

**MASTER OF SCIENCE IN TECHNICAL EDUCATION
MECHANICAL ENGINEERING**



**The Relevance of BScTE Curriculum of IUT with the Occupations of Automobile
Professionals**

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GAZIPUR, DHAKA-BANGLADESH**

May, 2022

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Supervisor: Prof. Dr. Md. Faruque A. Haolader

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

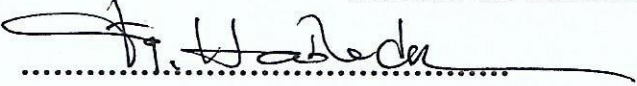
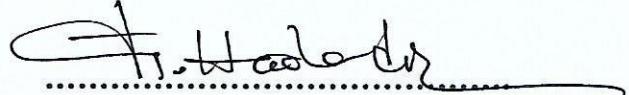

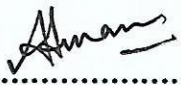
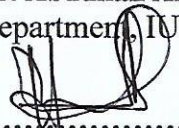
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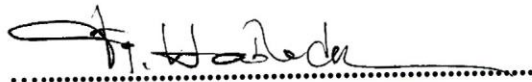
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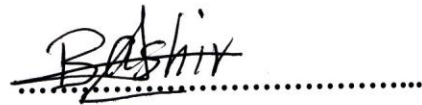
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DEDICATED TO MY PARENTS

I dedicated this thesis to my beloved parents for their moral and financial support during my study period. May almighty Allah (S.W.T) reward them abundantly Amen.

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LIST OF ACRONYMS

IUT	Islamic university of technology
OIC	Organizational Islamic cooperation
M.Sc.T.E	Master of Science in Technical Education
ME	Mechanical Engineering
EEE	Electrical and Electronic Engineering
CSE	Computer Science Engineering
B.Sc.T.E	Bachelor of Science in Technical Education
BTEB	Bangladesh Technical Education Board
DACUM	Developing a Curriculum
DTE	Diploma in Technical Education
UNESCO	United Nations Educational, Scientific and Cultural Organization
NTVQF	National Technical and Vocational Qualification Framework
BTEB	Bangladesh Technical Education Board
TVET	Technical and Vocational Education and Training
HC	Host Country
IS	International Students

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ABSTRACT

Automobile workshops need skilled professionals to help develop their workshops to provide services to their customers. One of the main goals of this research is to help TVE Department of IUT to produce TVET teachers/ trainers and professionals with specialization in mechanical engineering who ultimately produce TVET graduates who can provide services to this sector. This study aimed to study the relevance of B.Sc.T.E (Mechanical Engineering) curriculum of IUT with the occupations of automobile professionals.

The specific objectives of this descriptive type research study are: (i) to identify the duties/ responsibilities and the occupational tasks (competencies) of an automotive professional. (ii) to determine the skill gaps (if any) between the BScTE (specialization in mechanical engineering) graduates and occupational competencies required for an automobile professional and (iii) to assess the present state of the linkage between IUT and automobile workshops/ industries.

This is a descriptive type, applied research and mixed method (both quantitative and qualitative) approach was used. The population of this study were managers, technicians, and skilled workers of automobile workshops in Bangladesh and Somalia. For objective (i), survey a questionnaire was designed by the researcher. The researcher used 5-point Likert-type questionnaire for gathering opinions regarding the listed duties and tasks of automobile professionals. For objective (iii) interview questions were also developed by the researcher and a personal interview was used.

The findings of objective (i) shows that the occupational tasks of automotive professionals are; to Perform maintenance of intake, exhaust, lubricating and cooling system; to Repair and service ignition system; to Perform Repairing and Servicing Auto Transmission System; Repair and service suspension system; to Repair and service steering system; to Repair braking system; to Replace an ABS control module; to Know how to communicate and care for customers, etc

The findings of objective (ii) was based on the outcomes of objective 1 (To identify the duties/ responsibilities and the occupational tasks (competences) of an automotive professionals) the researcher found that there is no significance gap between BSc.TE (specialization in mechanical engineering) graduates and occupational competencies required for automobile professionals.

The findings of objective (iii) shows that; IUT has linkage or connection with industries in Bangladesh for internship purposes.

CHAPTER I

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Context and Background of the Study

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 programs are: Master of Science in Technical Education (M.Sc.T.E) with specializations in Electrical & Electronic Engineering (EEE), Mechanical Engineering (ME) and Computer Science and Engineering (CSE), Bachelor of Science and Diploma in Technical Education with specialization in above mentioned areas and Bachelor of Tourism and Hospitality Technology (BTHT).

Technical and Vocational Education and Training (TVET) is increasingly seen for solving future problems. As the technology changes rapidly the curricula of technical educational programs 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 (Mechanical Engineering) program addresses the qualification requirements of automobile professionals in their occupation. Curricula are expected to be developed with the objective of producing qualified and employable workers who can easily fit into their expected occupations/ professions without being re-trained (Tedesco, J. C., Operti, R., & Amadio, M. (2014). In order to close up the industry-academia gap, there is immense work required by the educational institutions to align their curricula, instructional strategies and teaching-learning materials and media/ aids with the existing needs of the industry if education is to make any sense of the society ((Junejo, I., Memon, A. K., & Mohammad, J. (2018).

Most TVET graduates, particularly in many OIC countries, have to under-go retraining programs since most of them are viewed non- employable, going by the quality they got from their institutions. Industries always complain the failure of TVET graduates for doing their needs and requirements. The main reason for this failure is not only the inability of the educational institutions to adapt their curricula and structure of their training programs according to the needs of the industries/ workshops but also due to lack of well-trained qualified teachers who deliver the curriculum content ((Garg, N., & Manuja, M. (2013, December). Inadequate linkages with the industries and academia are also a major problem, among others ((Junejo, I., Memon, A. K., & Mohammad, J. (2018).

The educational objective of the Bachelor of Science in Technical Education (BSc. TE) of IUT is that the graduates should be competent and develop in their chosen profession as teachers at TVET institutions or as engineering professionals in their area of specialization (Haolader, F. A., Cicioglu, D., & Kassim, K. (2017). In this research, the relevance of BSc.TE (Mechanical Engineering) with the occupation of automobile engineering was studied. What motivated me in this area is to enrich the existing BSc.TE curricula (specializing in mechanical engineering) so that BSc.TE graduates (future TVET teachers) would be able to teach competently at TVET institutions and produce TVET graduates who would ultimately perform competently in automobile engineering industries.

1.2 Statement of the problem

This study attempts to identify duties and tasks of automobile professionals and to determine whether there is skill gap between the BScTE (specialization in mechanical engineering) graduates and occupational competences required for automobile professionals.

1.3 Aims and objectives

This study aims to determine the skills gaps between the competence/qualification requirements for the occupation of an automotive technician/ technologist/engineer who work in workshop/ industries and the BSc.TE graduates (future TVET teachers) who will ultimately produce competent TVET graduates who work in automobile engineering workshops and industries.

The Specific objectives of this study are:

- i. To identify the duties/ responsibilities and the occupational tasks (competences) of an automotive professional.

- ii. To determine the skill gaps (if any) between the BScTE (specialization in mechanical engineering) graduates and occupational competences required for automobile professionals.
- iii. To assess the present state of the linkage between IUT and automobile workshops/ industries.

1.4 Significance of the Study

The Technical and Vocational Education Department began its program in 1984 and offers programs 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 programs.

As we know, there is no automobile industries in Bangladesh, we focused on automobile workshops since cars technology are improving the workshops are improving also and the TVET institutions should improve in order to make graduates fit for the job. The workshops are constantly broadening and the knowledge is becoming complex. Also, we explored that whether IUT graduates have knowledge about what is going on in the industry. As the production of cars increases day after day and the innovations of new cars increases, that means the graduates of automotive engineering is crucial (Halderman, J. D., & Mitchell, C. D. (2014) and the need for good technicians continues to grow (Erjavec, J., & Thompson, R. (2014).

1.5 Scope of the Study

1.5.1 Delimitations

In B.Sc.T.E (ME) program of IUT there are three specializations: Mechanical Engineering (ME), Electrical and Electronic Engineering (EEE), and Computer Science and Engineering (CSE). This study was delimited to BScTE (ME) courses and automobile engineering workshops.

1.5.2 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. The researcher wanted to take data collection from automobile workshops in Bangladesh and Somalia because of COVID-19 this data collection was limited to Gazipur and Dhaka because the researcher could not be able to travel to Somalia and collect his/her data .

1.6 Assumptions

The researcher assumed that the respondents honestly provided reliable information that was required for this study.

1.7 Definition of Terms

Automobile: Automobile is a self- propelled vehicle that travels on land. It usually has four wheels. An engine provides the power to move the vehicle. The automobile or car, carries people primarily for their personal transportation. There are many different styles of car. Some people like a sports car like the Chevrolet corvette and some people like family car (Halderman, J. D., & Mitchell, C. D. (2014).

Automobile Engineering: Automobile Engineering is the branch of engineering that deals with designing, manufacturing, mechanical mechanisms as well operations of automobiles. Automobile engineering is very important field of engineering because today's world all people use car (Erjavec, J., & Thompson, R. (2014).

Automobile Engineering Workshops: automobile engineering workshops mean workshops engaged in the design and general repair and servicing of automobile vehicles (Erjavec, J., & Thompson, R. (2014).

Automobile Engineering Professionals: Automobile Engineering Professionals means here automobile engineers, technicians and skilled workers. Automobile engineer is responsible for vehicle design, growth, and produce and testing (Erjavec, J., & Thompson, R. (2014).

Technician: A specialist in the technical details of automotive repair and service. The term "technician" has replaced the previous term of "mechanic"(Erjavec, J., & Thompson, R. (2014).

Automobile Repair Technician. This person is an individual who works on the mechanical, electrical, and electronic elements of cars and light trucks. The occupational category also includes

an individual who performs structural or physical reconditioning to these vehicles for the purpose of restoration or correction due to collision (Erjavec, J., & Thompson, R. (2014).

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.

Profession

Profession implies an occupation that needs very special knowledge or training. For example, teacher, engineer, technician and lawyer all needs educational training.

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 automobile professional's means duties and responsibilities professionals who work at automobile workshops.

CHAPTER II

REVIEW OF RELATED LITERATURE

2.0 Introduction

2.1 Curriculum

2.1.1 The Concept of 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 is that which contends 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.

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 program 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 Relationships between Curriculum and Instruction

The definition of instruction and curriculum is subjective. Both curriculum and instruction may take on different meanings based on the purpose or interpretation whether political, social, or educational. Curriculum is what is taught in schools, instruction is how curriculum is delivered and learning is what knowledge or skill has been acquired (Wiles et al., 2002). The most common definition of curriculum is based on overt curriculum which supports an intentional instructional agenda of an educational institute (Wilson, 2005). Furthermore, curriculum is the content of what is being taught and instruction is the implementation of teaching according academic curriculum. According to Random (2016) the term instruction is derived from the late Middle English word *instruccoun* meaning to provide structure and direction. Curriculum is derived from the Latin word *currere* which is associated with the idea of running a racecourse (Hlebowitsh, 2005).

The relationship between curriculum and instruction is intimate. The relationship being so intimate that curriculum and instruction is often said as though the terms are one word. Yates (2000) further introduces *curstruction* and *instriculum* as morphed words to describe the seemingly inseparable relationship between curriculum and instruction. One of the views Hlebowitsh (2005) provides describes curriculum as providing structure, outline and purpose to experiences in school; however, the author does not limit curriculum to this single definition.

This author would describe the relationship between curriculum and instruction as a parent and child relationship. Curriculum takes the role of a parent who is independent and may function without instruction; whereas, academic instruction is inherently dependent upon curriculum—

much like a child is dependent upon a parent. Curriculum provides direction for instruction since instruction is the method of delivering academic curriculum. Instruction may exist without curriculum but would serve no direct purpose. Curriculum and instruction must be compatible and maintain a close relationship in order to maximize student learning.

The design of curriculum influences student learning. Curriculum is a vessel that helps learners gain knowledge, develop skills and broaden understanding and has outcomes that may be measured (Yates, 2000). Instruction, on the other hand, is as capricious as an unpredictable child. The design of instruction is influenced by an educator's philosophy and instructional beliefs. Instruction design is developed according to curriculum but maintains individuality while being dependent upon curriculum and standards. The prioritization of information found in overt curriculum and what instruction techniques are used is reflected by a teacher's philosophy. Teachers are individuals composed of different biases, attitudes, and personal philosophy—this human element plays a role in instructional practices. Teachers instruct according to their personal philosophy. Curriculum and instructional design alters according to society and is influenced by new technology and information. The parent-child relationship of curriculum and instruction suggests opportunity for growth as both the parent and child learn from each other. Knowledge of the relationship between curriculum and instruction may help educators strive to provide a quality education to students

2.1.3 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.

2.1.4 Determining Curriculum Content

➤ 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.

➤ 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 concerns 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 way 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 has high transferability to a number of occupations within a field.

➤ 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.

➤ 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.

➤ 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.

➤ 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.

Developing a Curriculum: Developing A Curriculum (DACUM) is an approach to job/occupational analysis. The profile chart that results from DACUM analysis is a low-cost, effective method of quickly determining what tasks must be performed by employees in a given job or occupational area. The DACUM analysis can be used as a basis for the following: curriculum development; curriculum review and revision; training needs assessments; competency test development; worker performance evaluations; student recruitment; student counseling; student achievement records; training program review; curriculum articulation; Tech Prep program development; job modifications; and job descriptions.

The information resulting from the task analysis is incorporated into modules, learning guides, or instructional materials. DACUM establishes relevant, up-to-date, and localized curriculum bases for instructional materials. DACUM is suited for developing new educational programs, review of existing educational programs, and updating existing DACUM charts. The DACUM committee is guided through seven procedural steps: orienting 8-12 committee members; review occupations; identify duties; identify specific tasks performed; review and refine task and duty statements; sequence task and duty statements; and identify entry-level tasks. After a DACUM workshop, the tentative task list should be verified by expert.

2.2 B.Sc.T.E Curriculum of IUT

The Bachelor of Science in Technical Education (B.Sc.T.E) curriculum is structured using traditional subject/course-based approach. Currently, TVE Department offers B.Sc.T.E degree program with three specializations: Mechanical Engineering (ME), Electrical and Electronics Engineering (EEE), and Computer Science Engineering (CSE). In the following Section the different categories of courses under BScTE (ME) are shown.

2.2.1 The Categories of Courses in B.Sc.T.E Curriculum

The B.Sc.T.E curriculum consists of different categories of courses: Vocational Pedagogical courses, Engineering/Technical Subjects, Math & Natural Science Subjects and Other Related Subjects, and Project/ Thesis. The following paragraphs describe each category of B.Sc.T.E curriculum with specialization in Mechanical Engineering.

Vocational Pedagogical Subjects include 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.

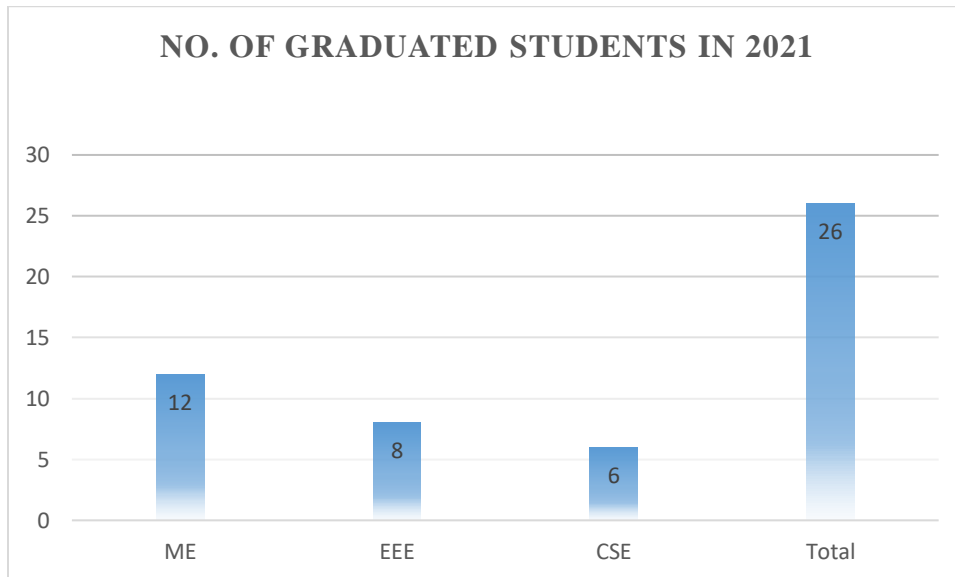
There are more than 14 engineering/ **technical courses offered for each specialization.** Each of which is complemented by a practical lab subject. Technical courses include mechanics of materials, fluid machinery, control and automation, machine tools, machine design, applied

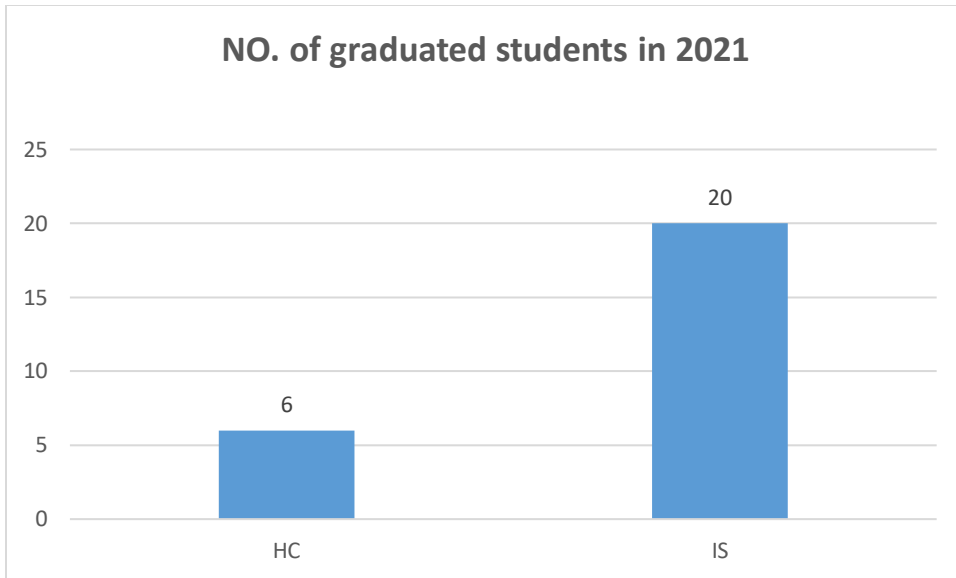
thermodynamics, vibration and system dynamics, power plant engineering, mechatronics, material engineering, automotive technology, automotive maintenance and fluid mechanics, e.t.c

There are few **Math & Natural Science Subjects**. **Other Related Subjects** are: Spoken Arabic I&II (Lab), Spoken English I&II (Lab), Islamiat, Islamic History, Science & Culture, Technology Environment and Society, Social Studies & Accounting, Engineering Management.

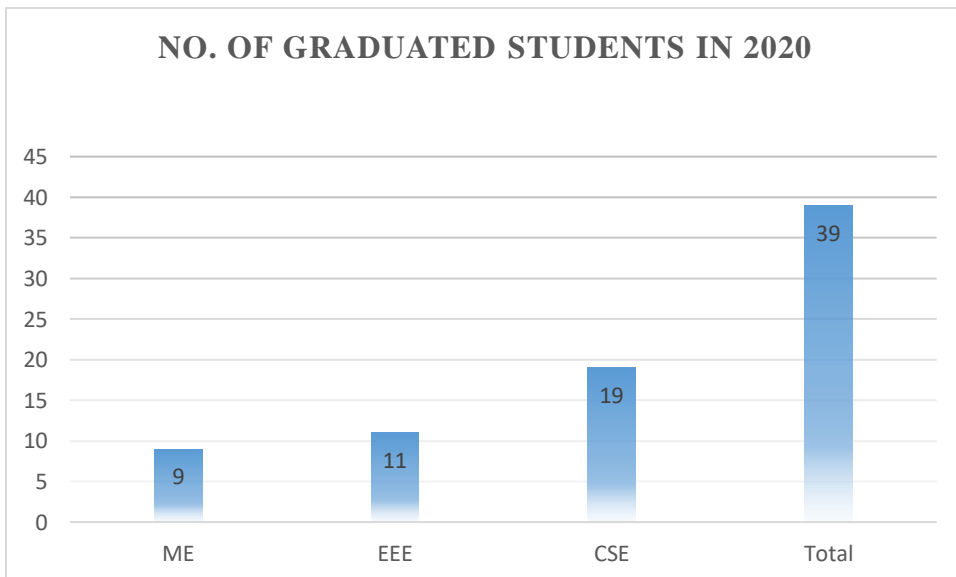
2.2.2 BSc.T.E Graduates of IUT

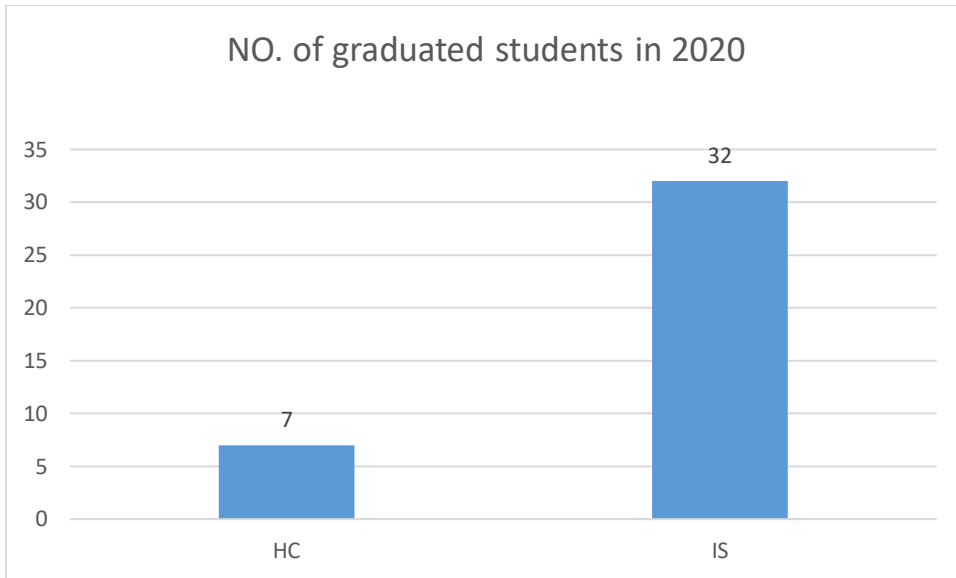
BScTE (1year and 2 year) Graduates for 2021			
Specialization			
ME	EEE	CSE	TOTAL
12	8	6	26 International =20 Host country= 6



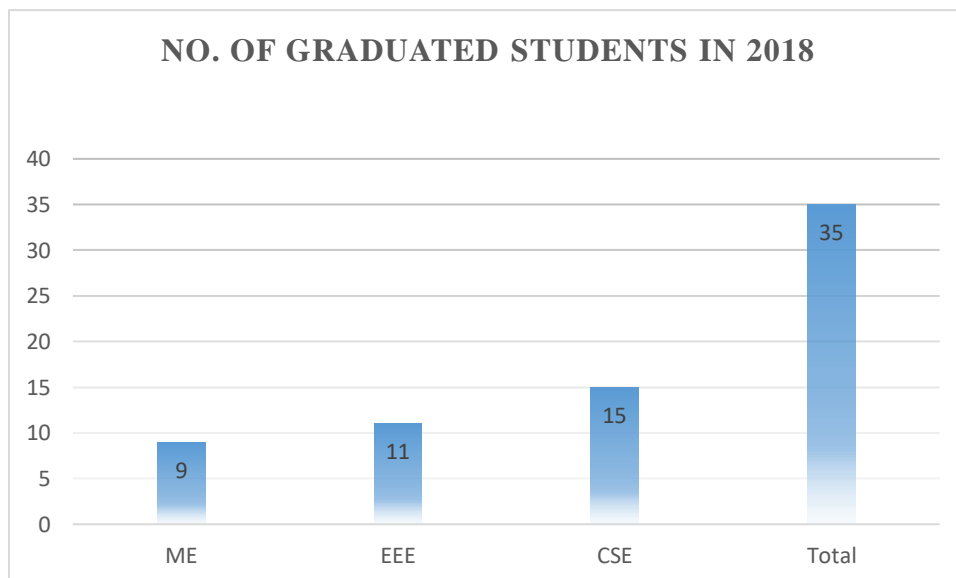


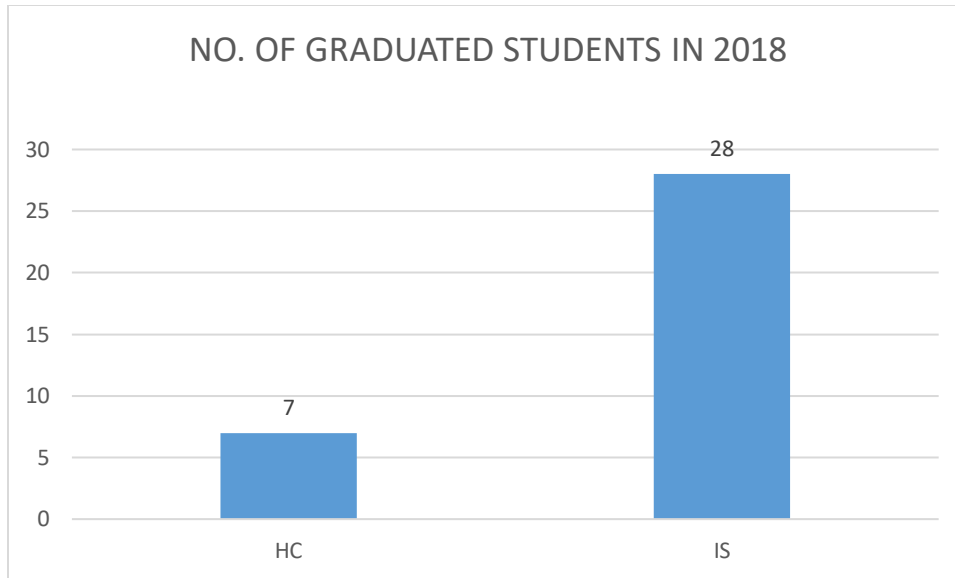
BScTE (1year and 2 year) Graduates for 2020			
Specialization			
ME	EEE	CSE	TOTAL
9	11	19	39 International =32 Host country =7



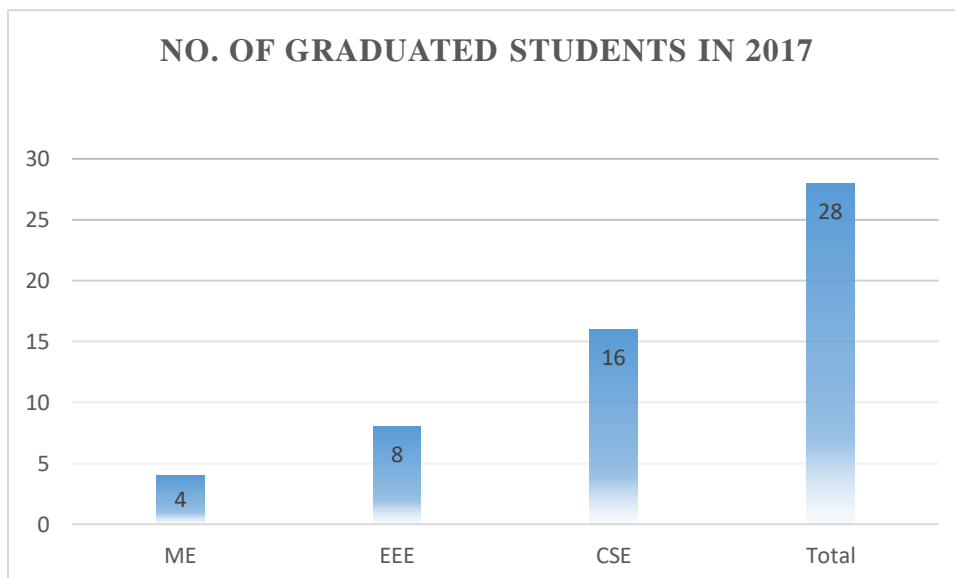


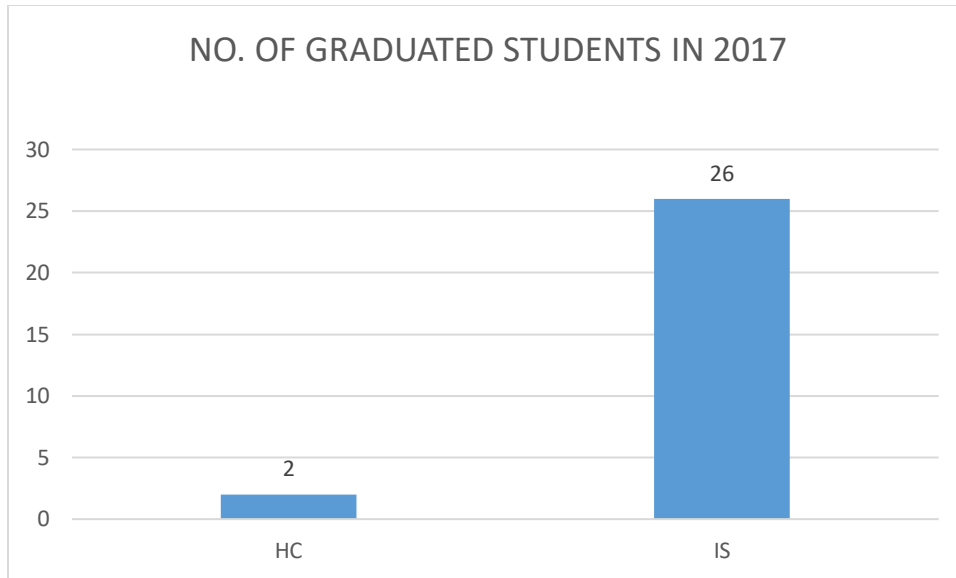
BScTE (1year and 2 year) Graduates for 2018			
Specialization			
ME	EEE	CSE	TOTAL
9	11	15	35 International =28 Host country =7





BScTE (1year and 2 year) Graduates for 2017			
Specialization			
ME	EEE	CSE	TOTAL
4	8	16	28 International =26 Host country =2





2.3 Job Description of Automobile Professionals

2.3.1 Job Description of an Automotive Engineer

Automotive engineers are included in the design, manufacture, distribution, marketing, sales and after- sales care of cars (including racing cars), motorbikes and other commercial vehicles.

Engineers will work on the decorative and technical performance of these vehicles and, growingly, the electronics and software involved with modern vehicles.

Responsibilities of the job typically include:

- ✓ Assessing project needs
- ✓ Agreeing and negotiating project budgets, timescales and specifications with clients and managers
- ✓ Developing and implementing test procedures
- ✓ Building prototypes of components to carry out test on
- ✓ Organizing and carrying out tests, for instance to check whether engines will work in different conditions, such as high temperatures
- ✓ Interpreting and analyzing results and data
- ✓ Sourcing vehicle components and selecting the best materials to use
- ✓ Providing technical advice and answering queries from clients
- ✓ Using specialist computer modelling software to produce designs
- ✓ Making improvements to vehicles in response to customer feedback
- ✓ Investigating and solving problems, e.g., mechanical failures

- ✓ Working closely with suppliers
- ✓ Writing reports and documentation
- ✓ Giving presentations
- ✓ Supervising junior staff

Qualification and training required

There are routes into the profession for both graduates and school leavers. Graduates will need a degree in a relevant subject such as automotive, mechanical or electrical engineering, production and manufacturing engineering, engineering design or physics. Some employers will ask for a 2.1 degree but others will accept candidates with a 2.2 degree.

Entry into the profession is also possible through an apprenticeship. Vehicle technician apprenticeships are available at intermediate or advanced level, and you can choose to specialize in light or heavy vehicles. Some advanced and higher apprenticeships in automotive engineering are available at larger automotive companies.

2.3.2 Job Description of an Automotive Technician

An Automotive Technician, or Automotive Service Technician, fixes, inspects, and maintains buses, exchanges, and other vehicles for motorists. Their main duties include using tools to find any implicit issues with someone's vehicle, explains problems with the auto to the motorist and performing conservation on the auto to fix it or help it from unborn breakdowns or issues.

Automotive Technician duties and responsibilities

An Automotive Technician is largely responsible for diagnosing and repairing vehicle machine systems. Automotive Technicians may have the ensuing duties and liabilities:

- ✓ Form boscage and steering systems.
- ✓ Diagnose and repair electrical and electronic systems.
- ✓ Replace or repair transmissions and energy factors as demanded.
- ✓ Form cooling factors and systems including air conditioners and machine cooling.
- ✓ Perform emigrations examinations, safety checks, and analogous state- regulated vehicle examinations.
- ✓ Maintain a clean, safe working terrain.
- ✓ Produce comprehendible and accurate paperwork reflecting work performed.
- ✓ Retain a valid state motorist's license for conducting test motorists.

2.3.3 Job Description of an automotive skilled worker

- ✓ To inspect vehicle engine and mechanical and electrical parts to diagnose issues correctly
- ✓ To inspect vehicle computer and electronic systems to repair
- ✓ To conduct routine maintenance work aiming to vehicle functionality and longevity

2.4 Related literature findings

Only a few research works have been found which are related to this study. For example, Freund (2013) in his PhD thesis/ project identified the need and the importance of academic skills acquired through general education coursework to the effectiveness and efficiency of the automobile repair technician's expertise in his or her employment. The researcher interviewed 35 employer representatives and affirmed that it is at least, beneficial, and in some cases an absolute necessity for their technicians to have an academic coursework background. Haolader, Cicioglu, & Kassim (2017) determined that the technical and vocational pedagogical course contents of B.Sc.TE programme of IUT were relevant to the occupational tasks of TVET teachers.

CHAPTER III

RESEARCH METHODOLOGY

3. 0 Introduction

This chapter presents the procedure adopted in carrying out the study. It includes the 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. 1 Design of the Study

This is a descriptive type, applied research and mixed method (both quantitative and qualitative) approach was used. As mentioned in Section 1.3 the research work was guided by three specific objectives. For objective (i): *To identify the duties/ responsibilities and the occupational tasks (competences) of automotive professionals*

the researcher used a survey method (quantitative), for objective (ii): *To determine the skill gaps (if any) between the BScTE (specialization in mechanical engineering) graduates and occupational competences required for an automobile professionals desk study* was used (qualitative) and objective (iii): *To assess the present state of the linkage between IUT and automobile workshops/ industries* interview techniques was used.

3. 1.1 Population of the study

The population of the survey comprises of those who (expert workers, managers) work in automobile maintenance workshops in Bangladesh and Somalia. Since majority of the automobile maintenance workshops are in the informal sector in these two countries, there are no data available indicating their precise number.

3.1.2 Sample of the Study

Considering the time and COVID19 pandemic situation, 5 renowned automobile maintenance workshops in the formal sector in Bangladesh including Navana, Rahim Afroze, Uttara Morots, Nitol-Tata, Ford Automobile and 20 workshops in the informal sector from Dhaka and Gazipur were selected. From Somalia least 10 workshops including Mogadishu Mechanic Workshop, Horyaal car repair and maintenance, SAAB Company Mogadishu, Cadaani workshop, Macallin aadan workshop, Macallin caato workshop, Daacad car care workshop, alaalaha workshop, and Macalin makaraan workshop were initially targeted to gather required data. But later, the researcher could not move to Somalia due to many reasons including COVID19. Finally, Managers, technicians and skilled workers from 25 different automobile workshops in Dhaka and Gazipur participated in this study. Thus the study included 100 respondents: among these respondents 25 were managers, 50 of them were the technicians and 25 of them were skilled workers. (See Table below).

Research area	No.of managers	No.of technician's	No.of skilled workers	Total Population
Bangladesh	25	50	25	100

3.1.3 Tools of Research

For the survey a questionnaire was designed by the researcher. The duties and responsibilities of automobile professionals that the researcher came up with were from Bangladesh Technical Education Board, city and guild and experts opinions.

The researcher used 5-point Likert-type questionnaire for gathering opinions regarding the listed duties and tasks of automobile professionals. The questionnaire consisted of unstructured and structured questions.

The questionnaire was developed by the researcher under close guidance of the supervisor. The questionnaire was validated with expert's opinions. The experts were requested to provide their views and opinions on the different aspects of the questionnaire. In light of the expert opinion, the questionnaire was finalized. The scale values used were: Highly Relevant (HR), Relevant (R), Moderately Relevant (MR), Undecided (U), and Not Relevant (NR). At the end the researcher requested to the automobile professionals to add one or two comments regarding the duties and responsibilities of automobile professionals but they did not add any comments this is because they were busy for their work. The questionnaire has been attached to this document (see appendix A).

For objective (iii) *to assess the present state of the linkage between IUT and automobile workshops/ industries*, interview questions were also developed by the researcher and a personal interview was used.

3.1.4 Data Collection Procedure

Copies of questionnaires were distributed to the automobile professionals of 25 workshops and collected immediately after have been completed by the respondents. Data have been gathered about the occupations of automobile professionals which are related to the course curricula of Bachelor of Science in Technical Education of IUT. The questionnaires were validated with experts' opinions before administrating. The experts were requested to provide their views and opinions on the different aspects of the questionnaires. In this study, the researcher gathered required data through various approaches, including desk studying related literature (curriculum documents, research papers, reports, etc.), individual interview with expert workers, as well as by observation, and the individual interview conducted face2face during the data collection phase. For collecting data related to objective (i), a semi-structured questionnaire designed by the author

adapting items from similar studies, which would then be used for the individual interview. For objective (ii), mainly, desk studying was conducted. For objective (iii) - assessing the present state of the linkage between IUT and automobile workshops interview questions developed by author. In order to collect data for objective (i) , the researcher visited the (sampled) automotive workshops and interviewed individual workers about what they do in their workshops (occupational tasks).

3.1.5 Methods of Data Analysis

For the analysis of the data, Microsoft Office Excel 2013 is used. The data from the questionnaires were put into Microsoft excel 2013. Weighted averages were calculated manually.

Table 3.1.5 Interpretation of the Weighted Average based on five points 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

The weighted Average was calculated from the respondents' opinions in each statement using the following formula:

$$WA = \frac{5N_1 + 4N_2 + 3N_3 + 2N_4 + N_5}{N_1 + N_2 + N_3 + N_4 + N_5}$$

Where;

N₁, N₂, N₃, N₄ and N₅ stands for numbers of respondents in different categories of respondents.

CHAPTER IV
ANALYSIS AND INTERPRETATION OF DATA

4.0 Introduction

This chapter presents the analysis of BSc.T.E curriculum and interpretation of automotive professionals' opinions survey data regarding the duties and tasks of automotive professionals. The data from the questionnaire were tabulated in the form of frequencies and percentages. A quantitative and qualitative approaches were used for analyzing the data. Weighted average values were calculated from the data gathered from respondents (automobile professionals).

4.1 Analysis and Interpretation of the Respondents' Response

In this section, the data gathered through administered questionnaire are analyzed and interpreted. The questionnaires were designed based on the research objectives. This presentation and analysis of data attempt to analyze the research objectives of this study. Tables were prepared for the questionnaire, which corresponds to the research objectives. The data of each table was followed by its interpretation. The weighted average was calculated from the data gathered from respondents. Weighted average formula was used manually.

As mentioned in Section 3. 1.3 a questionnaire was developed to gather data for Objective I: *'To identify the duties/ responsibilities and the occupational tasks (competences) of an automotive professional'* these data are tabulated as shown in the tables below:

Table 4.1.1 Responses of the Respondents with Percentages and Weighted Average for item

1.

Degree of Relevance with respect to occupations of automobile professionals	Item1	Item 1.1	Item 1.2	Item 1.3	Item 1.4	Item 1.5
	Overhaul automotive engine	Prepare to Overhaul Engine	Dismantle and evaluate engine and components	Overhaul Engine	Complete work processes	Clean & Store Equipment
Higher Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Relevance	4 (4%)	4 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Moderately Relevance	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)
undecided	12 (12%)	12 (12%)	16 (16%)	16 (16%)	16 (16%)	16 (16%)
Not Relevant	76 (76%)	76 (76%)	76 (76%)	76 (76%)	76 (76%)	76 (76%)

Weighted average	1.4	1.4	1.32	1.32	1.32	1.32
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By calculating the weighted average (1.4) for Item1 “Overhaul automotive engine” and its related tasks, as shown in Table 4.1.1, we see that the ‘Overhauling automotive engine’ is ‘not relevant’ according to the opinion given by automobile professionals.

They added that instead of overhauling automotive engine they rather use reconditioning engine. Reconditioning engine also known as remanufacturing engine is an engine goes through substantial repair intending to bring the worn engine back to “ as- new as it was” condition and enabling it to be used for another full service life.

Table 4.1.2 Responses for item 2

Degree of Relevance with respect to occupations of automobile professionals	Item 2	Item 2.1	Item 2.2	Item 2.3	Item 2.4
	Carry out wheel alignment operation	Prepare to carry out wheel alignment operation	Carry out wheel alignment pre-checks	Perform wheel alignment activities	Complete work processes
Higher Relevance	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)
Relevance	48 (48%)	48 (48%)	48 (48%)	48 (48%)	48 (48%)
Moderately Relevance	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
undecided	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.16	4.16	4.16	4.16	4.16

By calculating the weighted average (4.16) for Item2 “Carry out wheel alignment operation” and its related tasks, as shown in Table 4.1.2, it was found that the ‘Carry out wheel alignment operation’ is ‘relevant’ according to the opinion given by automobile professionals.

Table 4.1.3 Responses for item 3

	Item 3	Item 3.1	Item 3.2	Item 3.3	Item 3.4
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Degree of Relevance with respect to occupations of automobile professionals	Service emission control system	Prepare for service emission control system	Inspect emission control system	Service emission control system	Complete work processes
Higher Relevance	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
Relevance	52 (52%)	52 (52%)	52 (52%)	52 (52%)	52 (52%)
Moderately Relevance	32 (32%)	32 (32%)	32 (32%)	32 (32%)	32 (32%)
Undecided	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	3.48	3.48	3.48	3.48	3.48

By calculating the weighted average (3.48) for Item3 “Service emission control system” and its related tasks, as shown in Table 4.1.3, it was found that the ‘Service emission control system’ is ‘moderately relevant’ according to the opinion given by automobile professionals.

Table 4.1.4 Responses for item 4

Degree of Relevance with respect to occupations of automobile professionals	Item 4	Item 4.1	Item 4.2	Item 4.3	Item 4.4	Item 4.5	Item 4.6
	Perform shop maintenance	Prepare for shop management	Store/arrange tools and shop equipment	Collect required spare parts	Repair/ Service Tools & Equipment	Dispose waste/used lubricant	Prepare Report on damaged tools/equipment within inventory
Higher Relevance	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)
Relevance	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)
Moderately Relevance	40 (40%)	40 (40%)	40 (40%)	40 (40%)	40 (40%)	40 (40%)	40 (40%)
undecided	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
Not Relevant	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)

Weighted average	3.32	3.32	3.32	3.32	3.32	3.32	3.32
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By calculating the weighted average (3.32) for Item4 “Perform shop maintenance” and its related tasks, as shown in Table 4.1.4, it was found that the ‘Perform shop maintenance’ is ‘moderately relevant’ according to the opinion given by automobile professionals.

Table 4.1.5 Responses for item 5

Degree of Relevance with respect to occupations of automobile professionals	Item 5	Item 5.1	Item 5.2	Item 5.3	Item 5.4	Item 5.5
	Perform maintenance of intake, exhaust, lubricating and cooling systems	prepare for maintenance	Repair/service engine Intake system - Air filter - intake manifold	Repair/service exhaust system -exhaust manifold, - Exhaust pipes - mufflers	Repair /service lubricating system - Changing the oil/replacing the oil filter - Inspecting oil pumps -Tracing and fixing oil leaks - Measuring the oil pressure	Repair/service Coolingsystem -Checking the radiator and cleaning it on the outside - Checking coolant fluid hoses - Refreshing the coolant fluid - Measuring the freezing point of coolant fluid - Replacing the thermostat/ fluid pump
Higher Relevance	64 (64%)	64 (64%)	64 (64%)	64 (64%)	64 (64%)	64 (64%)
Relevance	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.64	4.64	4.64	4.64	4.64	4.64

By calculating the weighted average (4.64) for Item5 “Perform maintenance of intake, exhaust, lubricating and cooling systems” and its related tasks, as shown in Table 4.1.5, it was found that

the ‘Perform maintenance of intake, exhaust, lubricating and cooling systems’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.6 Responses for item 6

Degree of Relevance with respect to occupations of automobile professionals	Item 6	Item 6.1	Item 6.2	Item 6.3	Item 6.4
	Repair and service ignition system	prepare to service and repair ignition system	Diagnose fault	Service and repair ignition system components -battery - ignition switch - current distributor - high-voltage cables -spark plugs - switch unit	Clean and store tools and equipment
Higher Relevance	80 (80%)	80 (80%)	68 (68%)	68 (68%)	60 (60%)
Relevance	20 (20%)	20 (20%)	32 (32%)	32 (32%)	40 (40%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.8	4.8	4.68	4.68	5

By calculating the weighted average (4.8) for Item6 “Repair and service ignition system” and its related tasks, as shown in Table 4.1.6, it was found that the ‘Repair and service ignition system’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.7 Responses for item 7

Degree of Relevance	Item 7	Item 7.1	Item 7.2	Item 7.3	Item 7.4	Item 7.5	Item 7.6
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with respect to occupations of automobile professionals	Perform Repairing and Servicing Auto Transmission System	Prepare to repair and service transmission system - clutch - gearbox (transmission) - drive shafts and/or cardan shafts - final drive	Conduct inspection and analyze results	Flush and clean	Carry out repairing /Servicing of transmission system	Carryout final inspection	Clean and store equipment
Higher Relevance	64 (64%)	64 (64%)	64 (64%)	64 (64%)	64 (64%)	64 (64%)	56 (56%)
Relevance	32 (32%)	32 (32%)	32 (32%)	32 (32%)	32 (32%)	32 (32%)	40 (40%)
Moderately Relevance	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.6	4.6	4.6	4.6	4.6	4.6	4.52

By calculating the weighted average (4.6) for Item7 “Perform Repairing and Servicing Auto Transmission System” and its related tasks, as shown in Table 4.1.7, it was found that the ‘Perform Repairing and Servicing Auto Transmission System’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.8 Responses for item 8

Degree of Relevance with respect to occupations of automobile professionals	Item 8	Item 8.1	Item 8.2	Item 8.3	Item 8.4
	Repair and service suspension system	Prepare to repair and service suspension system	Diagnose faults of suspension system - springs - shock absorbers - axles - suspension arms - radius arms - anti-roll bars	Carryout repairing/servicing - Checking the spring system - Checking the shock absorbers - Checking and adjusting wheel bearing play - Checking the suspension	Clean and store tools and equipment
Higher Relevance	88 (88%)	88 (88%)	88 (88%)	88 (88%)	88 (88%)
Relevance	12	12	12	12	12

	(12%)	(12%)	(12%)	(12%)	(12%)
Moderately Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.88	4.88	4.88	4.88	4.88

By calculating the weighted average (4.88) for Item8 “Repair and service suspension system” and its related tasks, as shown in Table 4.1.8, it was found that the ‘Repair and service suspension system’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.9 Responses for item 9

Degree of Relevance with respect to occupations of automobile professionals	Item 9	Item 9.1	Item 9.2	Item 9.3	Item 9.4	Item 9.5
	Repair and service steering system	Repair and service steering system	Check steering system components to diagnose fit	Repair/Service steering System - rack and pinion steering system - hydraulic power steering - electric power steering system - power steering fluid leak check	Perform wheel Alignment service	Clean and store tools and equipment
Higher Relevance	100 (100%)	100 (100%)	100 (100%)	100 (100%)	96 (96%)	88 (88%)
Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (4%)	12 (12%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	5	5	5	5	5	4.88

By calculating the weighted average (5) for Item9 “Repair and service steering system” and its related tasks, as shown in Table 4.1.9, it was found that the ‘Repair and service steering system’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.10 Responses for item 10

Degree of Relevance with respect to occupations of automobile professionals	Item 10	Item 10.1	Item 10.2	Item 10.3	Item 10.4
	Perform repairing and servicing power train system	Prepare for repairing and servicing power train System	Diagnose faults of power train system	Repair/ service power train components	Clean and store tools and equipment
Higher Relevance	16 (16%)	16 (16%)	20 (20%)	16 (16%)	4 (4%)
Relevance	48 (48%)	48 (48%)	44 (44%)	48 (48%)	60 (60%)
Moderately Relevance	20 (20%)	20 (20%)	20 (20%)	20 (20%)	20 (20%)
undecided	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
Not Relevant	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
Weighted average	3.6	3.6	3.64	3.6	3.48

By calculating the weighted average (3.6) for Item10 “Perform repairing and servicing power train system” and its related tasks, as shown in Table 4.1.10, it was found that the ‘Perform repairing and servicing power train system’ is ‘relevant’ according to the opinion given by automobile professionals.

Table 4.1.11 Responses for item 11

Degree of Relevance with respect to occupations of automobile professionals	Item 11	Item 11.1	Item 11.2	Item 11.3	Item 11.4	Item 11.5
	Repair braking system	prepare to repair and service braking system	Check the system and Identify faults - brake master cylinder - disc &	Carry out repairing/ servicing	Conduct final inspection	Clean and store tools and equipment

			drum brake -Brake lines and pedals - fluid level			
Higher Relevance	100 (100%)	100 (100%)	100 (100%)	100 (100%)	100 (100%)	92 (92%)
Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	8 (8%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	5	5	5	5	5	4.92

By calculating the weighted average (5) for Item11 “Repair braking system” and its related tasks, as shown in Table 4.1.11, it was found that the ‘Repair braking system’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.12 Responses for item 12

Degree of Relevance with respect to occupations of automobile professionals	Item 12	Item 12.1	Item 12.2	Item 12.3	Item 12.4	Item 12.5
	Service battery system	Prepare to service Battery System	Detect fault of automotive Battery - Battery maintenance	Service and charge batteries Charging the battery Clean battery terminals	Jump- start vehicle	Clean and store tools and equipment
Higher Relevance	16 (16%)	16 (16%)	16 (16%)	16 (16%)	16 (16%)	16 (16%)
Relevance	28 (28%)	28 (28%)	28 (28%)	28 (28%)	28 (28%)	28 (28%)
Moderately Relevance	16 (16%)	16 (16%)	16 (16%)	16 (16%)	16 (16%)	16 (16%)

undecided	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)	36 (36%)
Not Relevant	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
Weighted average	3.16	3.16	3.16	3.16	3.16	3.16

By calculating the weighted average (3.16) for Item12 “Service battery system” and its related tasks, as shown in Table 4.1.12, it was found that the ‘Service battery system’ is ‘moderately relevant’ according to the opinion given by automobile professionals.

Table 4.1.13 Responses for item 13

Degree of Relevance with respect to occupations of automobile professionals	Item 13	Item 13.1	Item 13.2	Item 13.3	Item 13.4
	Repair charging system	Prepare to repair Charging System - Alternator drive - Measuring the charging voltage and charging current	Test the system to detect faults - Diagnosing charging systems - Checking alternator components	Repair charging system associated components	Clean and store tools and equipment
Higher Relevance	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
Relevance	24 (24%)	24 (24%)	24 (24%)	24 (24%)	24 (24%)
Moderately Relevance	20 (20%)	20 (20%)	20 (20%)	20 (20%)	20 (20%)
undecided	40 (40%)	40 (40%)	40 (40%)	40 (40%)	40 (40%)
Not Relevant	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
Weighted average	3	3	3	3	3

By calculating the weighted average (3) for Item13 “Repair charging system” and its related tasks, as shown in Table 4.1.13, it was found that the ‘Repair charging system’ is ‘moderately relevant’ according to the opinion given by automobile professionals.

Table 4.1.14 Responses for item 14

	Item 14	Item 14.1	Item 14.2	Item 14.3	Item 14.4
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Degree of Relevance with respect to occupations of automobile professionals	Perform maintenance of lighting system and Accessories	Prepare for work	Test systems and its components to detect faults - Adjusting headlamps - Diagnosing light systems	Repair/service lighting system. -headlamp -parking light/sidelight -fog lamp or high-beam headlamp -direction indicator -brake light etc.	Clean and store tools and equipment
Higher Relevance	36 (36%)	36 (36%)	36 (36%)	36 (36%)	28 (28%)
Relevance	56 (56%)	60 (60%)	60 (60%)	60 (60%)	64 (64%)
Moderately Relevance	4 (4%)	4 (4%)	4 (4%)	4 (4%)	8 (8%)
undecided	4 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.24	4.32	4.32	4.32	4.2

By calculating the weighted average (4.24) for Item14 “Perform maintenance of lighting system and Accessories” and its related tasks, as shown in Table 4.1.14, it was found that the ‘Perform maintenance of lighting system and Accessories’ is ‘relevant’ according to the opinion given by automobile professionals.

Table 4.1.15 Responses for item 15

Degree of Relevance with respect to occupations of automobile professionals	Item 15	Item 15.1	Item 15.2	Item 15.3	Item 15.4
	Perform Maintenance of Air conditioning system	Prepare for maintenance of air conditioning system	conduct test to identify fault	Repair/service air conditioning system components	Clean and store equipment
Higher Relevance	56 (56%)	56 (56%)	56 (56%)	56 (56%)	56 (56%)
Relevance	44 (44%)	44 (44%)	44 (44%)	44 (44%)	44 (44%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Weighted average	4.56	4.56	4.56	4.56	4.56	4.56
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By calculating the weighted average (4.56) for Item15 “Perform Maintenance of Air conditioning system” and its related tasks, as shown in Table 4.1.15, it was found that the ‘Perform Maintenance of Air conditioning system’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.16 Responses for item 16

Degree of Relevance with respect to occupations of automobile professionals	Item 16	Item 16.1	Item 16.2	Item 16.3	Item 16.4	Item 16.5
	Perform automotive system Diagnosis	Prepare for work	Identify nature of the fit or problem	Diagnosis by using eye or Scanner	Diagnosis by using engine analyzer	Clean and store tools and equipment
Higher Relevance	48 (48%)	44 (44%)	48 (48%)	48 (48%)	48 (48%)	44 (44%)
Relevance	44 (44%)	48 (48%)	44 (44%)	44 (44%)	44 (44%)	48 (48%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.32	4.28	4.32	4.32	4.32	4.28

By calculating the weighted average (4.32) for Item16 “Perform automotive system Diagnosis” and its related tasks, as shown in Table 4.1.16, it was found that the ‘Perform automotive system Diagnosis’ is ‘relevant’ according to the opinion given by automobile professionals.

Table 4.1.17 Responses for item 17

Degree of Relevance	Item 17	Item 17.1	Item 17.2	Item 17.3	Item 17.4	Item 17.5	Item 17.6
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with respect to occupations of automobile professionals	Replace an ABS control module	locate the ABS module	determine how to remove the ABS unit from the car	remove the module and solenoid block as a unit	remove only the module	install the new ABS module	install the ABS unit onto the car
Higher Relevance	88 (88%)	88 (88%)	88 (88%)	88 (88%)	88 (88%)	88 (88%)	88 (88%)
Relevance	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)
Moderately Relevance	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.88	4.88	4.88	4.88	4.88	4.88	4.88

By calculating the weighted average (4.88) for Item17 “Replace an ABS control module” and its related tasks, as shown in Table 4.1.17, it was found that the ‘Replace an ABS control module’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.18 Responses for item 18

Degree of Relevance with respect to occupations of automobile professionals	Item 18	Item 18.1	Item 18.2	Item 18.3
	Know how to communicate and care for customers	communicate effectively with customers	adapt their language when explaining technical matters to nontechnical customers	Care customers and achieve customer satisfaction.
Higher Relevance	80 (80%)	80 (80%)	80 (80%)	80 (80%)
Relevance	16 (16%)	16 (16%)	16 (16%)	16 (16%)
Moderately Relevance	4 (4%)	4 (4%)	4 (4%)	4 (4%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Not Relevant	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Weighted average	4.76	4.76	4.76	4.76

By calculating the weighted average (4.76) for Item18 “Know how to communicate and care for customers” and its related tasks, as shown in Table 4.1.18, it was found that the ‘Know how to communicate and care for customers’ is ‘highly relevant’ according to the opinion given by automobile professionals.

Table 4.1.19 Responses for item 19

Degree of Relevance with respect to occupations of automobile professionals	Item 19	Item 19.1	Item 19.2	Item 19.3	Item 19.4
	Know key health and safety requirements relevant to the automotive environment	list the main legislation relating to automotive environment health and safety	describe the general legal duties of employers and employees required by current health and safety legislation	describe key, current health and safety requirements relating to the automotive environment	describe why workplace policies and procedures relating to health and safety are important
Higher Relevance	68 (68%)	68 (68%)	68 (68%)	68 (68%)	68 (68%)
Relevance	20 (20%)	20 (20%)	20 (20%)	20 (20%)	20 (20%)
Moderately Relevance	4 (4%)	4 (4%)	4 (4%)	4 (4%)	4 (4%)
undecided	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Relevant	8 (8%)	8 (8%)	8 (8%)	8 (8%)	8 (8%)
Weighted average	4.4	4.4	4.4	4.4	4.4

By calculating the weighted average (4.4) for Item19 “Know key health and safety requirements relevant to the automotive environment” and its related tasks, as shown in Table 4.1.19, it was found that the ‘Know key health and safety requirements relevant to the automotive environment’ is ‘relevant’ according to the opinion given by automobile professionals.

Objective II: To determine the skill gaps (if any) between the BScTE (specialization in mechanical engineering) graduates and occupational competences required for automobile professionals.

In order to determine the skill gaps (if any) between the B.Sc.TE (specialization in mechanical engineering) graduates and the occupational competencies required for automobile professionals mainly, the researcher firstly, identified the duties and responsibilities of automobile professionals. Secondly, the researcher did a desk study where he (the researcher) identified the related courses (both theory and practical) that are offered for BSc.TE degree including Diploma in Technical Education. Additionally, the researcher examined the exam papers of last 5 years.

The related courses (both theory and practical) are:

MCE 4393, Automotive Technology, 3-0-0, Credit 3.00

Introduction to motor vehicles. Motor vehicle science, tractive effort and resistances, overturning, skidding, load transfer during braking, engine performances, efficiencies, SFC, dynamometers, Engine fundamentals, spark ignition engines, Compression ignition engines, cylinder arrangements, functions, design aspect and construction detail of engine parts. Fuel system, physical and chemical properties of motor fuels, pump, carburetors, injectors, exhaust silencer. Lubrication system. Cooling system, charging system, starter System, Ignition system.

MCE 4394, Automotive Technology Lab, 0-0-1.5, Credit 0.75

Conducted the Lab MCE 4394 based on the theories taught in MCE 4393.

MCE 4493, Automotive Maintenance Engineering, 3-0-0, Credit 3.00

Automotive testing methods, shop facilities, test equipment and tooling, use of ignition timing lights, compression tester, vacuum gage, electrical test meter, general principles of servicing, maintenance and repair of automotive engine and vehicles, diagnosis of engine and vehicle troubles and remedy, tuning-up, battery checking and charging; general servicing and servicing, checkup of ignition system, cooling system, lubrication system, electrical system, including their equipment. Engine overhauling, break down maintenance and repair, Accepted noise level and exhaust pollution control. Servicing checkup and repair of transmission, suspension, steering and braking system. Wheel alignment. Repair and maintenance of body mechanisms, door latches, locks, window regulators, wipers, bonnet. Denting and spray painting. Vehicle behavior, special material handling, vehicle security, vehicle inspection and testing, accidents and insurance covers. Workshop organization and management, layout of service station, garage planning. Fleet transport maintenance and repair, vehicle livery and cleaning. Estimating, costing and invoicing.

MCE 4494, Automotive Maintenance Engineering Lab, 0-0-1.5, Credit 0.75

Conducted the Lab MCE 4494 based on the theories taught in MCE 4493.

MCE 4780, Mechanical Engineering Lab 1, 0-0-3, Credit 1.50

1. Study of a 4 stroke and 2 stroke automotive petrol engine
2. Study of a 4-stroke diesel engine

3. Study of construction of piston, cylinder, connecting rod, crankshaft, camshaft of automotive engine
4. Study of fuel supply system and carburetors and EFI system
5. Study of cooling system in automotive engine
6. Study of lubricating system in automotive engine
7. Study of construction of automotive battery and its maintenance
8. Study of conventional ignition system in automotive petrol engine
9. Study of starting motor in automotive engine
10. Study of alternator used in automotive engine
11. Study the working principle of high pressure in line pump used in diesel engine
12. Study the working principle of distributor type pump used in diesel engine
13. Study the working principle of high-pressure injector nozzle

Automobile Engineering Lab II Experiment

MCE 4880, Mechanical Engineering Lab 2, 0-0-3, Credit 1.50

1. Study of transmission arrangement e.g., front engine front wheel drive and front engine rear wheel drive etc.
2. Study the construction and working principle of clutches
3. Study of 3-speed and 4-speed manual gear box
4. Study of the synchromesh device and gear shifter mechanism in manual gear box. Study of overdrive and transfer cases
 - a. Study of epicyclical gear train
 - b.** Study of automatic transmission
5. Study of final drive, differential unit and CV joints. Prop. Shaft and axle shaft
6. Study of different types of brakes
7. Study of automotive suspension
8. Steering system in automotive vehicle
9. Study of different electrical circuit in automotive vehicle including lighting and other electrical equipment
10. Study of automotive air-conditioning system

The question papers of last 5 years are summarized as below:

Automotive Technology I for winter final semester examination (2017-2018)

1. a) What precautions should be observed when charging a battery?
 - b) Write down the principle of generation of alternating current. Show the outputs generator when multi-pole magnets are used with necessary diagrams
 - c) Explain how half-wave and full-wave rectifications of alternating current into direct current are done while charging a battery
2. a. Draw a simple diagram showing the constructional details of pre-engaged type starter motor
 - b. Briefly describe the following components of automotive starting system with necessary diagrams
 - pinion and overrunning clutch
 - Neutral safety switch
3. a) write down the principle of starter motor showing how the bending of magnetic flux causes the rotation of motor armature
 - b) Draw a schematic diagram of starting system of Automotive Engine. Show the arrangement for passing the current through the armature and field windings in compound-wound DC motor
- 4 a) Draw a schematic diagram of the battery ignition system showing all the components
 - b) Explain why advancing in ignition is required. Describe the centrifugal advance Mechanism)Write down five advantages of the electronic ignition system
5. a) what are the types of lubrication systems? What is meant by SAE numbers?
 - b. Describe the function of pressure relief valve in lubrication with necessary diagram c. describes the two types of oil filters
6. a) Draw a schematic diagram of water-cooling system of 4-cylinder engine
 - b) Describe the following components of cooling system of automotive engine with necessary diagrams
 - radiator pressure cap
 - expansion tank

c. Write down the classification of radiators based on the direction of coolant flow

7. a) How is the amount of fuel controlled by reciprocation and rotation of plunger in the fuel pump of diesel engine? Explain with diagrams

b) Describe the mechanical governor in diesel engine fuel system

8. a) What do we understand about the 'Exhaust and Inlet Valve Overlap'? Why is it needed?

b) What are the basic differences between four stroke and two stroke engines? Write down the advantages of four stroke engine over two strokes engines) Draw the valve timing diagram of 4-stroke automotive CI engine

Automotive Maintenance engineering 1 for winter final semester examination (2017-2018)

1. a) Explain the importance of automotive maintenance engineering in your own language

b) Describe the following measuring instruments in brief

-inside and outside calipers

-dial indicator

-piston ring expander

-multimeter

-vacuum gauge

2. a) What are the cooling systems available in an automobile vehicle? Explain briefly.

b) Explain the following tests in engine cooling system

-cooling system pressure test

-combustion leak test

-thermostat test

3. a) What is engine tune-up? Discuss the importance of tune-up process. Mention the tools and equipment names that are used for tune up.

b) Describe a systematic tune-up procedure for automotive engine. Mention the precautions need to be taken

4. a) Why lubrication system is important? Describe the steps to diagnosis the fault of the lubrication system

b) Write a short note on 'spark plug installation

5. a) Briefly explain the governing factor that is responsible for a braking system

b) How to perform the antifreeze servicing?

c) How to replace the filter element of the two known filters in a lubricating system

6. a) Why maintenance of battery is important in an automobile vehicle? What are the important steps regarding disconnecting the battery?
 - b) Write a short note on following battery testing procedure
 - hydrometer
 - electric load tester
7. a) What are the requirements of valve operation in engine? Explain different types of valve troubles and describe in brief the valve servicing with diagrams if needed
 - b) Describe the diesel engine overhauling procedure in detail
8. a) Write down the differences between the modern electric car and the conventional car
 - b) Write down the possible causes of the following starting problems with the action needed to solve these problems
 - starter spins but the engine will not crank
 - Engine cranks too slowly so start
 - starter keeps running

Automotive Technology II for summer final semester examination (2017-2018)

1. a) Write the classification of steering system in automobiles. Explain mechanical and hydraulic steering system with proper labelled diagrams
 - b) Write the advantages and disadvantages of installing transaxle in vehicles
 - c) Draw a layout for electrically controlled steering system. Explain its pros and cons
2. a) Briefly explain different arrangements of engine in automobiles. Write the significance of each arrangement
 - b) Write objectives of differential gear box installation in vehicles. Explain the difference between conventional and limited slip differential gear box with labelled diagrams
 - c. Briefly explain engagement and disengagement of clutch system in automobiles
3. a) Elaborate the transmission power flow of five speed automatic transmission with labeled schematic diagrams
 - b) Briefly explain working principle of torque converter in automatic transmission system
4. a) Demonstrate the importance of installing stator in torque converter?
 - b) Draw a graph for demonstration of drive shaft yoke speed fluctuations. Why do manufacturers recommend installation of CV joint for front engine FWD arrangement? Explain

- c. Elaborate the transmission power flow of five-speed manual transmission with labeled schematic diagrams
5. a) Write the function of brakes in automobiles. Provide detailed explanation for working principle of Drum and Disc brakes with proper labeled diagrams
b) Briefly explain difference between torsion bar and coil spring
6. a) How does planetary gears work in automatic power transmission? Explain maximum forward direction and fast reverse with proper diagrams and significant details
b) What is antilock braking system? Why this ABS system is preferred over conventional braking system?
7. a) What are the main components used in Macpherson strut suspension system? Explain how shock is observed through this system in automobiles
b) Write the principle and main components of hydraulic brake system. Explain its operational principle in detail with labelled diagrams
8. a) Why leaf spring is installed in heavy vehicles? Explain working of this type of suspension system
b) Write and explain gear shift mechanism components in both manual and automatic power transmission vehicles. Draw proper diagrams

Summary of the Question Items for Automotive Maintenance Engineering, summer semester final examination

1. Write different types of punches with uses
2. a) Describe the following measuring instruments in brief
 - inside and outside calipers
 - dial indicator
 - piston ring expander
 - feeler gauges
 - vacuum gauge
 b) Briefly describe the steps for performing basic tune-ups
3. a) Categorize the different troubles and repairs of engine parts with an explanation
b) Describe the troubles and repairs of piston and piston rings
c) Write a short note on valve service
4. a) Explain the flushing of engine cooling system with necessary diagrams.

- b) Explain the following tests in engine cooling system
 - cooling system pressure test
 - combustion leak test
 - thermostat test
- 5. a) How to perform the anti-freezing servicing?
 - b) Explain the basic four lubricating system problems
 - c) How to replace the filter elements of the two known filters in the lubricating system?
- 6. a) Write down the precautions that should be observed while charging a battery
 - b) Briefly describe the battery testing using hydrometer
 - c) Write down the important notes regarding disconnecting the battery
- 7. a) Describe the procedure to perform the 'current draw test' for the starting system.
 - b) Write down the possible causes of the following starting problems with actions needed to solve these problems-
 - Starter spins but the engine will not crank
 - Engine cranks too slowly so start
 - Starter keeps running
 - Engine cranks too slowly to start
 - Engine will not crank
- 8. a) Write down the procedure that should be followed when cleaning spark plugs
 - b) Write down the procedure of performing a spark test with figures if needed
 - c) Write a short note on 'spark plug installation''

Automotive Technology 1 for winter final examination (2018-2019)

- 1. a) Explain the working principle of solenoid operated starting motor used in automotive vehicle with necessary diagrams
 - b) Why a thermostat is used in water cooling system? Explain how it works
- 2. a) Describe the working principle of an automotive battery during charging and discharging showing the chemical reactions associated with the systems
 - b) Explain the working principle of a generator, used for charging of battery in the car, with necessary diagrams. Describe how the rectification from AC to DC is done

- 3.a) Draw a schematic diagram of the battery ignition system showing all the components and describe how the ignition system works
- b) Show the classification of cooling systems in automotive engine. Describe the water-cooling system in an automotive engine with necessary diagram
4. a) List the functions of lubricating system in automotive engine. Show the path of lubricating oil flow to various parts of the engine and describe accordingly
- b) What is an overhauling clutch? Describe the functions and operations of overhauling clutch
5. a) What is an EFI system? Describe different types of sensors used in the EFI system.
- b) With the help of necessary diagrams explain the carburetor operations while an automotive is at low speed and at normal driving speed
6. a) Draw the valve timing diagram and valve indicator diagram for a 4-stroke diesel engine and explain them
- b) Write down the differences between a SI engine and CI engine
- 7.a) What is an Engine? Describe the working procedure of a 2-stroke engine with simple diagrams
- b) Explain the operating procedure of the mechanical fuel pump with necessary diagrams
8. a) Describe the CNG injection technology in an automobile mentioning the main parts of the system with simple diagram
- b) Write down small notes on the following components:
- radiator pressure cap
 - contact breaker
 - Anti-freeze mixture

Automotive Maintenance Engineering 1 for winter final examination (2018-2019)

1. a) What are the common and non-common problems in ignition system? Briefly classify them.
- b) How electromagnetic interference is induced in automobiles? How does it affect the vehicles performance?
2. a) Write down the necessary steps for no-start engine diagnosis? Provide detailed explanation
- b) Write down the possible causes and remedies for following conditions;
- firing voltage lines, the same, but abnormally high
 - cylinders not firing
 - firing voltage lines, the same, but abnormally low

3. a) Provide a detailed explanation for rectifying spark plug problems. What are the different types of fouling in spark plugs? Explain
 - b) Explain the maintenance procedure for fuel injector. Briefly explain the injector cleaning procedure
4. a) What are the reasons for excessive oil consumption in engine? Explain
 - b. Write down the necessary steps for throttle body inspection. Explain
5. a) Explain the reason and impact of sludge on engine performance. How to examine the oil condition in engine
 - b) Write down the common causes for following conditions of engine overheating;
 - overheats in heavy traffic or after idling for a long time
 - overheats anytime or erratically
 - overheats when driving at speed or after repeated heavy acceleration
6. a) Write down the complete inspection procedure for the following cooling devices;
 - radiator
 - water pump
 - b) How the battery load test is conducted? Explain
7. a) Provide necessary steps and explanation to measure the parasitic drain on the battery
 - b) How the maintenance of the cylinder head is performed? Explain
8. a) write down all the steps for voltage drop testing of a starter circuit
 - b) What are the different types of contaminants? Demonstrate all the cleaning methods with a reasonable explanation.

Automotive Technology 1 for summer final examination (2018-2019)

1. a) Briefly explain different arrangements of engine in automobiles. Write the significance of each arrangement.
 - b) Write down the objectives of differential gear box installation in vehicles. Explain the working principle of planetary gear system in auto transmission using simple schematic diagram
2. a) Elaborate the transmission power flow of five speed automatic transmission with labeled schematic diagrams.
 - b) Briefly explain working principle of torque converter in automatic transmission system.
3. a) What is antilock braking system? Why this ABS system is preferred over conventional braking system?

- b) Write the function of brakes in automobiles. Provide detailed explanation for working principle of drum and disc brakes with proper labelled diagrams.
4. a) Draw a relay as used in a simple headlight circuit of an automobile vehicle and explain the basic operation of the relay.
- b) Describe different types of lamps and light in lighting system of a car.
- c.) Draw a lighting circuit incorporating fuse and relays used in automobile vehicle.
5. a) What is an electronic control unit? What are the different types of ECU available?
- b) Briefly describe the different types of sensors that is used in an automobile vehicle.
6. a) Demonstrate the importance of installing stator in TC?
- b) Elaborate the transmission power flow of five speed manual transmission with labeled schematic diagrams.
7. a) Write the principle and main components of hydraulic brake system. Explain its operational principle in detail with labelled diagrams.
- b) Briefly explain mechanism of engagement and disengagement of clutch system in automobiles.
8. a) What are the main components of a suspension system? Explain how shock is absorbed by the suspension system in automobiles.
- b) Why is leaf spring installed in heavy vehicles? Explain working of this type of suspension system.

Automotive Maintenance Engineering II for summer final examination (2018-2019)

1. a) Provide the necessary steps to be taken for dismantling and replacing a MacPherson strut. Explain them briefly.
- b) Write the steps to be followed while changing the automatic transmission fluid and filter.
2. Explain the procedures for inspecting the following systems
- Rack and pinion steering system.
 - Brake line and brake pedal of hydraulic brake system.
 - Master cylinder of hydraulic brake system.
3. a) Write a comprehensive note on the following clutch problems diagnosis,
- a. slippage b. chatter c. drag and binding d. pedal pulsation e. vibration

4 a) write down the through explanation for diagnosis and inspection of CV joints. Briefly explain the maintenance steps for serving of U-joints.

b. How the compressor's clutch service is performed. Briefly explain the procedure adopted for clutch and pulley replacement.

5.a) Write the crucial steps for diagnosing a suspension System of an automobile. Explain.

b) Demonstrate the following angles with labelled diagrams and explain why their accuracy plays grander role in acquiring accuracy of steering system's alignment

- Caster - Camber -Toe

6. a) write the safety precautions needs to be taken before proper examination of ABS. explain

b) Provide the necessary steps for checking the solenoidal leaks in the hydraulic modulator.

7. a) write the possible causes and remedies of following problems appear in transmission/transaxle of automobile.

-Gear clash when shifting from one gear to another

- Does not shift into one gear

-Slips out of gear

-Transmission/transaxle shift hard

b) Write a procedure for removing and installing a steering wheel.

8) write a complete note on the maintenance of following components of AC,

-Evaporator

-Condenser

The researcher compared these related course contents (both theory and practical) and last 5 question papers with the duties and responsibilities of automobile professionals and he found that there is no significance gap between BSc.TE (specialization in mechanical engineering) graduates and occupational competencies required for automobile professionals.

Objective III: To assess the present state of the linkage between IUT and automobile workshops/ industries

In order to assess the present state linkage of IUT with automobile workshops, the researcher interviewed a faculty member who knows about it.

Responses

1. Is there any linkage between IUT and automobile workshops?

IUT has connection or linkage with industries in Bangladesh for internship purposes.

2. Does IUT have enough equipment to fulfill its needs in at?

IUT has equipment to fulfill its needs.

3. What did the university do if it faces any difficulties?

If IUT faces any difficulties regarding automobiles they write formal letter to the workshop they want to contact with to solve their problems.

4. Why linkages between institutions and industries are important?

- ✓ To enhance the skills of the graduates.
- ✓ To improve the connection between academia and industries
- ✓ To create a better understanding of each other's needs
- ✓ To identify how they can be met through the industry programs.

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 objective of this study was to identify the duties/ responsibilities and the occupational tasks (competencies) of automotive professionals.

The second objective of carrying out of this study was to determine the skill gap (if any) between the BScTE (specialization in mechanical engineering) graduates and the occupational competencies required for automobile professionals.

The third objective of this study was to assess the present state of the linkage between IUT and automobile workshops/ industries.

In order to fulfill these objectives, automobile workshops were considered for this study. Data has been collected from automobile workshops in Bangladesh. The study included 100 respondents; among these respondents, 25 were managers, 50 of them were technicians and 25 were skilled workers. The questionnaire was consisting of duties and tasks of automobile technicians. The data have been collected from automobile workshops through distributing to each participant a copy of questionnaire. For objective (III) personal interview was used.

For the analysis of the data, Weighted Average has been calculated manually and also (the data) were analyzed by using Microsoft excel 2013.

5.2 Findings

Research objective 1

To identify the duties/ responsibilities and the occupational tasks (competences) of an automotive professional.

The findings shows that the occupational tasks of automotive professionals are; to Perform maintenance of intake, exhaust, lubricating and cooling system; to Repair and service ignition system; to Perform Repairing and Servicing Auto Transmission System; Repair and service

suspension system; to Repair and service steering system; to Repair braking system; to Replace an ABS control module; to Know how to communicate and care for customers, etc.

Research objective II

To determine the skill gaps (if any) between the BScTE (specialization in mechanical engineering) graduates and occupational competences required for an automobile professional.

The findings of objective (ii) was based on the outcomes of objective 1 (To identify the duties/ responsibilities and the occupational tasks (competences) of an automotive professionals) the researcher found that there is no significance gap between BSc.TE (specialization in mechanical engineering) graduates and occupational competencies required for automobile professionals.

Research objective III

To assess the present state of the linkage between IUT and automobile workshops/ industries.

The findings of objective (iii) shows that; IUT has linkage or connection with industries in Bangladesh for internship purposes.

5.3 Conclusions

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

Automotive technology and automotive engineering maintenance course contents were found relevant to the occupational tasks of automobile professionals. The researcher compared occupational tasks, course contents of automotive technology and automotive maintenance and their labs and last 5 years of IUT exam papers with the occupational competences required for automobile professionals and he found that there is no significance skill gap between the BScTE (specialization in mechanical engineering) graduates. Finally, the researcher interviewed a faculty member of IUT from mechanical engineering and he found that IUT has linkage or connection with industries in Bangladesh for internship purposes.

5.4 Recommendations and Future Work

5.4.1 Recommendations

Through this study we can say that the course contents of automobile courses of IUT might be extended or included new syllabus, new contents like hybrid cars and instead of using old cars for lab experiments it's better to use new cars so that students can improve their skills. Also the

researcher suggested IUT to have linkage or connection with high quality automobile workshops to produce automobile skilled graduates and match the demand of automobile workshops.

5.4.2 Future Works

This research study was only conducted with the automobile courses, a further research work can be done on the analysis of contents of other subjects e.g., production and energy courses and other related courses. The sample size of the population should include not only automobile professionals in Bangladesh but also to include other automobile professionals in other developed countries.

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APPENDIX A
QUESTIONNAIRE

Tentative Title: The Relevance of BScTE Curriculum of IUT with the Occupations of Automobile Professionals

1. **Name of respondent:**
2. **Position of respondent (... / Manager/Technician/ ...)**
3. **Name of enterprise:**
4. **Nature of the enterprise (Formal sector/Informal sector)**
5. **Number of employees:**
6. **Educational levels of employees:**

Educational level	Number of employees at this level
Higher education (B.Sc. engineering, or any)	
Particular level of technical/vocational education and training	Diploma level: Certificate level:
Secondary	
Below	

Below is a list of duties and tasks of an automobile engineer/technician

Please express your opinion on how relevant is each duty and its task shown in the table

You can use the following 5-point scale:

1. **Highly relevant (HR), Relevant (R), Moderately relevant (MR) Undecided (U), Not relevant (NR)**

Duties	Tasks					
1. Overhaul automotive engine	1.1 Prepare to Overhaul Engine	1.2 Dismantle and evaluate engine and components	1.3 Overhaul Engine	1.4 Complete work processes	1.5 Clean & Store Equipment	
2. Carry out wheel alignment operation	2.1 Prepare to carry out wheel	2.2 Carry out wheel alignment pre-checks	2.3 Perform wheel alignment activities	2.4 Complete work processes		

	alignment operation						
3. Service emission control system	3.1 Prepare for service emission control system	3.2 Inspect emission control system	3.3 Service emission control system	3.4 Complete work processes			
4. Perform shop maintenance	4.1 Prepare for shop management	4.2 Store/arrange tools and shop equipment	4.3 Collect required spare parts	4.4 Repair/Service Tools & Equipment	4.5 Dispose waste/used lubricant	4.6 Prepare Report on damaged tools/equipment with inventory	
5. Perform maintenance of intake, exhaust, lubricating and cooling system	5.1 prepare for maintenance	5.2 Repair/service engine Intake system - Air filter - intake manifold	5.3 Repair/service exhaust system -exhaust manifold, - Exhaust pipes - mufflers.	5.4 Repair /service lubricating system - Changing the oil/replacing the oil filter - Inspecting oil pumps -Tracing and fixing oil leaks - Measuring the oil pressure	5.5 Repair/service Cooling system -Checking the radiator and cleaning it on the outside - Checking coolant fluid hoses - Refreshing the coolant fluid - Measuring the freezing point of coolant fluid - Replacing the thermostat/ fluid pump	5.6 Clean and store equipment	

6. Repair and service ignition system	6.1 prepare to service and repair ignition system	6.2 Diagnose fault -	6.3 Service and repair ignition system components -battery - ignition switch - current distributor - high-voltage cables -spark plugs - switch unit	6.4 Clean and store tools and equipment		

7. Perform Repairing and Servicing Auto Transmission System	7.1 Prepare to repair and service transmission system - clutch - gearbox (transmission) - drive shafts and/or cardan shafts - final drive	7.2 Conduct inspection and analyze results	7.3 Flush and clean	7.4 Carry out repairing /Servicing of transmission system	7.5 Carryout final inspection	7.6 Clean and store equipment

8. Repair and service suspension system	8.1 Prepare to repair and service suspension system	8.2 Diagnose faults of suspension system - springs - shock absorbers - axles - suspension arms - radius arms - anti-roll bars	8.3 Carryout repairing/servicing - Checking the spring system - Checking the shock absorbers - Checking and adjusting wheel bearing play - Checking the suspension	8.4 Clean and store tools and equipment							
					9. Repair and service steering system	9.1 Prepare to repair steering system.	9.2 Check steering system components to diagnose fit	9.3 Repair/Service steering System - rack and pinion steering system - hydraulic power steering - electric power steering system - power steering fluid leak check	9.4 Perform wheel Alignment service	9.5 Clean and store tools and equipment	

10. Perform repairing and servicing power train system	10.1 Prepare for repairing and servicing power train System	10.2 Diagnose faults of power train system	10.3 Repair/ service power train components	10.4 Clean and store tools and equipment		
11. Repair braking system	11.1 prepare to repair and service braking system	11.2 Check the system and Identify faults - brake master cylinder - disc & drum brake -Brake lines and pedals - fluid level	11.3 Carry out repairing/ servicing	11.4 Conduct final inspection	11.5 Clean and store tools and equipment	
12. Service battery system	12.1 Prepare to service Battery System	12.2 Detect fault of automotive Battery - Battery maintenance -	12.3 Service and charge batteries Charging the battery Clean battery terminals	12.4 Jump-start vehicle	12.5 Clean and store tools and equipment	

13. Repair charging system	13.1 Prepare to repair Charging System - Alternator drive - Measuring the charging voltage and charging current	13.2 Test the system to detect faults - Diagnosing charging systems - Checking alternator components	13.3 Repair charging system associated components	13.4 Clean and store tools and equipment		
14. Perform maintenance of lighting system and Accessories	14.1 Prepare for work	14.2 Test systems and its components to detect faults - Adjusting headlamps - Diagnosing light systems	14.3 Repair/service lighting system. -headlamp -parking light/sidelight -fog lamp or high-beam headlamp -direction indicator -brake light etc.	14.4 Clean and store tools and equipment		

15. Perform Maintenance of Air conditioning system	15.1 Prepare for maintenance of air conditioning system	15.2 conduct test to identify fault	15.3 Repair/service air conditioning system components	15.4 Clean and store equipment		
16. Perform automotive system Diagnosis	16.1 Prepare for work	16.2 Identify nature of the fit or problem	16.3 Diagnosis by using engine Scanner	16.4 Diagnosis by using engine analyzer	16.5 Clean and store tools and equipment	
17. Replace an ABS control module	17.1 locate the ABS module	17.2 determine how to remove the ABS unit from the car	17.3 remove the module and solenoid block as a unit	17.4 remove only the module	17.5 install the new ABS module	17.6 install the ABS unit onto the car
18. Know how to communicate and care for customers	18.1 communicate effectively with customers	18.2 adapt their language when explaining technical matters to nontechnical customers	18.3 care customers and achieve customer satisfaction.			

19. Know key health and safety requirements relevant to the automotive environment	19.1 list the main legislation relating to automotive environment health and safety	19.2 describe the general legal duties of employers and employees required by current health and safety legislation	19.3 describe key, current health and safety requirements relating to the automotive environment	19.4 describe why workplace policies and procedures relating to health and safety are important		
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You may add one or more duties if you think so

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APPENDIX- B
TVE GRADUATED STUDENTS LIST IN (2021)

BScTE-2ndSem (1-Yr)

SINo	Student ID	Name	Country
1	200033401	Dawood	Pakistan
2	200033402	Rafiullah Momand	Afghanistan
3	200033201	Amadou Jallow	Gambia
4	200033101	Fatou Joof	Gambia
5	200033102	Biran Mbye	Gambia
6	200033103	Ahmed Shuaib Khawari	Afghanistan
7	200033104	Abubakar Issak Ali Adan	Somali
8	200033105	Abdullah Mabkhot Ali Taqi	Yemen
9	200033106	Abshir Hassan Mohamud Abdi	Somali
10	200033107	Ayman Elsadig Abd alla Ahmed	Sudan

Specialization	Total
BScT.E (ME)	7
BScT.E (EEE)	1
BScT.E (CSE)	2
	Total =10

BScTE-4thSem (2-Yr)

1	190032101	Fakebba Drammeh	Gambia
2	190032102	Omar Manneh	Gambia
3	190032103	Md. Sayedul Islam	Bangladesh
4	190032104	Yankuba Danso	Gambia
5	190032105	Famara Bojang	Gambia

6	190032201	Fanding Darboe	Gambia
7	190032202	Md. Tarekul Islam	Bangladesh
8	190032203	Md. Foredul Islam	Bangladesh
9	190032204	Takia Sultana	Bangladesh
10	190032205	Abubakar Salele	Nigeria
11	190032206	Ms. Binta Sanyang	Gambia
12	190032207	Nabil Ameen Qaid Ayshan	Yemen
13	190032401	Muhammad Dikko Gambo	Nigeria
14	190032402	Marjia Khatun	Bangladesh
15	190032403	Naznin Akter Lima	Bangladesh
16	190032404	Usman Ahmed Shehu	Nigeria
Specialization		Total	
BScT.E (ME)		5	
BScT.E (EEE)		7	
BScT.E (CSE)		4	
		Total =16	

TVE GRADUATED STUDENTS LIST IN (2020)

BScTE-2ndSem (1-Yr)

SINo	Student ID	Name	Country
1	180033411	Rami Abdullah	Palestine
2	190033101	Mounjouonpou Yaya	Cameroon
3	190033102	Abdoul-Enziz Imamou	Comoros
4	190033201	Oun Ali	Pakistan
5	190033202	Abdul Hakim Nura	Nigeria
6	190033203	Abdulhafiz Aliyu Jani	Nigeria
7	190033204	Abbas Muntari	Nigeria
8	190033205	Abdirahman Ahmed Osman	Somalia
9	190033206	Bilal Mosleh Muhsin Aziz	Yemen
10	190033207	Mugahed Hamid Gjaleb Farhan	Yemen
11	190033208	Fath Ahmed	Yemen
12	190033401	Zabihullah Amiri	Afghanistan
13	160041088	Abdul Aziz Yousufzai	Afghanistan
14	190033403	Mounkambou Abdel Karim	Cameroon

15	190033404	Sani Usman Aminu	Nigeria
16	190033405	Mohammad Aslam	Afghanistan
17	190033406	Tariq Hilal	Afghanistan
18	190033407	Mohamed Kafi	Comoros
19	190033408	Muhindo Mubaraka	Uganda
20	190033409	Anasse Mohamed Maoulida	Comoros
21	190033410	Hamse Hassan Adnan	Somalia
22	190033411	Aiman Mohammed Hamood Babakr	Yemen
23	190033412	Asraf Gamal Hasan Hatem	Yemen
24	190033413	Hayatou Amadou	Cameroon
25	190033414	Ashraf Ali Musaed Al -Zyadi	Yemen

Specialization	Total
BScT.E (ME)	2
BScT.E (EEE)	8
BScT.E (CSE)	15
	Total =25

BScTE-4thSem (2-Yr)

SINo	Student ID	Name	Country
1	180032101	Ismaila Sanyang	Gambia
2	180032102	Abu Sayed	Bangladesh
3	180032103	Baboucarr A. Bojang	Gambia
4	180032104	Khurul Islam	Bangladesh
5	180032105	Md. Hasan Ali	Bangladesh
6	180032106	Md. Shafiul Islam	Bangladesh
7	180032107	Kebba Ceesay	Gambia
8	180032201	Amadou A. K. Jallow	Gambia
9	180032203	Muhammed Seckan	Gambia

10	180032204	Md. Mousum Kabir Rabbi	Bangladesh
11	180032401	Md. Maharul Islam	Bangladesh
12	180032402	Mst. Shahida Khatun	Bangladesh
13	180032403	Idriss Audu Yusuf	Nigeria
14	180032404	Ashiru Ahmad Rufai	Nigeria

Specialization	Total
BScT.E (ME)	7
BScT.E (EEE)	3
BScT.E (CSE)	4
	Total =14

TVE GRADUATED STUDENTS LIST IN (2018)

BScTE-2ndSem (1-Yr)

SINo	Student ID	Name	Country
1	170033101	Abou Hanifa Mziarani	Comoros
2	170033102	Samiullah Nazari	Afghanistan
3	170033103	Mohammed Khalid	Yemen
4	170033104	Dhiaa Yahya Ali Abushibh	Yemen
5	170033105	Saidou Mamadou David	Cameroon
6	170033106	Soibahadine Mohamed Thani	Comoros
7	170033107	Zayyad Abubakar Sada	Nigeria
8	170033201	Mohammad Huddain Hossaini	Afghanistan
9	170033204	Jerreh Manjang	Gambia
10	170033205	Abdoul Kadiri Lawane	Cameroon
11	170033206	Abdourahimou Saidou	Cameroon
12	170033207	Ataturk	Afghanistan
13	170033209	Saddam Mohammed Ahmed	Yemen
14	170033210	Abdimajid Adam Ibrahim	Somalia
15	170033212	Charif Said Mohamed	comoros

16	170033401	Mohammad Arif Haidari	Afghanistan
17	170033402	Mbohou Fils Aboubakar Sidik	Cameroon
18	170033403	Adama Moussa	Cameroon
19	170033404	Noor Ahmed	Afghanistan
20	170033405	Salisu Ibrahim Salisu	Nigeria
21	170033406	Mohamed Said Mohamed	Somalia
22	170033408	Njoya Pefensie Mohamed	Cameroon
23	170033409	Landing K.J Sanneh	Gambia
24	170033410	Ibrahim Haruna Yar'adua	Nigeria
25	170033411	Asif Ali Ansari	Pakistan
26	170033412	Abdoul- Aziz Alioum	Cameroon
27	170033413	Hussaini Alkasim	Nigeria

Specialization	Total
BScT.E (ME)	7
BScT.E (EEE)	8
BScT.E (CSE)	12
	Total =27

BScTE-4thSem (2-Yr)

1	160032101	Shibli Sadik	Bangladesh
2	160032102	Md. Rofiqul Islam	Bangladesh
3	160032202	Md. Anowarul Islam	Bangladesh
4	160032203	Md. Samsul Haque	Bangladesh
5	160032205	Pa Foday Khan	Gambia
6	160032401	Md. Tariqul Islam	Bangladesh
7	160032402	Md. Samidul Islam	Bangladesh
8	160032403	Md. Tohiduzzaman	Bangladesh

Specialization	Total
BScT.E (ME)	2
BScT.E (EEE)	3
BScT.E (CSE)	3

	Total =8
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TVE GRADUATED STUDENTS LIST IN (2017)

BScTE-2ndSem (1-Yr)

SINo	Student ID	Name	Country
1	160033101	Abdullahi Idris Kusada	Nigeria
2	160033102	Chahardine Hassani Ali	Comoros
3	160033103	Abdullah Mohammed Hussein	Yemen
4	160033105	Muhammad Usman Khan	Pakistan
5	160033201	Hussaini Musa Dankaura	Nigeria
6	160033202	Abdurrazaq yahya Bello	Nigeria
7	160033203	Ali Abdillah Abdallah	Comoros
8	160033204	Woussoufa Ahamada	Comoros
9	160033205	Nassar Abdullah Rageh	Yemen
10	160033206	Saleh Mohammed Ali	Yemen
11	160033207	Fahardine Ali	Comoros
12	160033208	Mohammed Daniel	Nigeria
13	160033401	Karamba Jaiteh	Gambia
14	160033402	Jabir Surajo	Nigeria
15	160033403	Abdel Salam Abbo	Cameroon
16	160033404	Moussa Sali	Cameroon
17	160033405	Abdouroihamane Mmadi	Comoros
18	160033406	Aboubacar Abdou Abdallah	Comoros
19	160033407	Mohamed Elmi	Djibouti
20	160033408	Musa Muslim	Nigeria

Specialization	Total
BScT.E (ME)	4
BScT.E (EEE)	8

BScT.E (CSE)	8
	Total =20

BScTE-4thSem (2-Yr)

1	153401	Md. Shakil Ahmed	Bangladesh
2	153403	Mustapha Sanyang	Gambia
3	153404	Alieu E. Jammeh	Gambia
4	153406	Nambobi Mutwalibi	Uganda
5	153407	Md. Asraful Alam	Bangladesh
6	153430	Fuad Yahya Ali	Yemen
7	153431	Oumar Marcel	Comoros
8	153432	Abdulahdi M. Ahmed	Yemen

Specialization	Total
BScT.E (ME)	0
BScT.E (EEE)	0
BScT.E (CSE)	8
	Total =8

