vocational and technical education emanates from educational country? To what extent will teachers and administrators assist in the content determination process? How well will educators accept the result of systematic curriculum content determination? These are several questions a curriculum developer should pose.

2.3.5 The occupational setting

The occupational setting represents another area of concern for the curriculum developer. As with the educational setting, those aspects of the occupational that may result in a better strategy choice must be identified. Several of the questions one might ask about relationships between the occupational setting and curriculum content include: is the occupation clearly identifiable or is it emerging? Can workers in the occupation clearly identifiable or is it emerging? Can workers in the occupation be interviewed by the

telephone or face-to-face will permission is granted for workers to complete survey forms and questionnaires? To what extent will businesses or industries assist with data gathering? These are the types of questions that should be asked by the developer as he or she begins to focus on the ways content may be determined.

2.3.6 Content determination strategies

A final and most important concern is with strategies that may actually be used to determine curriculum content. If we were to draw a straight line and place "more subjective" at one end and "more objectives" at other, we have a continuum along which each of the strategies could roughly be placed. The **philosophical basis** for determining content is perhaps the most subjective strategy, since a specific philosophy or set of philosophies serves as a foundation for content decisions. This strategy is most typically used to develop the curriculum content in academic areas. Introspection is used by an individual or group to examine personal experiences and knowledge and incorporate these into a framework for the vocational curriculum content. **Introspection** is a reflective looking inward: an examination of one's own feelings. This strategy is concerned with "what vocational teachers feel that can constitute the content of a curriculum?" introspection may be classified as quite subjective, since very little (if any) hard data are used in the decision-making process.

Task analysis focuses on the identification and verification of tasks performed by workers in a certain occupation or cluster of occupations. Its procedures enable this strategy to produce quite objective data related to worker tasks. Several other meaningful strategies may be considered by the curriculum developer. These include the **critical incident technique** and the Delphi technique. The critical incident technique is useful in identifying curriculum content related to worker values and attitudes. Content in emerging occupations may be identified via Delphi technique.

The critical incident technique is comprised of "procedures for collecting direct observation of human behavior in such a way as to facilitate their potential usefulness in solving practical problems" " incident" is any observable human activity that enables "inference and predictions to be made about the person performing the act."

The observation may be made the more objective curriculum content strategies are, the more costly they are to use. For example, task analysis is a very objective process, but this objectivity is obtained at a high cost, since one must send material or travel to

locations where workers are employed. The philosophical approach is very inexpensive and the small investment yields a meager return in terms of objectivity. Realistically the curriculum developer should consider using several strategies, since each has its own particular strengths and weakness. When several strategies are used, there is a much greater likelihood that the content developed will be valid.

2.4 UNESCO and ILO Recommendations

As economic, social and technological change gathers pace, people everywhere need to develop their knowledge and skills, on a continuous basis, so that they can live and work meaningfully in the knowledge society. Education and training contribute to an individual's personal development, increase her/his productivity and incomes at work, and facilitate everybody's participation in economic and social life. It follows that education and training can also help individuals to escape poverty by providing them with the skills and knowledge to raise their out-put and generate income. Investing in education and training is therefore an investment in the future; knowledge and skills is the engine of economic growth and social development.

UNESCO and the international community have set the ambitious goal "to ensure that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programmes" (World Forum on Education, Dakar, 2000). The effort to provide basic education and literacy for all children and adults will underpin the economic and social development of countries by ensuring the capacity of people to learn and provide the foundation for their employability and access to decent work. This is also one of the key policy challenges in the ILO's *Global Employment Agenda. Education for All* and *Work for All* are two sides of the same coin.

With these views of UNECO and ILO some more recommendations related to program of TVET have been given below:

A. All programmes of technical and vocational education as preparation for an occupational field should:

1. Aim at providing scientific knowledge, technical versatility and a cluster of core competencies and generic skills required for rapid adaptation to new ideas and procedures and for steady career development;

2. Be based on analyses and forecasts of occupational requirements by national education authorities, employment authorities, occupational organizations and other stakeholders;

3. include an appropriate balance between general subjects, science and technology, as well as subjects such as computer literacy, information and communication technology, the environment and studies of both the theoretical and practical aspects of the occupational field;

4. Stress developing a sense of values, ethics and attitudes to prepare the learner for self-reliance and responsible citizenship.

B. In particular, programmes should:

1. be interdisciplinary in character, as many occupations now require two or more traditional areas of study;

2. Be based on curricula designed around core knowledge, competencies and skills;

3. Include studies of the social and economic aspects of the occupational field as a whole;

4. Include an interdisciplinary perspective to equip students to work in the changing employment environment, and incorporate a multicultural perspective, which may include the study of a foreign language as preparation for international employment;

5. Include the study of at least one foreign language of international use, which, while conducive to a higher cultural level, will give special emphasis to the requirements of communication, the acquisition of a scientific and technical vocabulary, and the need to prepare for international employment and multicultural working environments.

6. Include an introduction to organizational, planning and entrepreneurial skills;

7. Emphasize instruction in safe and environmentally sound procedures relative to the materials and equipment used in a given occupational field, the importance of safe working conditions, and the health aspects relative to the occupation as a whole, including emergency and first-aid training

C. Technical and vocational education programmes leading to university qualification, while encouraging research and offering high-level specialization should be developed with particular attention to:

1. The inclusion of components directed to developing attitudes whereby those with broad responsibilities in technological fields constantly relate their professional tasks to broader social and ethical goals;

2. Preparing the learner more generally for life and the world of work bearing in mind that technical and vocational education is for economic, personal and social benefit.

D. Programmes preparing for occupations in small industry, individual farming or the artisan trades, particularly for self-employment, should include entrepreneurship and elementary information and communication technology studies to enable those engaged in such occupations to take responsibility for production, marketing, competent management and the rational organization of the enterprise.

E. Programmes leading to occupations in the business, commercial and service sector, including the tourism and hospitality industries, should consist of:

1. Training in the methods and skills developed as a result of the application of computer-based technology to business and office management, and particularly to the acquisition and processing of information;

2. Training in the organizational and management skills required for the smooth operation of enterprises;

3. An introduction to marketing and distribution procedures.

2.5 B.Sc.T.E Programme of IUT

B.Sc.T.E program is under Technical Vocational Education (TVE) Department which offers teacher education programmes to cater to the needs of professionally trained teachers and other educational personnel in the field of Technical Education in the OIC countries the programmes provide for three categories of entrants i.e. Diploma Engineers, Higher Diploma Engineers and Graduate Engineers. It is considered appropriate that effective professional preparation for teaching in technical institutions should involve pedagogical training as well as the enrichment and upgrading of specialized technical subject areas to a level higher than one's basic preparation. Through a series of pedagogical and professional courses, the trainees develop competencies for improvement of teaching learning process, abilities to teach effectively in classroom through the application of appropriate methods and techniques along with the use of innovative teaching aids and materials, administrative and supervisory competencies for running technical institutions, understanding of the principles and techniques of measurement and evaluation in order to apply them for improvement of teaching-learning process, competencies for curriculum development, abilities for proper planning and management, skill in evaluating the outcomes of technical education and designing and conducting educational research.

In addition to the professional courses, the department offers general courses in Languages, Islamiat, Islamic History and Science & Culture to all fresh entrants in the five departments of the university. The relevant technical departments of IUT for upgrading their subject matter knowledge and specialization offer technical courses for the students of teacher education programmes (IUT Calendar 2010-2011).

2.5.1 B.Sc.T.E Curriculum of IUT

Structured internal and external examination of technical and vocational education programmes is also unique in the world of curriculum planning and development (Che Kum, 2002) Noticeable changes in today's world of work have resulted in a variety of new and emerging occupations due to the rapid technological developments and modern industrial processes this also calls for the modernization of our training programmes, hence the entire process of curriculum development. Since the beginning of the programmes of IUT by then Islamic Center of Technical and Vocational Training and Research, (ICTVTR) in 1984, the TVE department has been successfully running its programmes even though curricula and programme changes have being made time and again in order to adjust with the technological changes and also with the changes of the institution. Even though the various changes, it is necessary to make known to the stakeholders and the public at large the type of changes, and also the process in which the curriculum have been developed in the TVE department. This could only be made possible by a thorough scientific investigation and analysis. This calls for the present research theme, "The Curriculum Development Process of Instructor Training and General Studies Programmes of Islamic University of Technology from 1984 to present "

Technical and Vocational education is an organized educational activity that offers a sequence of courses that provides individuals with the academic and technical knowledge and skills the individuals need to prepare for further education and for careers in current or emerging employment sectors; and include competency-based applied learning that contributes to the academic knowledge higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, of an individual. Content was deemed satisfactory to fill the junior level administrative and service jobs.

2.5.2 Entry Requirements of B.Sc.T.E

For 2-year Bachelor of Science in Technical Education (B.Sc.T.E) programme, the entry requirement is Diploma in Technical Education (DTE) or its equivalent with good grades. For 1-year B.Sc.T.E, the entry requirement is Higher Diploma in Engineering (HDE) of IUT or its equivalent.

This study includes the 1-Year Diploma in Technical Education curriculum with the 2-Year B.Sc.T.E curriculum. The entry requirements of Diploma in Technical Education (DTE); requires at least 3-Year Diploma in Engineering / Technology after 11-12 years of schooling (IUT Calendar 2010-2011).

2.6 Relationship between Industry and Polytechnic Institutes

Hjorland &Sejer Christensen, 2002 defined about relation as "Something (A) is relevant to a task (T) if it increases the likelihood of accomplishing the goal (G), which is implied by T". Now, society and the economy are changing rapidly: change of industrial structure and working structure, the advance of science and technology, the information-oriented society and also internationalization. So specifying the relationship between the industry and the Polytechnic Institutes is very important for Bangladesh. According to Roth, 1987 that school-industry linkage represents a means of contributing to industry to succeed in an increasingly competitive world marked is contingent upon challenging market and techniques. It is clear that industry and for its survival, the quality training which related with the industry is most important. Dikko (1978)said that production of craftsman in trade centre and technical schools has always suffered from absence of good working relationship between institutions and suitable industries .He suggested that the best way to educate and train craftsmen is through the combination of industrialized instructions and industrialized practical experience. According to Oziyanka (1993) "Industries and other employers of labor are expected to give training and retraining courses to their workers. The fresh graduates take industrial training from their choice able industries as a part of their course in Polytechnic Institutes. Therefore the fresh graduates can simultaneously combine their theoretical and practical knowledge in Industry. In the same vein, Oziyanka (1993) noted that the cooperation between the polytechnic institute and industry can be maintained through employer follow-up and student follow-up activities. He further suggested that the instructor should explore any opportunity of taking a job in industry during long vacation. In relation to this suggestion, it is notices that many countries are now implementing policies on education by recommending in service training including

industrial attachment as issues that should be recognized as necessary for updating the competence of technical teachers. Participation in work-based learning internships and job-site career education programs provide valuable learning experiences for students (Stone & Alfeld, 2004).According to Amu (2011) "Institutions should have liaison offices and employ people who are well versed in public relations and industrial practices to help create meaningful links. Seminars, field trips and excursions should be incorporated into the academic curriculum, so that it will help expose students to real working environments while still undergoing academic training."

2.7 Research Studies on the Related Topic

Identifying alternative curriculum-planning processes could have a sizeable influence on the future of technology education. If teachers were able to know and to use curriculum planning processes which are compatible with the goals they choose to implement, then the congruence between the goals and practices of technology education should improve. This is especially critical for a subject matter which is in a state of transition. Learning about a variety of curriculum designs and processes would result in a more informed technology education teacher, capable of making more accurate curriculum decisions. Accurate decisions about content and the presentation of that content should result in observable differences in the conduct of technology education.

The priority task of all Technical and Vocational Education and Training (TVET) policies and systems distinctively and in contrast to general education, is to prepare individuals for specific occupations and for the world of work. TVET associated with having a broader scope including personal, general, entrepreneurial skills which can help individuals in their lifelong learning, improve their employability and facilitate overall involvement in society. At its core, however TVET remains concerned with those aspects of the educational process in addition to general education which involve the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic (UNESCO, 2001).

Another distinctive feature compared to general education is that TVET, by definition has a practice-oriented component or work-based learning aspect involved. It can even be reasoned that ultimately any occupation must be learned on the job, regardless of whether it is an academic profession or a nonacademic occupation (Rauner & Smith, 2009).

Warner's (1928) identified goals reflected the influence of manual training; current goals for technology education reflect the influence of technical and vocational education goals. Even with the influence of tradition, a shift in the emphasis of occupational /technology education goals may be observed. More emphasis is being put on the subjects of industry and technology, the teaching of cognitive and affective intellectual processes, and the role of consumerism, which is represented as a critical preparation for citizenship.

In technology education, current curriculum proposals which focus on technology as the basis of content and also focus on taxonomies of technological concepts reflect an academic curriculum design. One of the first and best examples of this design was created in 1964 by De Vore with the construction of taxonomies similar to the taxonomies of plant and animal life forms.

2.8 Occupational Tasks of TVET Teachers

In order to accomplish these tasks TVET teachers should possess the following competencies among others;

- They should be able to work within the TVET policy framework of the country.
- They should be able to apply Occupational Safety and Healthy (OSH).
- They should be able to maintain training equipment and facilities.
- They should be professional (technical skills) in their occupational field.
- They should be able to use ICT in teaching and learning.
- They should be able to design and develop learning materials and resources.
- They should be able to plan and organize lectures (training sessions).
- They should be able to deliver lectures.
- They should be able to assess their students, etc. ILO TVET Reform Project (March 2012).

2.9 Analysis of the B.Sc.T.E Curriculum

The Bachelor of Science in Technical Education (B.Sc.T.E) curriculum is structured using traditional subject/course based approach. There are 36 subjects/courses in B.Sc.T.E curriculum. Currently the TVE Department offers B.Sc.T.E degree with 5 different specializations in electrical and electronics engineering - they are: Electrical Machine & Power Technology, Power System Technology, Switchgear & Protection Technology, Instrumentation and Control Technology, Radio & Television Technology; with 5 different specialization in Mechanical Engineering – they are Refrigeration & Air-

conditioning, Automotive Technology, Energy Technology, Production Engineering; and with specialization in Computer Science and Engineering. As it was mentioned in 1.6.1 Delimitation in this study the author considers only the curriculum for B.Sc.T.E degree in Electrical and Electronics Engineering with the specialization in Instrumentation and Control Technology.

2.9.1 The structure of the curriculum

The B.Sc.T.E curriculum consists of different categories of subjects: Vocational Pedagogical Subjects, Technical Subjects, Math & Natural Science Subjects and Other Related Subjects, Related Project & Report Subject**.** The following paragraphs describe each category of B.Sc.T.E curriculum with specialization Instrumentation and Control Technology.

There are 13 **Vocational Pedagogical Subjects**. They are Educational Psychology, Methods & Techniques of Teaching and Lab, Educational Measurement and Evaluation, Principles of Vocational & Technical Education, Observation& Practice Teaching, Computer Aided Instruction and Lab, Occupational Analysis & Course Construction, Curriculum Development, History of Technical & Vocational Education, Comparative Education, Instructional Technology and Commutation Skill and Lab, Sociology of Education, Educational Measurement and Statistics.

There are 14 **Technical Subjects.** Each of which is complemented by a practical lab subject. They are Digital Techniques I&II and Labs, Electrical Measurement & Instrumentation I&II and Labs, Industrial Electronics I&II and Labs, Instrumentation Engineering I&II and Labs, Introduction to Micro-Process & Computer Programming and Lab, Control System Engineering and Lab, Advanced Electronics I&II and Labs, Medical Electronics and Lab, Fundamentals of Computer and Lab.
There are 2 **Math & Natural Science Subjects** are Engineering Mathematics III, Engineering Mathematics IV

There are **Other Related Subjects** are any of the following three language courses: Spoken Arabic I&II (Lab), Spoken English I&II (Lab), Spoken French I&II (Lab) and Islamiat, Islamic History, Science & Culture, Technology Environment and Society, Social Studies & Accounting, Engineering Management.

There is **Related Project & Report Subject.**

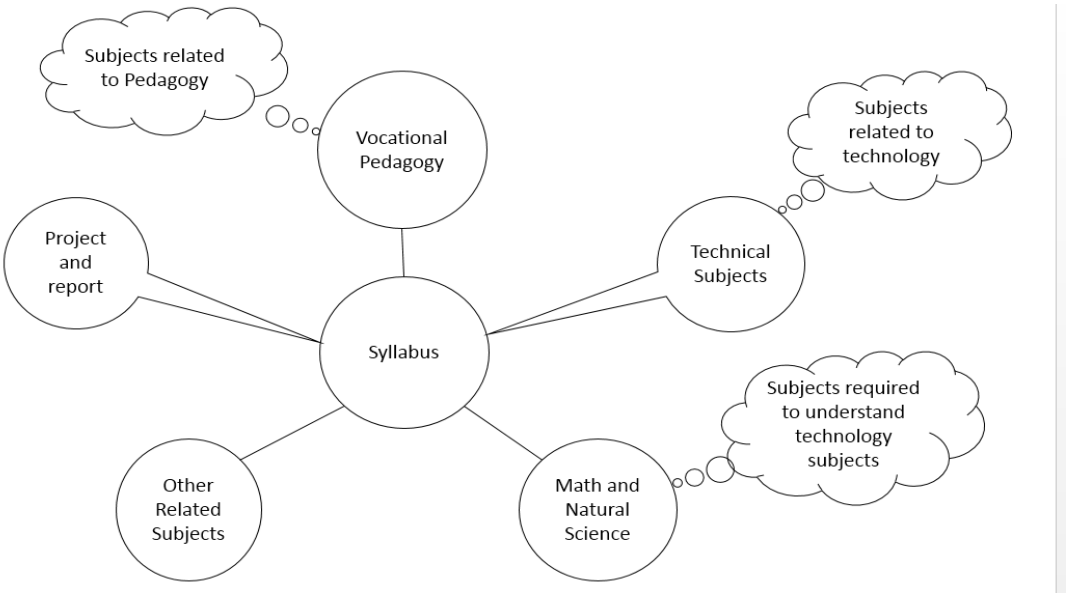

Fig.2.9.1 Five Category Subjects of B.Sc.T.E Program

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the procedure adopted in carrying out the study. It includes a design of the study, area of the study and population. It describes the method of data collection, segments used for data collection, and the method of data analysis.

3.2 Design of the Study

The study was quantitative as well as qualitative in nature.

3.2.1 Population of the Study

TVET teachers and trainers, working in polytechnics and those M.Sc.T.E students of IUT who are currently TVET teachers have been used as a population for this study. In this study the researcher expected that at least 40 TVET teachers, 15 M.Sc.T.E students would respond this opinion survey. The respondents of this study were TVET teachers of departments of electrical & electronic technology, electro-medical technology, instrumentation and control technology, computer technology.

Table 3.2.1 Population of the Study

Research area	Number of TVET Teachers	Number of M.Sc.T.E Students In IUT	Population
Bangladesh	40	15	55

3.2.2 Sampling of the Study

The sample size of this study was teachers of polytechnics and other TVET teachers who have different background under electrical specialization, have been selected on the basis of availability. The study included 30 respondents; among these respondents 25 of them were the teachers of Dhaka Mohila polytechnic and 5 of them were M.Sc.T.E students of IUT. The questionnaire was consisting of technical and vocational pedagogical

subjects' content. The data have been collected from polytechnic teachers through distributing to each teacher a copy of questionnaire.

3.2.3 Tools of Research

A questionnaire has been developed and used for gathering opinion of the population. The questionnaire has consisted of items from the curriculum content of technical and pedagogical subjects. The respondents have put their opinion on five-point scale as well as they could comment regarding the course contents**.** This has reflected views and ideas of the respondents regarding the content courses. The questionnaire has been developed by the researcher under close guidance of the supervisor. The questionnaire has been put to the appendix A.

3.2.4 Data Collection Procedure

Copies of questionnaires were distributed to the TVET teachers in selected polytechnics and collected immediately after have been completed by the respondents. Data were collected through questionnaires. The researcher used the instrument for this study was structured questionnaire. The researcher sat with TVET teachers who are working in the polytechnics in order to gather information regarding their opinions. Data have been gathered about the occupational tasks of TVET teachers which are related to the course curricula of Bachelor of Science in Technical Education. The responses of the respondents emerged about the relevance of B.Sc.T.E curriculum course contents. There were two questionnaires designed for gathering data which are respectively technical subjects' part as well as pedagogical subjects' part. The questionnaires were validated with expert's opinions before administrating. The experts were requested to provide their views and opinions on the different aspects of the questionnaires.

3.2.5 Methods of Data Analysis

For the analysis of the data, Weighted Average, SPSS (Statistical Package for Social Science) software version 15.0 Evaluation production modes and Microsoft Office Excel 2007 were used. The data from the questionnaires were put in to the SPSS software. The weighted averages were calculated directly from the raw data in SPSS software. Some data were analyzed where simple percentages were used. Beyond these the results were

also shown in the following table for more explanations. This helped a clear presentation of the data.

Table 3.1.2 Interpretation of the Weighted Average based on five point likert scale

Weighted Average	**Weighted Average Interpretation**
4.5≤Weight Average	Highly Relevant
3.5≤4.5 WA	Relevant
2.5≤3.5 W.A	Moderately Relevant
1.5≤ 2.5 W.A	Undecided
0≤ 1.5 W.A	Not Relevant

Weighted Average was calculated from the respondents' opinion in each statement using the following formula:

$$\frac{}{}$$

Where;

N_1, N_2, N_3, N_4 and N_5 stands for numbers of respondents in different categories of respondents.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

4.1 Introduction

This chapter presents the analysis of B.Sc.T.E curriculum and interpretation of experts' opinion survey data regarding the relevance of curriculum content. The data from the questionnaires were tabulated in the form of frequencies and percentages. Separate tables were prepared for each group of courses of the questionnaires. Each table was followed by its interpretation. A quantitative approach was used for analyzing the data. Weighted average and values were calculated from the raw data gathered from respondents' (experienced polytechnic teachers as well as from M.Sc.T.E students those who are currently TVET teachers). Statistical Package for Social Science (SPSS) software version 15.0 was used. TVET teachers have written their comments at the end of each course in the questionnaire.

4.2 The Distribution of Credits and Contact Hours of Subjects

A credit hours and contact hours assigned to each of the subjects mentioned above were calculated. (Please see the Appendix B for detail. The total number of credit points is 120 and they are distributed as shown in following table.

Table 4.2.1the Distribution of Credits and Contact Hours of Subjects

Subjects	Credit Hours	Contact Hours		
		Theory	Practical	Total
Vocational Pedagogy	40	31	15	46
Technical Subjects	52	44	22	66
Math & Natural Science	6	6	0	6
Other Subjects Related (Managment, Accounting.)	16	14	4	18
Project & Report	6	0	12	12
Total	120	95	53	148

As it is seen in the above table; there are 120 credit hours and 148 contact hours in the specialization of Instrumentation and Control Technology under the B.Sc.T.E program.

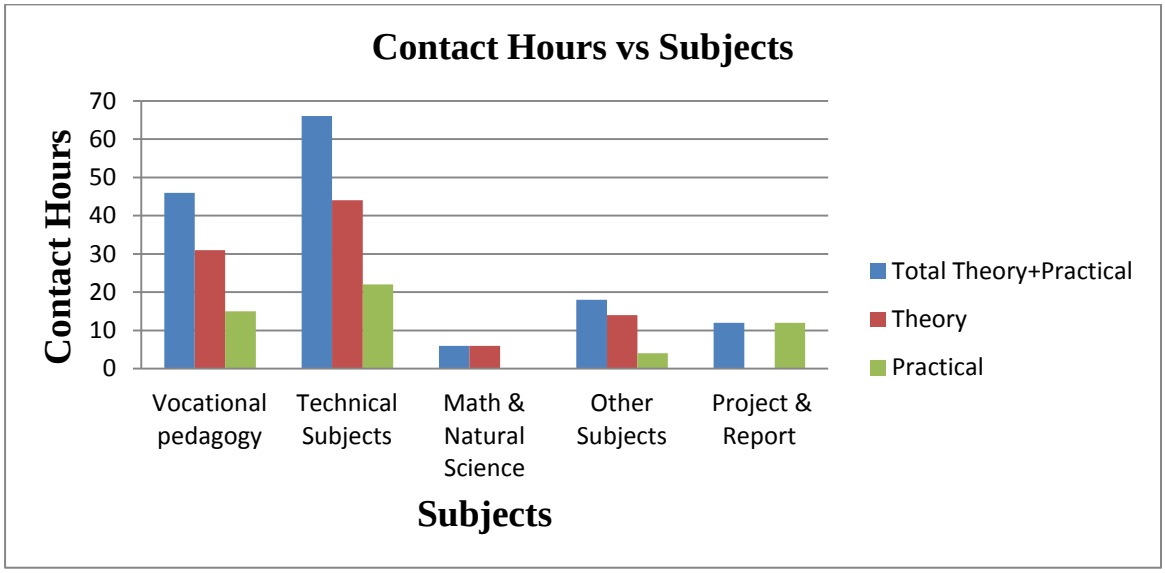

Figure 4.2.2 the Distribution Contact Hours of Subjects

From the figure 4.3.2 can be seen that the total (theory+practical) of technical subjects are more than vocational pedagogical subjects and also from other subjects.

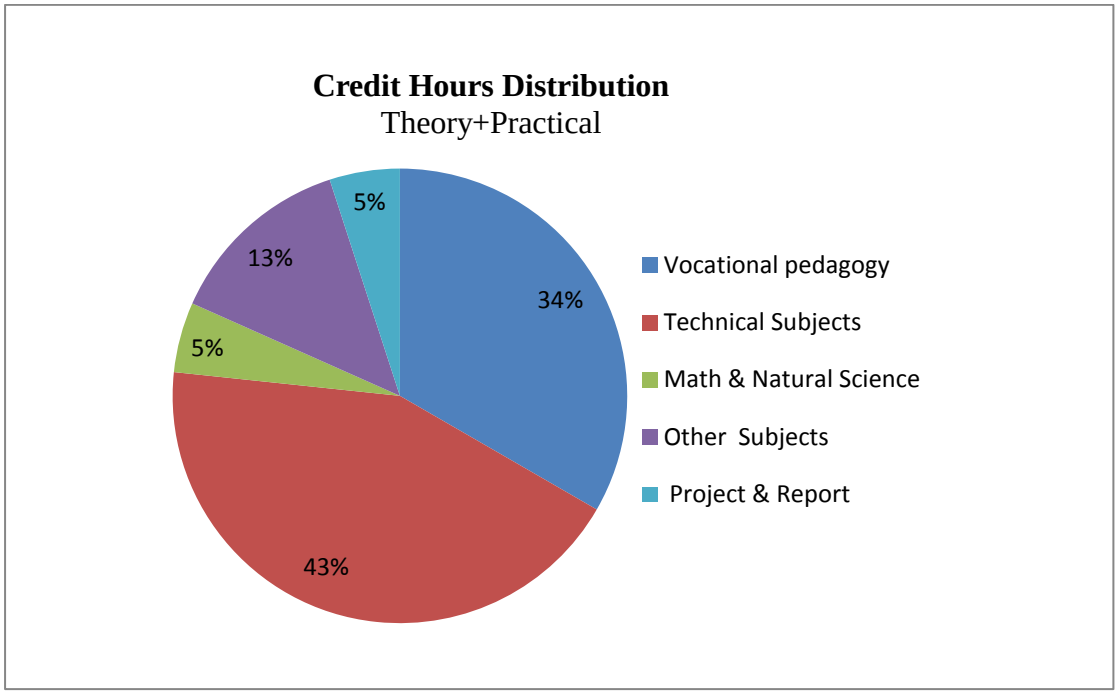

Figure4.2.3the Distribution of Credits of Subjects

The Pie Chart in Figure 4.2.3 shows the percentage of credit hours distribution among various categories of subjects in B.Sc.T.E curriculum.

As it is seen from the pie chart of credit hours distribution that the percentage of Technical Subjects is 43%, Vocational Pedagogical Subjects is 34%, Other Related Subjects is 13%, Math and Natural Science and Project & Report is 5%.

The Pie Charts in Figure 4.2.4 shows the credit hours distribution respectively, among various categories of subjects in B.Sc.T.E curriculum.

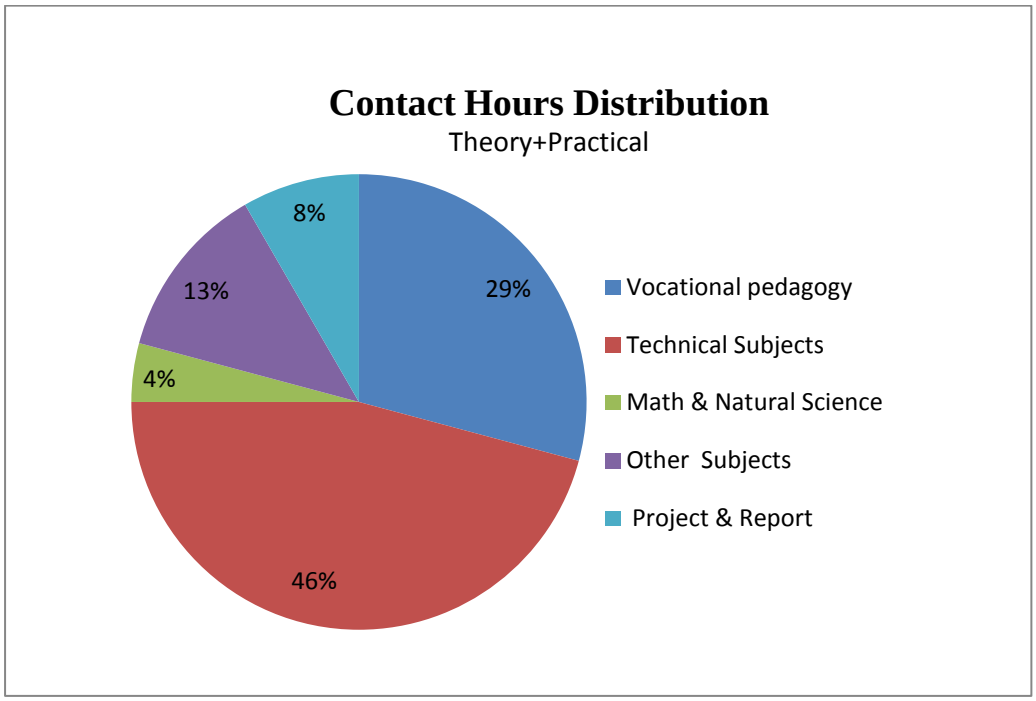

Figure 4.2.4 the Contact Hours Distribution of Subjects

4.3 Analysis and Interpretation of the Respondents' Response

In this section the data gathered through administered questionnaires are analyzed and interpreted. The questionnaires were designed based on the research questions. This presentation and analysis of data attempts to analyze the research questions of this study. Separate tables were prepared for different parts of the questionnaire, which correspond to the research questions. Data of each table was followed by its interpretation. Weighted Average was calculated from the raw data gathered from respondents. Statistical Package for Social Science (SPSS) software version 15.0 was used for average weighted were calculated for the interpretation of data.

Table 4.3.1 the Responses of number of Respondents with Percentages and Weighted Average for Digital Techniques I &II

Digital Techniques I &II	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	19 (63.3%)	11 (36.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.63
Response for Course Content of Segment 2	18 (60.0)	10 (33.3)	2 (6.7)	0 (0.0%)	0 (0.0%)	4.53
Response for Course Content of Segment 3	22 (73.3%)	7 (23.3%)	1 (3.3%)	0 (0.0%)	0 (0.0%)	4.7
Response for Course Content of Segment 4	24 (80%)	6 (20%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.8
Response for Course Content of Segment 5	24 (80%)	4 (13.3%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.73

Table 4.3.2 the Responses of number of Respondents with Percentages and Weighted Average for Electrical Measurement & Instrumentation I &II

Electrical Measurement & Instrumentation I &II	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	26 (86.7%)	4 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.86
Response for Course Content of Segment 2	23 (76.7%)	6 (20%)	1 (3.3%)	0 (0.0%)	0 (0.0%)	4.73
Response for Course Content of Segment 3	26 (86.7%)	4 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.86
Response for Course Content of Segment 4	26 (86.7%)	1 (3.3%)	1 (3.3%)	2 (6.7%)	0 (0.0%)	4.7
Response for Course Content of Segment 5	19 (63.3%)	7 (23.3%)	3 (10%)	1 (3.3%)	0 (0.0%)	4.46

Table 4.3.3 the Responses of number of Respondents with Percentages and Weighted Average for Industrial Electronics I & II

Industrial Electronics I & II	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	16 (53.3%)	5 (16.7%)	7 (23.3%)	2 (6.7%)	0 (0.0%)	4.16
Response for Course Content of Segment 2	17 (56.7%)	6 (20%)	7 (23.3%)	0 (0.0%)	0 (0.0%)	4.33
Response for Course Content of Segment 3	24 (80%)	6 (20%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.8
Response for Course Content of Segment 4	19 (63.3%)	9 (30%)	1 (3.3%)	1 (3.3%)	0 (0.0%)	4.53
Response for Course Content of Segment 5	20 (66.7%)	6 (20%)	4 (13.3%)	0 (0.0%)	0 (0.0%)	4.53
Response for Course Content of Segment 6	23 (76.7%)	7 (23.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.76
Response for Course Content of Segment 7	27 (90%)	3 (10%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.83
Response for Course Content of Segment 8	25 (83.3%)	5 (16.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.73

Table 4.3.4 the Responses of number of Respondents with Percentages and Weighted Average for Instrumentation Engineering I & II

Instrumentation Engineering I & II	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	16 (53.7%)	11 (36.3%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.43
Response for Course Content of Segment 2	18 (60%)	12 (40%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.6
Response for Course Content of Segment 3	18 (60%)	9 (30%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.5
Response for Course Content of Segment 4	8 (26.7%)	8 (26.7%)	14 (46.7%)	0 (0.0%)	0 (0.0%)	3.8
Response for Course Content of Segment 5	6	9	15	0	0	3.7

	(20%)	(30%)	(50%)	(0.0%)	(0.0%)	
Response for Course Content of Segment 6	6 (20%)	7 (23.3%)	17 (56.7%)	0 (0.0%)	0 (0.0%)	3.63

Table 4.3.5 the Responses of number of Respondents with Percentages and Weighted Average for Introduction to Microprocessors & Computer Programming

Introduction to Microprocessors & Computer Programming	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	5 (16.7%)	5 (16.7%)	20 (66.7%)	0 (0.0%)	0 (0.0%)	3.5
Response for Course Content of Segment 2	24 (80%)	1 (3.3)	5 (16.7%)	0 (0.0%)	0 (0.0%)	4.63
Response for Course Content of Segment 3	20 (66.7%)	10 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.66
Response for Course Content of Segment 4	19 (63.3%)	11 (36.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.63

Table 4.3.6 the Responses of number of Respondents with Percentages and Weighted Average for Control System Engineering

Control System Engineering	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	20 (66.7%)	10 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4.66
Response for Course Content of Segment 2	17 (56.7%)	12 (40%)	1 (3.3%)	0 (0.0%)	0 (0.0%)	4.53
Response for Course Content of Segment 3	3 (10%)	5 (16.7%)	22 (73.3%)	0 (0.0%)	0 (0.0%)	3.36
Response for Course Content of Segment 4	6 (20%)	3 (10%)	21 (70%)	0 (0.0%)	0 (0.0%)	3.5
Response for Course Content of Segment 5	2 (6.7%)	6 (20%)	22 (73.3%)	0 (0.0%)	0 (0.0%)	3.33
Response for Course Content of Segment 6	2 (6.7%)	2 (6.7%)	12 (40%)	14 (46.7%)	0 (0.0%)	2.73

Table 4.3.7 the Responses of number of Respondents with Percentages and Weighted Average for Advanced Electronics I & II

Advanced Electronics I & II	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	2 (6.7%)	2 (6.7%)	2 (6.7%)	24 (80%)	0 (0.0%)	2.4
Response for Course Content of Segment 2	22 (73.7%)	5 (16.3%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.63
Response for Course Content of Segment 3	2 (6.7%)	23 (76.7%)	5 (16.7%)	0 (0.0%)	0 (0.0%)	3.9
Response for Course Content of Segment 4	18 (60%)	6 (20%)	6 (20%)	0 (0.0%)	0 (0.0%)	4.4
Response for Course Content of Segment 5	20 (66.7%)	5 (16.7%)	5 (16.7%)	0 (0.0%)	0 (0.0%)	4.5
Response for Course Content of Segment 6	22 (73.3%)	5 (16.7%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.63
Response for Course Content of Segment 7	2 (6.7%)	2 (6.7%)	24 (80%)	2 (6.7%)	0 (0.0%)	3.13

Table 4.3.8 the Responses of number of Respondents with Percentages and Weighted Average for Medical Electronics

Medical Electronics	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	3 (10%)	6 (20%)	21 (70%)	0 (0.0%)	0 (0.0%)	3.4
Response for Course Content of Segment 2	22 (73.3%)	6 (20%)	2 (16.7%)	0 (0.0%)	0 (0.0%)	4.6
Response for Course Content of Segment 3	19 (63.3%)	6 (20%)	5 (16.7%)	0 (0.0%)	0 (0.0%)	4.46
Response for Course Content of Segment 4	17 (56.7%)	6 (20%)	7 (23.3%)	0 (0.0%)	0 (0.0%)	4.33
Response for Course Content of Segment 5	22 (73.3%)	6 (20%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.66
Response for Course Content of Segment 6	19 (63.3%)	5 (16.7%)	6 (20%)	0 (0.0%)	0 (0.0%)	4.43

Table 4.3.9 the Responses of number of Respondents with Percentages and Weighted Average for Educational Psychology

Educational Psychology	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	24 (80%)	4 (13.3%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.66

Table 4.3.10 the Responses of number of Respondents with Percentages and Weighted Average for Methods & Techniques of Teaching

Methods & Techniques of Teaching	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	26 (86.7%)	2 (6.7%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.8

Table 4.3.11 the Responses of number of Respondents with Percentages and Weighted Average for Educational Measurement and Evaluation

Educational Measurement and Evaluation	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	23 (76.7%)	4 (13.3%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.66

Table 4.3.12 the Responses of number of Respondents with Percentages and Weighted Average for Principles of Vocational & Technical Education

Principles of Vocational & Technical Education	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	22 (73.3%)	5 (16.7%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.63

Table 4.3.13 the Responses of number of Respondents with Percentages and Weighted Average for Computer Aided Instruction

Computer Aided Instruction	Degree of relevance of responses with respect to occupational tasks					
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	Weighted Average
Response for Course Content	22 (73.3%)	5 (16.7%)	2 (6.7%)	1 (3.3%)	0 (0.0%)	4.6

Table 4.3.14 the Responses of number of Respondents with Percentages and Weighted Average for Occupational Analysis & Course Construction

Occupational Analysis & Course Construction	Degree of relevance of responses with respect to occupational tasks					
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	Weighted Average
Response for Course Content	26 (86.7%)	3 (10%)	1 (3.3%)	0 (0.0%)	0 (0.0%)	4.83

Table 4.3.15 the Responses of number of Respondents with Percentages and Weighted Average for Curriculum Development, Administration and Supervision of TVE

Curriculum Development, Administration and Supervision of TVE	Degree of relevance of responses with respect to occupational tasks					
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	Weighted Average
Response for Course Content	22 (73.3%)	5 (16.7%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.63

Table 4.3.16 the Responses of number of Respondents with Percentages and Weighted Average for History of Technical & Vocational Education

History of Technical & Vocational Education	Degree of relevance of responses with respect to occupational tasks					
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	Weighted Average
Response for Course Content	24 (80%)	4 (13.3%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.73

Table 4.3.17 the Responses of number of Respondents with Percentages and Weighted Average for Comparative Education

Comparative Education	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	22 (73.3%)	5 (16.7%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.63

Table 4.3.18 the Responses of number of Respondents with Percentages and Weighted Average for Instructional Technology and Communication Skill

Instructional Technology and Communication Skill	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content of Segment 1	25 (83.3%)	3 (10%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.76
Response for Course Content of Segment 2	23 (76.7%)	5 (16.7%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.7

Table 4.3.19 the Responses of number of Respondents with Percentages and Weighted Average for Sociology of Education

Sociology of Education	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	21 (70%)	6 (20%)	3 (10%)	0 (0.0%)	0 (0.0%)	4.6

Table 4.3.20 the Responses of number of Respondents with Percentages and Weighted Average for Observation & Practice Teaching

Observation & Practice Teaching	Degree of relevance of responses with respect to occupational tasks					Weighted Average
	Highly Relevant	Relevant	Moderately Relevant	Undecided	Not Relevant	
Response for Course Content	7 (23.3%)	21 (70%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.16

The details for each subject segments has been shown in Appendix A.

Table 4.3.21 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects

		EEE4321	EEE4421	EEE4327	EEE4427	EEE4505
N	Valid	30	30	30	30	30
	Missing	0	0	0	0	0
Mean		4,6222	4,7667	4,8000	4,6667	4,4833
Std. Deviation		,51590	,48660	,40684	,56222	,67573
Minimum		3,33	3,50	3,50	3,00	3,00
Maximum		5,00	5,00	5,00	5,00	5,00

The Table 4.3.21 shows the statistics of the respondents' opinion. Based on this statistics the following statements can be made:

- The course content of EEE 4321/ EEE4421 Digital Techniques I &II are highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of EEE 4327/ EEE 4427 Electrical Measurement & Instrumentation I&II are highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of EEE 4505 Industrial Electronics I is relevant to occupational tasks of TVET teachers with the mean value above 3.5.

Table 4.3.22 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects (contd.)

		EEE4603	EEE4517	EEE4617	EEE4631
N	Valid	30	30	30	30
	Missing	0	0	0	0
Mean		4,5167	4,4667	3,7167	4,0833
Std. Deviation		,72497	,62881	,80605	,54272
Minimum		2,50	3,50	3,00	3,50
Maximum		5,00	5,00	5,00	5,00

The Table 4.3.22 shows the statistics of the respondents' opinion. Based on this statistics the following statements can be made:

- The course content of EEE 4603 Industrial Electronics II is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.

- The course content of EEE 4517 / EEE 4617 Instrumentation Engineering I&II are relevant to occupational tasks of TVET teachers with the mean value above 3.5.

- The course content of EEE 4631 Introduction to Micro-Process & Computer Programming is relevant to occupational tasks of TVET teachers with the mean value above 3.5.

Table 4.3.23 the statistics of the responses Weighted Average (WA) of the participated teachers for Technical Subjects (contd.)

		EEE4705	EEE4733	EEE4833	EEE4835
N	Valid	30	30	30	30
	Missing	0	0	0	0
Mean		3,4667	4,5667	4,0167	4,6667
Std. Deviation		,61495	,70385	,54903	,68649
Minimum		2,50	3,00	3,00	2,50
Maximum		5,00	5,00	5,00	5,00

The Table 4.3.23 shows the statistics of the respondents' opinion. Based on this statistics the following statements can be made:

- The course content of EEE 4705 Control System Engineering is moderately relevant to occupational tasks of TVET teachers with the mean value above 2.5.

- The course content of EEE 4733 Advanced Electronics I is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.

- The course content of EEE 4833 Advanced Electronics II is relevant to occupational tasks of TVET teachers with the mean value above 3.5.

- The course content of EEE 4835 Medical Electronics is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.

Table 4.3.24 the statistics of the responses Weighted Average (WA) of the participated teachers for Pedagogical Subjects

		TVE3103	TVE3125	TVE3235	TVE3239	TVE3259	TVE 4258
N	Valid	30	30	30	30	30	30
	Missing	0	0	0	0	0	0
Mean		4,8000	4,6667	4,6333	4,6000	4,8333	4.6667
Std. Deviation		,55086	,66089	,66868	,77013	,46113	,66089
Minimum		3,00	3,00	3,00	2,00	3,00	3,00
Maximum		5,00	5,00	5,00	5,00	5,00	5,00

. The Table 4.3.24 shows the statistics of the respondents' opinion. Based on this statistics the following statements can be made:

- The course content of TVE 3103 Educational Psychology is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 3125 Methods & Techniques of Teaching is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 3235 Educational Measurement and Evaluation is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 3239 Principles of Vocational & Technical Education is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 3259 Computer Aided Instruction is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 4258 Observation & Practice Teaching is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.

Table 4.3.25 the statistics of the responses Weighted Average (WA) of the participated teachers for Pedagogical Subjects (contd.)

		TVE4111	TVE4117	TVE4141	TVE4143	TVE4230	TVE4251
N	Valid	30	30	30	30	30	30
	Missing	0	0	0	0	0	0
Mean		4,6333	4,7333	4,6333	4,7667	4,6500	4,1667
Std. Deviation		,66868	,58329	,66868	,56832	,61798	,53067
Minimum		3,00	3,00	3,00	3,00	3,00	3,00
Maximum		5,00	5,00	5,00	5,00	5,00	5,00

The Table 4.3.25 shows the statistics of the respondents' opinion. Based on this statistics the following statements can be made:

- The course content of TVE 4111 Occupational Analysis & Course Construction is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 4117 Curriculum Development, Administration and supervision of TVE is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 4141 History of Technical & Vocational Education is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 4143 Comparative Education is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE 4230 Instructional Technology and Communication Skill is highly relevant to occupational tasks of TVET teachers with the mean value above 4.5.
- The course content of TVE Sociology of Education is relevant to occupational tasks of TVET teachers with the mean value above 3.5.

4.3.1 Comments Based on Open-ended Questions

The researcher was expecting regarding open-ended questions that the respondents would answer for each subject that would help in reviewing of each subject but unfortunately only the subject of Educational Psychology was recommended by respondents. Because of that the comments for each subject was not tabulated. The comment for this subject was; TVET psychology will not be similar to the general education psychology so that the content of this subject should be related to TVE.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK

5.1 Summary

This chapter provides a summary of the study; major findings, conclusions, recommendations as well as future works. The main purpose of this study was to find out the relevance of technical and pedagogical subject of B.Sc.T.E course content of IUT with the occupational tasks of TVET teachers. The second purpose of carrying out of this study was to state the occupational tasks of TVET teachers. In order to fulfill these objectives, primarily polytechnic teachers were considered for this study. Data has been collected from TVET teachers in polytechnic institutions and M.Sc.T.E students of IUT who are currently teachers in polytechnics.

The study included 30 respondents; among these respondents 25 were the teachers of Dhaka Mohila polytechnic and 5 of them were M.Sc.T.E students of IUT. The questionnaire was consisting of technical and vocational pedagogical subjects' content. The data have been collected from polytechnic teachers through distributing to each teacher a copy of questionnaire.

For the analysis of the data, Weighted Average has been used and also (the data) were analyzed by using SPSS (Statistical Package for Social Science) software tool.

5.2 Findings

Research question I

What are the occupational tasks of TVET teachers?

The finding shows that the occupational tasks of TVET teachers are; to be aware of policy framework of the country, to apply occupational safety and healthy, to maintain training equipment and facilities, to be professional (technical skills) in their occupational field, to use ICT in teaching and learning, to design and develop learning materials and resources, to plan and organize lectures, to deliver lectures, to assess their students, etc.

Research question II

Are the course contents of Bachelor of Science in Technical Education (B.Sc.T.E) program relevant to the occupational tasks of TVET teachers?

The majority opinion of TVET teachers at polytechnics has shown that; the technical and vocational pedagogical course contents of B.Sc.T.E program of IUT were relevant to the occupational tasks of TVET teachers.

5.3 Conclusions

Based on analysis of the data and findings of the study these conclusions can be made;

1. The occupational tasks of TVET teachers are relevant to the course contents of B.Sc.T.E program of IUT.
2. The Vocational Pedagogical course contents of Educational Psychology, Methods & Techniques of Teaching, Educational Measurement and Evaluation, Principles of Vocational & Technical Education, Observation& Practice Teaching, Computer Aided Instruction, Occupational Analysis & Course Construction, Curriculum Development, History of Technical & Vocational Education, Comparative Education, Instructional Technology and Commutation Skill were found highly relevant while the subject Sociology of Education was found relevant with the occupational tasks of TVET teachers.
3. The Technical Subject contents of Digital Techniques I&II, Electrical Measurement & Instrumentation I&II, Industrial Electronics II, Advanced Electronics I, Medical Electronics were found highly relevant; Industrial Electronics I, Instrumentation Engineering I&II, Introduction to Micro-Process & Computer Programming, Advanced Electronics II were found relevant; while the subject Control System Engineering was found moderately relevant with the occupational tasks of TVET teachers.

5.4 Recommendations and Future Work

5.4.1 Recommendations

Through this study we can say that the course content of Educational Psychology should be extended or included new syllabus, new contents, under the light of the comments of TVET teacher. For example the education which is being offered should be complying with international standards. Every semester, the student should new pedagogy units. The students will be dealing with questions of pedagogy and didactics, to various training methods in vocational training, to lesson and training preparation as well as a number of different training techniques.

5.4.2 Future Works

- This research study was only conducted with the Vocational Pedagogical Subjects and Technical subjects, a further research work can be done on the analysis of contents of other subjects e.g. Math & Science and other related subjects.
- It has been found that some of the technical courses e.g. Digital Techniques I&II, Electrical Measurement & Instrumentation I&II are offered in both B.Sc.T.E and B.Sc.E under engineering programmes therefore further study can be done how these courses are implemented particularly in B.Sc.T.E program; for example delivery method, student assessments etc.
- The sample size of the population should include not only TVET teachers but also professionals who work in the industries

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APPENDIX A

QUESTIONNAIRE

With respondents responses

Name:

Institution:

Address:

Field work Area:

☐ TVET Institution with Department ☐ Industry

Nature of your Work:

☐ Teaching ☐ Operator

☐ Dept. Head/ supervisor ☐ Technician

☐ Other (Please Specify) ☐ Supervisor

Length work experience to application of TVET institution and Industry

☐ Less than 1 year ☐ 1-5 years

☐ 6-10 years ☐ 11-15 years

☐ More than 15 years

Educational Qualification

☐ College level ☐ Technical course

☐ Bachelor's Degree ☐ Masters Degree

☐ Doctorate Degree ☐ Others (Please Specify)

Brief description of your present Job:

Instruction: In the following pages you will find the course content of the B.Sc.TE curriculum of IUT. Please read it and put your opinion.

COURSE CONTENT OF B.SC.TE CURRICULUM OF IUT

(SOME SELECTED COURSES)

TECHNICAL SUBJECTS

Digital Techniques

Following is the whole course content according to IUT syllabus which is presented segment-wise in the following table.

Digital Techniques I (Offered in the First Semester of DTE, 3 Theory and 1.5 practical Classes per week.)

Number system and Codes: General way of representing numbers, decimal, binary, octal and hexadecimal number systems and their representation conversion of number from one system to another. Compliment in number system. Different Codes: BCD, Alphanumeric, Gray, Excess-3, ASCII and error detection codes.

Digital Logic: Boolean algebra, De-Morgan's Theorem logic gates and their truth tables. Canonical form of logic expression. Simplification of logic expression: Algebraic method, K-Map and Quine-Mc Clauskey method. Realization by using NAND/NOR gates.

Classification of logic systems: Combinational logic system. Combinational logic design using MSI & LSI. Adders, sub tractors, Code Converters. Magnitude Comparator Encoder, Decoder, Multiplexer, De-multiplexer, ROM, RAM, Programmable logic, Array (PLA), D /A & A/D converters with applications. Different types of digital storage media.

Digital Techniques II (Offered in the Second Semester of DTE, 3 Theory and 1.5 practical Classes per week.)

Sequential logic system: Flip-Flops, clocked RS, JK, Master Slave JK, D-type, T-type, Flip-Flops, Flip-Flop Design. Sequential logic Registers: Different types of Registers and their applications. Counters and their simplified design. Timing Circuits: Application of logic gates in Timing Circuits, OPAM-application in timing circuits-use of IC-555 as timing circuits.

Based on the above course content, please read the following segments and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance With Respect to (Technical) Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average (WA)**
Number system and Codes: General way of representing numbers, decimal, binary, octal and hexadecimal number systems and their representation conversion of number from one system to another. Compliment in number system.	**19 (63.3%)**	**11 (36.7%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**
Different Codes: BCD, Alphanumeric, Gray, Excess-3, ASCII and error detection codes.	**18 (60.0)**	**10 (33.3)**	**2 (6.7)**	**0 (0.0%)**	**0 (0.0%)**	**4.53**

Digital Logic Boolean algebra, De-Morgan's Theorem logic gates and their truth tables. Canonical form of logic expression. Simplification of logic expression: Algebraic method, K-Map and Quine-Mc Clauskey method. Realization by using NAND/NOR gates.	**22 (73.3%)**	**7 (23.3%)**	**1 (3.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.7**
Classification of logic systems: Combinational logic system. Combinational logic design using MSI & LSI. Adders, sub tractors, Code Converters. Magnitude Comparator Encoder, Decoder, Multiplexer, De-multiplexer, ROM, RAM, Programmable logic, Array (PLA), D /A & A/D converters with applications. Different types of digital storage media. Sequential logic system: Flip-Flops, clocked RS, JK, Master Slave JK, D-type, T-type, Flip-Flops, Flip-Flop Design. Sequential logic Registers: Different types of Registers and their applications.	**24 (80%)**	**6 (20%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.8**
Counters and their simplified design. Timing Circuits: Application of logic gates in Timing Circuits, OPAM-application in timing circuits-use of IC-555 as timing circuits	**24 (80%)**	**4 (13.3%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.73**

Is the course content given above adequate for Digital Technique of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Electrical Measurement & Instrumentation

Electrical Measurement & Instrumentation I (Offered in the First Semester of DTE, 3 Theory and 1.5 practical Classes per week.)

Measurement: Units and standards. Measurement of resistance, inductance and capacitance, A.C. and D.C. bridge methods, current, power and energy, measurement of frequency and phase difference. Earth resistance measurement, measurement of cable fault location. Measuring Instruments: Indicating instruments and their classifications, moving coil and moving iron instruments. "Clip- on" instruments; Dynamometer and thermal instruments; Vibrating reed instruments, recording instruments, Merger with applications.

Electrical Measurement & Instrumentation II (Offered in the Second Semester of DTE, 3 Theory and 1.5 practical Classes per week.)

Measurement: Magnetic Measurements-Ballistic galvanometer-flux meter- measurement of non-electrical quantities like temperature, pressure speed, level, flow, rate, stress, strain etc. High voltage measurement and testing, radio frequencies measurements. Effect of Instrument connection on the accuracy of measurement, care and handling of Instruments, sensitivity of Instruments. Measurement Instruments: Cathode ray oscilloscope, Q meters, extension of Instrument range. Instrument transformers, tube and transistor testers, Tachometer Stroboscope, Instrumentation amplifier, digital voltmeter and millimeters, A/D and D/A converters.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Measurement: Units and standards. Measurement of resistance, inductance and capacitance, A.C. and D.C. bridge methods, current, power and energy, measurement of frequency and phase difference. Earth resistance measurement, measurement of cable fault location.	**26 (86.7%)**	**4 (13.3%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.86**
Measuring Instruments: Indicating instruments and their classifications, moving coil and moving iron instruments. "Clip- on" instruments; Dynamometer and thermal instruments; Vibrating reed instruments, recording instruments, Merger with applications.	**23 (76.7%)**	**6 (20%)**	**1 (3.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.73**
Measurement: Magnetic Measurements-Ballistic	**26**	**4**	**0**	**0**	**0**	**4.86**

galvanometer-flux meter- measurement of non-electrical quantities like temperature, pressure speed, level, flow, rate, stress, strain etc.	**(86.7%)**	**(13.3%)**	**(0.0%)**	**(0.0%)**	**(0.0%)**	
High voltage measurement and testing, radio frequencies measurements. Effect of Instrument connection on the accuracy of measurement, care and handling of Instruments, sensitivity of Instruments	**26 (86.7%)**	**1 (3.3%)**	**1 (3.3%)**	**2 (6.7%)**	**0 (0.0%)**	**4.7**
Measurement Instruments: Cathode ray oscilloscope, Q meters, extension of Instrument range. Instrument transformers, tube and transistor testers, Tachometer Stroboscope, Instrumentation amplifier, digital voltmeter and millimeters, A/D and D/A converters.	**19 (63.3%)**	**7 (23.3%)**	**3 (10%)**	**1 (3.3%)**	**0 (0.0%)**	**4.46**

Is the course content given above adequate for Electrical Measurement & Instrumentation of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Industrial Electronics

Industrial Electronics I (Offered in the First Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Brief review of (i) Junction Diode, (ii) Schottky Diode, (iii) Zener Diode. Introduction to thyristors: (i) SCR and (ii) TRIAC. Introduction to trigger devices: (i) UJT, (ii) PUT, (iii) Schottky diode, (iv) Silicon Unilateral Switch (SUS), (v) Diac; (vi) Silicon Bilateral Switch (SBS); (vii) Asymmetrical AC Trigger Devices. SCR power control circuits for DC and AC. TRIAC power control circuits for AC. Stabilized power supplies. Controlled Rectification: with SCRs for resistive and inductive loads, Single phase half-wave and full-wave rectification. Switch -mode power supplies. Magnetic Amplifiers, Induction Heating, Dielectric Heating & Microwave Heating.

Industrial Electronics II (Offered in the Second Semester of B..Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Different types of transducers and their principle of operations: (i) Position and Displacement Transducers (a) Potentiometer, (b) Linear Variable Differential Transformers (LVDT), (ii) Pressure Transducer; (iii) Temperature Transducer; (iv) Optical Transducer; (v) Flow Transducer; (vi) Strain gauge Transducer; (vii) Ultrasonic Transducer; (viii) Humidity Transducer; (ix) Hall-Effect Transducer; (x) Speed Transducer. Voltage Multipliers. Electronic Timers: using (i) UJT, (ii) PUT, (iii) IC 555 (iv) IC XR 2240. DC Motor Controls: (i) DC Motor braking and plugging circuits, (ii) Speed Control of PM/Shunt Motors: Electronic speed control using armature voltage control method, solid state motor speed controllers SCR speed control circuits for PM/shunt motor: (a) simple SCR circuit, (b) SCR plus UJT circuit: Variation of a pulse-width modulation (PWM) speed control circuit. (iii) Speed control of series/Universal motor: circuits using (a) SCR (half-wave control), (b) TRIAC and DIAC (full-wave control). TRIAC control with hysteresis compensation. (iv) DC Motor Reversing Control: Balanced bridge reversing drive for PM or Shunt motors, Reversing Control Circuit for Series DC Motors. AC Motor Controls: (i) AC motor braking, (ii) Speed control of AC Motors: Introduction to variable frequency converter. A simple single phase inverter using (i) transistors. A simple single phase inverter using SCRs (McMurray Bedford commutation circuit). A simple Three-phase six-step Inverter circuit. A simplified single phase cycloconverter. Amplifiers in Industrial Electronics: DC Amplifiers, Balanced Push-pull DC amplifier, Chopper and Chopper Amplifier, Chopper stabilized DC Amplifier. Introduction to semiconductor Laser

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average (WA)**
Brief review of (i) Junction Diode, (ii) Schottky Diode, (iii) Zener Diode.	**16 (53.3%)**	**5 (16.7%)**	**7 (23.3%)**	**2 (6.7%)**	**0 (0.0%)**	**4.16**
Introduction to thyristors: (i) SCR and (ii) TRIAC. Introduction to trigger devices: (i) UJT, (ii) PUT, (iii) Schottky diode, (iv) Silicon Unilateral Switch (SUS), (v) Diac; (vi) Silicon Bilateral Switch (SBS); (vii) Asymmetrical AC Trigger Devices. SCR power control circuits for DC and AC. TRIAC power control circuits for AC. Stabilized power supplies.	**17 (56.7%)**	**6 (20%)**	**7 (23.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.33**
Controlled Rectification: with SCRs for resistive and inductive loads, Single phase half-wave and full-wave rectification. Switch -mode power supplies. Magnetic Amplifiers, Induction Heating, Dielectric Heating & Microwave Heating.	**24 (80%)**	**6 (20%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.8**
Different types of transducers and their principle of operations: (i) Position and Displacement Transducers (a) Potentiometer, (b) Linear Variable Differential Transformers (LVDT), (ii) Pressure Transducer; (iii) Temperature Transducer; (iv) Optical Transducer; (v) Flow Transducer; (vi) Strain gauge Transducer; (vii) Ultrasonic Transducer; (viii) Humidity Transducer; (ix) Hall-Effect Transducer; (x) Speed Transducer. Voltage Multipliers.	**19 (63.3%)**	**9 (30%)**	**1 (3.3%)**	**1 (3.3%)**	**0 (0.0%)**	**4.53**
Electronic Timers: using (i) UJT, (ii) PUT, (iii) IC 555 (iv) IC XR 2240.	**20 (66.7%)**	**6 (20%)**	**4 (13.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.53**
DC Motor Controls: (i) DC Motor braking and plugging circuits, (ii) Speed Control of PM/Shunt Motors: Electronic speed control using armature voltage control method, solid state motor speed controllers SCR speed control circuits for PM/shunt motor: (a) simple SCR circuit, (b) SCR plus UJT circuit: Variation of a pulse-width	**23 (76.7%)**	**7 (23.3%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.76**

modulation (PWM) speed control circuit. (iii) Speed control of series/Universal motor: circuits using (a) SCR (half-wave control), (b) TRIAC and DIAC (full-wave control). TRIAC control with hysteresis compensation. (iv) DC Motor Reversing Control: Balanced bridge reversing drive for PM or Shunt motors, Reversing Control Circuit for Series DC Motors.						
AC Motor Controls: (i) AC motor braking, (ii) Speed control of AC Motors: Introduction to variable frequency converter. A simple single phase inverter using (i) transistors. A simple single phase inverter using SCRs (McMurray Bedford commutation circuit). A simple Three-phase six-step Inverter circuit. A simplified single phase cycloconverter.	**27 (90%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.83**
Amplifiers in Industrial Electronics: DC Amplifiers, Balanced Push-pull DC amplifier, Chopper and Chopper Amplifier, Chopper stabilized DC Amplifier. Introduction to semiconductor Laser.	**25 (83.3%)**	**5 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.73**

Is the course content given above adequate for Industrial Electronics of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE)program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Instrumentation Engineering

Instrumentation Engineering I (Offered in the First Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Introduction to Instrumentation: Review of Conversion of non- electrical signals into electrical signals. Linear wave shaping Technique. Switching circuits, pulse Transfers and its uses into instrumentation. Pulse Generations: Generation of monostable, bistable and astable pulses. Schmitt Trigger, Blocking Oscillators. Timing Circuits: Ramps Circuits - Constant-current ramps, Boot strap ramps, Auto generation of CRT sweeps. Use of logic Gates in Timing Circuits. Analog to Digital Converts (A/D), and Digital to Analog Convert (D/A) and their uses in Instrumentation.

Instrumentation Engineering II (Offered in the Second Semester of BScTE, 3 Theory and 1.5 practical Classes per week.)

General instrumentation of plants: Operational amplifiers and their uses in instrumentation techniques. Digital instrumentation, Pneumatic instrumentation, signals conditioning. Data transmission. Indicating, recording and display systems. Case studies of instrumentation of a Chemical processing plant.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Introduction to Instrumentation: Review of Conversion of non- electrical signals into electrical signals. Linear wave shaping Technique. Switching circuits, pulse Transfers and its uses into instrumentation.	**16 (53.7%)**	**11 (36.3%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.43**
Pulse Generations: Generation of monostable, bistable and astable pulses. Schmitt Trigger, Blocking Oscillators.	**18 (60%)**	**12 (40%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.6**
Timing Circuits: Ramps Circuits - Constant-current ramps, Boot strap ramps, Auto generation of CRT sweeps. Use of logic Gates in Timing Circuits. Analog to Digital Converts (A/D), and Digital to Analog Convert (D/A) and their uses in Instrumentation.	**18 (60%)**	**9 (30%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.5**

General instrumentation of plants: Operational amplifiers and their uses in instrumentation techniques.	**8 (26.7%)**	**8 (26.7%)**	**14 (46.7%)**	**0 (0.0%)**	**0 (0.0%)**	**3.8**
Digital instrumentation, Pneumatic instrumentation, signals conditioning. Data transmission	**6 (20%)**	**9 (30%)**	**15 (50%)**	**0 (0.0%)**	**0 (0.0%)**	**3.7**
Indicating, recording and display systems. Case studies of instrumentation of a Chemical processing plant.	**6 (20%)**	**7 (23.3%)**	**17 (56.7%)**	**0 (0.0%)**	**0 (0.0%)**	**3.63**

Is the course content given above adequate for Instrumentation engineering of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Introduction to Microprocessors & Computer Programming (Offered in the Second Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Microprocessors and Microcomputers- their definitions. Block diagram representation. Functions of different blocks. Simple programming concepts and Instruction set. Input/output; Interfacing and simple applications.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Microprocessors and Microcomputers- their definitions.	**5 (16.7%)**	**5 (16.7%)**	**20 (66.7%)**	**0 (0.0%)**	**0 (0.0%)**	**3.5**
Block diagram representation. Functions of different blocks.	**24 (80%)**	**1 (3.3)**	**5 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**
Simple programming concepts and Instruction set.	**20 (66.7%)**	**10 (33.3%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.66**
Input/output; Interfacing and simple applications.	**19 (63.3%)**	**11 (36.7%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**

Is the course content given above adequate for Introduction to Microprocessors & Computer Programming of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Control System Engineering (Offered in the Third Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Concepts of an Engineering System and its representation. Dynamical System, their characterizations: mathematical models of physical systems; transfer function, signal flow diagrams. Steady state and transient response using place transform method; pole- zero concepts; error analysis. Stability analysis- Routh, Nyquist and Bode diagrams: Stability margins; M and N circles; Nichols chart; experimental determination for transfer functions. Root- locus method-plot

and analysis. Design and compensation techniques, perform specifications, introduction to system compensation design with examples of lead and lag compensation.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Concepts of an Engineering System and its representation.	**20 (66.7%)**	**10 (33.3%)**	**0 (0.0%)**	**0 (0.0%)**	**0 (0.0%)**	**4.66**
Dynamical System, their characterizations: mathematical models of physical systems; transfer function, signal flow diagrams.	**17 (56.7%)**	**12 (40%)**	**1 (3.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.53**
Steady state and transient response using place transform method; pole- zero concepts; error analysis.	**3 (10%)**	**5 (16.7%)**	**22 (73.3%)**	**0 (0.0%)**	**0 (0.0%)**	**3.36**
Stability analysis- Routh, Nyquist and Bode diagrams: Stability margins; M and N circles; Nichols chart; experimental determination for transfer functions.	**6 (20%)**	**3 (10%)**	**21 (70%)**	**0 (0.0%)**	**0 (0.0%)**	**3.5**
Root- locus method-plot and analysis.	**2 (6.7%)**	**6 (20%)**	**22 (73.3%)**	**0 (0.0%)**	**0 (0.0%)**	**3.33**
Design and compensation techniques, perform specifications, introduction to system compensation design with examples of lead and lag compensation.	**2 (6.7%)**	**2 (6.7%)**	**12 (40%)**	**14 (46.7%)**	**0 (0.0%)**	**2.73**

Is the course content given above adequate for Control System Engineering of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Advanced Electronics

Advanced Electronics I (Offered in the Third Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Excess carriers in semiconductors, carrier lifetime, diffusion of carriers. Optical process in semiconductors: Radioactive and non-radioactive recombination, optical absorption, luminescence. Light Emitting Diodes: Visible and infrared LED, principle, material, construction. Photo detectors: photoconductor, junction photodiode, p-I-n photodiode, avalanche photodiode, phototransistor: Solar cell; Silicon solar cell, thin film solar cell, heterostructural solar cell, IC fabrication technology: Monolithic and hybrid circuits, device elements, charge transfer devices, LSI, VLSI, and ULSI techniques.

Advanced Electronics II (Offered in the Fourth Semester of B.Sc.TE, 3 Theory and 1.5 practical Classes per week.)

Metal-semiconductor junctions: Schottky and ohmic contacts. Semiconductor hetero junctions: structure, band alignment. Negative conductance microwave devices: Transit time devices, Gunn Effect and related devices. Spontaneous and stimulated emission, Einstein relationship, threshold conditions, pumping methods.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance With Respect to Occupational Tasks (Technical)**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Excess carriers in semiconductors, carrier lifetime, diffusion of carriers.	**2 (6.7%)**	**2 (6.7%)**	**2 (6.7%)**	**24 (80%)**	**0 (0.0%)**	**2.4**
Optical process in semiconductors: Radioactive and non-radioactive recombination, optical absorption, luminescence.	**22 (73.7%)**	**5 (16.3%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**
Light Emitting Diodes: Visible and infrared LED, principle, material, construction	**2 (6.7%)**	**23 (76.7%)**	**5 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**3.9**
Photo detectors: photoconductor, junction photodiode, p-I-n photodiode, avalanche photodiode, phototransistor: Solar cell; Silicon solar cell, thin film solar cell, heterostructural solar cell, IC fabrication technology: Monolithic and hybrid circuits, device elements, charge transfer devices, LSI, VLSI, and ULSI techniques.	**18 (60%)**	**6 (20%)**	**6 (20%)**	**0 (0.0%)**	**0 (0.0%)**	**4.4**
Metal-semiconductor junctions: Schottky and ohmic contacts. Semiconductor heterojunctions: structure, band alignment.	**20 (66.7%)**	**5 (16.7%)**	**5 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.5**
Negative conductance microwave devices: Transit time devices, Gunn Effect and related devices. Spontaneous and stimulated emission, Einstein relationship, threshold conditions, pumping methods.	**22 (73.3%)**	**5 (16.7%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**
Semiconductor Laser: population inversion, confinement, turn-on delay, emission power, and materials Biomedical electronics: active and rest potentials, electrocardiograph (ECG), pacemaker.	**2 (6.7%)**	**2 (6.7%)**	**24 (80%)**	**2 (6.7%)**	**0 (0.0%)**	**3.13**

Is the course content given above adequate for Advanced Electronics of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

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Medical Electronics (Offered in the Fourth Semester of B.Sc.TE, 2 Theory and 1.5 practical Classes per week.)

Scope of Medical Electronics, Introductory concepts on basic body functions; Membrane potential - Nerve Action potential, Nerve Conduction Velocity (NCV), electrical RC equivalent circuit of nerve fiber. Bioelectrical signal measurement, signal size and frequency content of different bio-electrical signals: Electromyogram (EMG), Electrocardiograph (ECG), Electroencephalogram (EEG), and Evoked nerve, muscle and brain potentials. Noise and interference, and their elimination. Bioelectrical amplifier design, analysis for gain, input and output impedance, Common Mode Rejection Ratio, Patient safety, Micro shock & electrical Isolation; Measurement of sensory and motor NCV through evoked action potentials, Electrical Nerve Stimulation, Design of a nerve stimulator. Transducers: Electrode as transducer, electrical activity at electrode-body interface, electrode equivalent circuit, electrode impedance. Heart conduction block and artificial pacemaker, Heart fibrillation and Defibrillator; Temperature, flow and velocity sensors as needed in Thermometry, and blood flow measurement; Blood Pressure measurement and monitoring, Blood Cell counters; Pulse beat monitor, Electronic Stethoscope, Focused Impedance Measurement, application ideas. Ultrasound scanning techniques: A, B and M scans and applications, Use of LASER in medicine; Radioactivity and Radiotherapy; Hearing test, Correction of hearing; Basic concepts on Infrared heating, radio-frequency heating, Ultrasound heating, Bio-telemetry, Telemedicine; Basics of Clinical X-ray equipment, Fluoroscopy, Digital X-ray, CT scanner; Basics of Gamma Camera, SPECT, MRI and PET.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Technical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Scope of Medical Electronics, Introductory concepts on basic body functions; Membrane potential - Nerve Action potential, Nerve Conduction Velocity (NCV), electrical RC equivalent circuit of nerve fiber.	**3 (10%)**	**6 (20%)**	**21 (70%)**	**0 (0.0%)**	**0 (0.0%)**	**3.4**
Bioelectrical signal measurement, signal size and frequency content of different bio-electrical signals: Electromyogram (EMG), Electrocardiograph (ECG), Electroencephalogram (EEG), and Evoked nerve, muscle and brain potentials. Noise and interference, and their elimination.	**22 (73.3%)**	**6 (20%)**	**2 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.6**
Bioelectrical amplifier design, analysis for gain, input and output impedance, Common Mode Rejection Ratio, Patient safety, Micro shock & electrical Isolation; Measurement of sensory and motor NCV through evoked action potentials, Electrical Nerve Stimulation, Design of a nerve stimulator.	**19 (63.3%)**	**6 (20%)**	**5 (16.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.46**
Transducers: Electrode as transducer, electrical activity at electrode-body interface, electrode equivalent circuit, electrode impedance.	**17 (56.7%)**	**6 (20%)**	**7 (23.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.33**
Heart conduction block and artificial pacemaker, Heart fibrillation and Defibrillator; Temperature, flow and velocity sensors as needed in Thermometry, and blood flow measurement; Blood Pressure measurement and monitoring, Blood Cell counters; Pulse beat monitor, Electronic Stethoscope, Focused Impedance Measurement, application ideas.	**22 (73.3%)**	**6 (20%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.66**

Ultrasound scanning techniques: A, B and M scans and applications, Use of LASER in medicine; Radioactivity and Radiotherapy; Hearing test, Correction of hearing; Basic concepts on Infrared heating, radio-frequency heating, Ultrasound heating, Bio-telemetry, Telemedicine; Basics of Clinical X-ray equipment, Fluoroscopy, Digital X-ray, CT scanner; Basics of Gamma Camera, SPECT, MRI and PET.	**19 (63.3%)**	**5 (16.7%)**	**6 (20%)**	**0 (0.0%)**	**0 (0.0%)**	**4.43**

Is the course content given above adequate for Medical Electronics of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

PEDAGOGICAL SUBJECTS

Educational Psychology (Offered in the First Semester of DTE, 3 Theory Classes per week.)

Basic concepts of psychology and their application for understanding of human behavior, particularly in the teaching learning set-up of the educational institutions and their management; principles of physical, mental and personality development; theories of learning and their application for interpretation of educational and learning problems; principles of therapeutic psychology; application of the principles of educational psychology for solution of educational management problems.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Basic concepts of psychology and their application for understanding of human behavior, particularly in the teaching learning set-up of the educational institutions and their management; principles of physical, mental and personality development; theories of learning and their application for interpretation of educational and learning problems; principles of therapeutic psychology; application of the principles of educational psychology for solution of educational management problems.	**24 (80%)**	**4 (13.3%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.66**

Is the course content given above adequate for Educational Psychology of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

Methods & Techniques of Teaching (Offered in the First Semester of DTE, 3 Theory and 2 Practical Classes per week.)

Aims of technical & vocational education; principles of learning and motivation; teaching methods in common use; lesson planning; preparation and use of various instruction sheets; steps in teaching; teaching aids and their use; discipline in the shop and classroom; safety and accident prevention; evaluation.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Aims of technical & vocational education; principles of learning and motivation; teaching methods in common use; lesson planning; preparation and use of various instruction sheets; steps in teaching; teaching aids and their use; discipline in the shop and classroom; safety and accident prevention; evaluation.	**26 (86.7%)**	**2 (6.7%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.8**

Is the course content given above adequate for Methods & Techniques of Teaching of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

Educational Measurement and Evaluation (Offered in the Second Semester of DTE, 3 Theory Classes per week.)

Principles of measurement and evaluation; scales of measurement; criteria for assessing goodness of tests; validity, reliability, usability; classification of validity and reliability; norms and standardization of tests; construction and use of different types of tests and other measuring devices; planning the test; test items and their types; essay and objective tests; types of objective items; constructing essay and objective items; item analysis, scoring, grading, and reporting; interpreting test scores; measurements of abilities and personality.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Principles of measurement and evaluation; scales of measurement; criteria for assessing goodness of tests; validity, reliability, usability; classification of validity and reliability; norms and standardization of tests; construction and use of different types of tests and other measuring devices; planning the test; test items and their types; essay and objective tests; types of objective items; constructing essay and objective items; item analysis, scoring, grading, and reporting; interpreting test scores; measurements of abilities and personality	**23 (76.7%)**	**4 (13.3%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.66**

Is the course content given above adequate for Educational Measurement and Evaluation of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

Principles of Vocational & Technical Education (Offered in the Second Semester of DTE, 3 Theory Classes per week.)

Concept, nature and scope of vocational and technical education; socio-economic needs and psychological bases; historical development; problems of vocational technical educational organization, administration, instruction and evaluation of vocational and technical education.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Concept, nature and scope of vocational and technical education; socio-economic needs and psychological bases; historical development; problems of vocational technical educational organization, administration, instruction and evaluation of vocational and technical education.	**22 (73.3%)**	**5 (16.7%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**

Is the course content given above adequate for Principles of Vocational & Technical Education of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

Computer Aided Instruction (Offered in the Second Semester of DTE, 1 Theory Class per week.)

Review of teaching learning methods; review of planning and producing instructional media; drawing flowcharts; CAL fundamentals; Application of Word-processing and spreadsheet in teaching-learning process; study of a suitable software package like Microsoft PowerPoint to create computer controlled presentations which can be shown directly on IBM compatible PC, projected with a video projector or transferred to other media such as video tape, slides or paper for producing CAL; designing; developing and testing simple CAL materials using the aforesaid software packages.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Review of teaching learning methods; review of planning and producing instructional media; drawing flowcharts; CAL fundamentals; Application of Word-processing and spreadsheet in teaching-learning process; study of a suitable software package like Microsoft PowerPoint to create computer controlled presentations which can be shown directly on IBM compatible PC, projected with a video projector or transferred to other media such as video tape, slides or paper for producing CAL; designing; developing and testing simple CAL materials using the aforesaid software packages.	**22 (73.3%)**	**5 (16.7%)**	**2 (6.7%)**	**1 (3.3%)**	**0 (0.0%)**	**4.6**

Is the course content given above adequate for Computer Aided Instruction of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers? [ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

Occupational Analysis & Course Construction (Offered in the Third Semester of B.Sc.TE, 3 Theory Classes per week.)

Definition of terms such as job, occupation, vocation and profession; Classification of occupations; Occupational analysis – task analysis, learning tasks, identification, selection, sequencing and detailing of tasks; Performance objectives; Instructional package; Course construction – preliminary considerations for course construction; Types of educational

structures; Preparing a course outline – difference between course of instruction and course outline, principal parts of a course outline – course outline format.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Definition of terms such as job, occupation, vocation and profession; Classification of occupations; Occupational analysis – task analysis, learning tasks, identification, selection, sequencing and detailing of tasks; Performance objectives; Instructional package; Course construction – preliminary considerations for course construction; Types of educational structures; Preparing a course outline – difference between course of instruction and course outline, principal parts of a course outline – course outline format.	**26 (86.7%)**	**3 (10%)**	**1 (3.3%)**	**0 (0.0%)**	**0 (0.0%)**	**4.83**

Is the course content given above adequate for Occupational Analysis & Course Construction of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

Curriculum Development, Administration and Supervision of TVE (Offered in the Third Semester of B.Sc.TE, 3 Theory Classes per week.)

Meanings and development of educational administration and supervision, structure and organization of technical and vocational education of OIC countries; meaning, concepts of leadership, leadership style; human relations in technical and vocational institutes,

supervision & techniques of supervision; administrative competencies, innovations: types of innovation management, and evaluation of TVE.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Meanings and development of educational administration and supervision, structure and organization of technical and vocational education of OIC countries; meaning, concepts of leadership, leadership style; human relations in technical and vocational institutes, supervision & techniques of supervision; administrative competencies, innovations: types of innovation management, and evaluation of TVE.	**22 (73.3%)**	**5 (16.7%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**

Is the course content given above adequate for Curriculum Development, Administration and Supervision of TVE of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

History of Technical & Vocational Education (Offered in the Third Semester of B.Sc.TE, 3 Theory Classes per week.)

The origin of vocational education; the Russian system of teaching the mechanic arts; the sloyd of Scandinavia; the manual training, trade and technical education in French and Germany; technical

education in England; development of vocational education in United States; development of vocational education in OIC countries.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
The origin of vocational education; the Russian system of teaching the mechanic arts; the sloyd of Scandinavia; the manual training, trade and technical education in French and Germany; technical education in England; development of vocational education in United States; development of vocational education in OIC countries.	**24 (80%)**	**4 (13.3%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.73**

Is the course content given above adequate for History of Technical & Vocational Education of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

Comparative Education (Offered in the Third Semester of B.Sc.TE, 3 Theory Classes per week.)

Concept, nature and scope of comparative education; methodology of comparative education; forces responsible for different types of educational programmes; political, social and economic determinants of educational programmes; systems of education, particularly vocational and technical education, in selected developed countries - U.K., France, U.S.A., Russia, and in one of the OIC countries; special and innovative programmes particularly in OIC countries.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Concept, nature and scope of comparative education; methodology of comparative education; forces responsible for different types of educational programmes; political, social and economic determinants of educational programmes; systems of education, particularly vocational and technical education, in selected developed countries - U.K., France, U.S.A., Russia, and in one of the OIC countries; special and innovative programmes particularly in OIC countries.	**22 (73.3%)**	**5 (16.7%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.63**

Is the course content given above adequate for Comparative Education of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers? [ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

Instructional Technology and Communication Skill (Offered in the Fourth Semester of B.Sc.TE, 3 Theory and 3 practical Classes per week.)

Teaching, Learning and Instruction, Instructional Technology, Instructional Materials, Supplementary Materials, Significance of Instructional Materials, Classification of Instructional Materials, Criteria for selection of Instructional Materials, Improvised Instructional Materials. Teaching Aids, Computer Assisted Instruction (CAI); Developing overhead Transparencies, Power Point presentation. Basic principles of communication in teaching learning process; concept and theoretical basis of communication; linguistic and non linguistic communication, process of communicative association and message reliability; organization of communication; agents of communications; Concept and Nature of classroom communications, Role of communication in teaching and learning, Criteria of effective communication, Effective teaching and communication: man and machine; cybernetics: technology based communication and their effectiveness; teacher and communication.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Teaching, Learning and Instruction, Instructional Technology, Instructional Materials, Supplementary Materials, Significance of Instructional Materials, Classification of Instructional Materials, Criteria for selection of Instructional Materials, Improvised Instructional Materials. Teaching Aids, Computer Assisted Instruction (CAI); Developing overhead Transparencies, Power Point presentation. Types of instructional materials; hardware and software; audio-visual materials and equipment; Radio and Television Programme as instructional materials for education; Instructional	**25 (83.3%)**	**3 (10%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.76**

resources centre and maintenance of instructional materials						
Basic principles of communication in teaching learning process; concept and theoretical basis of communication; linguistic and non linguistic communication, process of communicative association and message reliability; organization of communication; agents of communications; Concept and Nature of classroom communications, Role of communication in teaching and learning, Criteria of effective communication, Effective teaching and communication: man and machine; cybernetics: technology based communication and their effectiveness; teacher and communication.	**23 (76.7%)**	**5 (16.7%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.7**

Is the course content given above adequate for Instructional Technology and Communication Skill of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?

[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

6._____

Sociology of Education (Offered in the Fourth Semester of B.Sc.TE, 3 Theory Classes per week.)

Social Framework and education: the family; peer group and other socializing agencies; demographic trends in the family and their implications for education; social class and education; equality of educational opportunity; economic system, its characteristics and implication for education; economy and the content of education; economics of education; social functions of education; cultural, political, economic and selection; sociology of teaching role of the teacher and teaching profession: teacher in the classroom and in the school.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Social Framework and education: the family; peer group and other socializing agencies; demographic trends in the family and their implications for education; social class and education; equality of educational opportunity; economic system, its characteristics and implication for education; economy and the content of education; economics of education; social functions of education; cultural, political, economic and selection; sociology of teaching role of the teacher and teaching profession: teacher in the classroom and in the school.	**21 (70%)**	**6 (20%)**	**3 (10%)**	**0 (0.0%)**	**0 (0.0%)**	**4.6**

Is the course content given above adequate for Sociology of Education of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers? [ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

Observation & Practice Teaching (Offered in the Fourth Semester of B.Sc.TE, 4 Practical Classes per week.)

Development of further skills in teaching: Core teaching skills and their components; skills in questioning; skills of reinforcements; illustration and narration; Measures for integrating skills. Microteaching: Definition and meaning of Microteaching; phases of microteaching, important features of microteaching; models of microteaching, critical evaluation of microteaching. Practice of skills through microteaching Simulation of Teaching, observation of classroom teaching, Development of observation schedule.

Based on the above course content, please read the following statements and put the tick (√) mark on the five-point scale shown at the right sight.	**Degree of Relevance Respect to (Pedagogical) With Occupational Tasks**					
	Highly Relevant	**Relevant**	**Moderately Relevant**	**Undecided**	**Not Relevant**	**Weighted Average(WA)**
Development of further skills in teaching: Core teaching skills and their components; skills in questioning; skills of reinforcements; illustration and narration; Measures for integrating skills. Microteaching: Definition and meaning of Microteaching; phases of microteaching, important features of microteaching; models of microteaching, critical evaluation of microteaching. Practice of skills through microteaching Simulation of Teaching, observation of classroom teaching, Development of observation schedule.	**7 (23.3%)**	**21 (70%)**	**2 (6.7%)**	**0 (0.0%)**	**0 (0.0%)**	**4.16**

Is the course content given above adequate for Observation & Practice Teaching of the curriculum of Bachelor of Science in Technical Education (B.Sc.TE) program which is related to Occupational Tasks of TVET teachers?[ ] yes [ ] no

If no, please indicate what should be included/ excluded:

1._____

2._____

3._____

4._____

5._____

APPENDIX B

The Table of Distributions of Contact Hours and Credits

Category A: Technical Subjects					
Course No	**Name of the Subject**	**Program**	**L**	**P**	**C**
CSE 3151	Fundamentals of Computer	DTE,1.Semester	2	0	2
CSE 3152	Fundamentals of Computer Lab	DTE,1.Semester	0	2	1
EEE 4321	Digital Techniques I	DTE,1.Semester	3	0	3
EEE 4322	Digital Techniques I Lab	DTE,1.Semester	3	1.5	0.75
EEE 4327	Electrical Measurement & Instrumentation I	DTE,1.Semester	3	0	3
EEE 4328	Electrical Measurement & Instrumentation I Lab	DTE,1.Semester	0	1.5	0.75
EEE 4421	Digital Techniques II	DTE,2.Semester	3	0	3
EEE 4422	Digital Techniques II Lab	DTE,2.Semester	0	1.5	0.75
EEE 4427	Electrical Measurement & Instrumentation II	DTE,2.Semester	3	0	3
EEE 4428	Electrical Measurement & Instrumentation II Lab	DTE,2.Semester	0	1.5	0.75
EEE 4505	Industrial Electronics I	BScTE,1.Semester	3	0	3
EEE 4506	Industrial Electronics I Lab	BScTE,1.Semester	0	1.5	0.75
EEE 4517	Instrumentation Engineering I	BScTE,1.Semester	3	0	3
EEE 4518	Instrumentation Engineering I Lab	BScTE,1.Semester	0	1.5	0.75
EEE 4603	Industrial Electronics II	BScTE,2.Semester	3	0	3
EEE 4604	Industrial Electronics II Lab	BScTE,2.Semester	0	1.5	0.75
EEE 4617	Instrumentation Engineering II	BScTE,2.Semester	3	0	3
EEE 4618	Instrumentation Engineering II Lab	BScTE,2.Semester	0	1.5	0.75
EEE 4631	Introduction to Micro-Process & Computer Programming	BScTE,2.Semester	3	0	3
EEE 4632	Introduction to Micro-Process & Computer Programming Lab	BScTE,2.Semester	0	1.5	0.75
EEE 4705	Control System Engineering	BScTE,3.Semester	3	0	3
EEE 4706	Control System Engineering Lab	BScTE,3.Semester	0	1.5	0.75
EEE 4733	Advanced Electronics I	BScTE,3.Semester	3	0	3
EEE 4734	Advanced Electronics I Lab	BScTE,3.Semester	0	1.5	0.75
EEE 4833	Advanced Electronics II	BScTE,4.Semester	3	0	3
EEE 4834	Advanced Electronics II Lab	BScTE,4.Semester	0	1.5	0.75
EEE 4835	Medical Electronics	BScTE,4.Semester	3	0	3
EEE 4836	Medical Electronics Lab	BScTE,4.Semester	0	1.5	0.75
Category B: Vocational pedagogy					
Course No	**Name of the Subject**		**L**	**P**	**C**
TVE 3103	Educational Psychology	DTE,1.Semester	3	0	3
TVE 3125	Methods & Techniques of Teaching	DTE,1.Semester	3	0	3

TVE 3126	Methods & Techniques of Teaching Lab	DTE,1.Semester	0	2	1
TVE 3235	Educational Measurement and Evaluation	DTE,2.Semester	3	0	3
TVE 3239	Principles of Vocational & Technical Education	DTE,2.Semester	3	0	3
TVE 3258	Observation & Practice Teaching	DTE,2.Semester	0	4	2.5
TVE 3259	Computer Aided Instruction	DTE,2.Semester	1	0	1
TVE 3260	Computer Aided Instruction Lab	DTE,2.Semester	0	2	1
TVE 4111	Occupational Analysis & Course Construction	BScTE,3.Semester	3	0	3
TVE 4117	Curriculum Development,Administration and supervision of TVE	BScTE,3.Semester	3	0	3
TVE 4141	History of Technical & Vocational Education	BScTE,3.Semester	3	0	3
TVE 4143	Comparative Education	BScTE,3.Semester	3	0	3
TVE 4229	Instructional Technology and Communation Skill	BScTE,4.Semester	3	0	3
TVE 4230	Instructional Technology and Communation Skill Lab	BScTE,4.Semester	0	3	1.5
TVE 4251	Sociology of Education	BScTE,4.Semester	3	0	3
TVE 4258	Observation & Practice Teaching	BScTE,4.Semester	0	4	2.5
Category C: Math & Natural Science					
Course No	**Name of the Subject**		**L**	**P**	**C**
Math 4301	Engineering Mathematics III	BScTE,1.Semester	3	0	3
Math 4401	Engineering Mathematics IV	BScTE,2.Semester	3	0	3
Category D: Other Subjects	**Name of the Subject**		**L**	**P**	**C**
Lang 0102/4 /6	Spoken Arabic I /Spoken English I/Spoken French I	DTE,1.Semester	0	2	1
Hum 0207	Islamic History, Science & Culture	DTE,2.Semester	3	0	3
Hum 0107	Islamiat	DTE,1.Semester	2	0	2
Lang 0202/4 /6	Spoken Arabic II /Spoken English II/Spoken French II	DTE,2.Semester	0	2	1
TVE 4149	Technology Environment and Society	BScTE,1.Semester	3	0	3
TVE 4549	Social Studies & Accounting	BScTE,2.Semester	3	0	3
MCE 4629	Engineering Managment	BScTE,2.Semester	3	0	3
Category E: Project & Report	**Name of the Subject**		**L**	**P**	**C**
EEE 4700T/ 4800T	Related Project & Report	BScTE,3 & 4.Semester	0	12	6