Integration of Soft Skills into Diploma in Engineering Curriculum: needs, pedagogical approaches and means.

RESEARCH REPORT

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Executive Summary

Technical and Vocational Education and Training (TVET) institutions play a critical role in preparing students for the workforce by equipping them with technical skills. However, in today's competitive job market, employers increasingly value soft skills as well. Soft skills encompass a range of interpersonal, communication, and problem-solving abilities that are essential for success in the workplace. Therefore, it is crucial for TVET institutions to adopt effective pedagogical approaches that enhance the soft skills of their students. This paper aims to explore ways integrate pedagogical approaches into diploma engineering curriculum that can be employed to enhance the soft skills of diploma graduates known as diploma engineers. It is important to note that these pedagogical approaches should be integrated systematically into the curriculum and supported by trained educators who can facilitate the development of soft skills effectively.

Though the aim of TVET is to provide students with the skills and knowledge they need to succeed in their chosen career, and to help address any skills gaps in the job market. Unfortunately, employer's feedback in many occasions shows that our TVET graduates' productivity and efficiency fall short of what is desired from them. This is affecting proper placement and decent job facilities of the TVET graduates. Earlier in this year (April 2023) we conducted a social qualitative research with an objective to find the Soft skills need, supports and readiness of the TVET graduates to meet challenge of 4IR. Our respondents expressed that, to be competent for job market, soft skills are essential for all our TVET graduates to meet the challenges of modernization. The study also found that, there is a gap between current level of TVET graduates' soft skills and what is expected from them.

Enhancing the soft skills of Diploma in engineering students is essential to prepare them for success in the modern workforce. By implementing effective pedagogical approaches such as integrating soft skills training, experiential learning, role plays, group projects, communication and presentation skills development, emotional intelligence training, and industry engagement, TVET institutions can empower their students with a well-rounded education. These approaches will not only increase the employability of TVET graduates but also equip them with the necessary skills to excel in their chosen fields and contribute to the socio-economic development of their communities.

Findings of this study suggest that initiatives should be taken for adopting modern pedagogical methods in our teaching delivery system and assessments. Teachers need to be trained in pedagogy and soft skills practice.

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Acronyms and Abbreviation

IR4.0	Industrial Revelation 4.0
TMED	Technical and Madrasah Education Division
DTE	Directorate of Technical Education
BTEB	Bangladesh Technical Education Board
BNQF	Bangladesh National Qualifications Framework
TVET	Technical and Vocational Education and Training
NTVQF	National Technical Vocational Qualification Framework
NSDP	National Skill Development Policy
A2i	Aspire to Innovate Project
FGD	Focus Group Discussion
KII	Key Informant Interview

Chapter 1: Introduction

1.1 Background:

All over the world technological advancements are changing job roles and requirements. To keep pace with this transition, our workforce need to be equipped with technical skills and some generic skills commonly known as soft skills.

Soft skills, encompassing personal attributes, communication abilities, and interpersonal skills, that are crucial for success in the workplace. Diploma in engineering curriculum designed by Bangladesh Technical Education Board (BTEB) to equip students with 4th Industrial Revolution responsive technologies like Internet of Things (IoT), Industrial automation, Robotics, Artificial Intelligence, Cyber security, etc. While technical skills are essential, there is a growing recognition of the importance of soft skills in the professional success of diploma graduates. Interpersonal relations, communication, and problem-solving abilities contribute to individual employability, adaptability, and overall career growth.

At present, four-year Diploma in engineering courses are offered for 30 technologies. Our diploma graduates should possess soft skills as it is demanded globally by the employers. Common set of soft skills that can be useful for students, irrespective of their technologies need to be identified. The newly approved diploma curriculum, 2022 has scope of incorporating soft skills. But, implementation strategy and methods of practice is yet to be determined. Soft skills can be

This research proposal aims to investigate and identify effective pedagogical approaches in TVET settings that can enhance soft skills among diploma graduates.

1.2 Statement of the Problem:

Bangladesh Technical Education Board (BTEB) is formulating a 4th Industrial Revolution based curriculum to prove its worth in line with the demands of the changing labor market. TVET system need to ensure that TVET graduates are well equipped not only with the requisite skills for the job market but also capable to meet the challenges of IR 4.0

At present, the production and service sector of Bangladesh has an average demand of about 10 lakh workers every year. (BIDS-SEIP Skills gap analysis study, 2017)

Finding the challenges to adopt competent graduate supply from the TVET institutions (polytechnic) to meet the labor skill demand locally and globally is the main rational of the study.

Technical and Vocational Education and Training (TVET) plays a key role in skills development of any country. It boosts productivity and helps improving the quality of life of the people. Skilled manpower to support industrial and agricultural development is vital for poverty reduction, economic growth, and sustainable development of Bangladesh. The majority of TVET programmes are provided at Diploma and Certificate levels. The Diploma curriculum contains 41% theoretical content and 59% practical content. Technical Education Board (BTEB) is formulating a 4th Industrial Revolution based curriculum to prove its worth in line with the demands of the changing labor market. TVET system need to ensure that diploma graduates are well equipped not only with the requisite skills for the job market but also capable to meet the challenges IR 4.0 and economic transformation.

Bangladesh is in huge need of highly skilled human resources to address the present demand of the local industries that are driving the economy. At this moment our job seeker are facing various challenges of technological up gradation and automation.

1.3 Importance of the study:

There is a close relationship between TVET and the socio-economic development of a country. Technological advancement in Bangladesh is happening at a fast pace. The international labor market for skilled workers is also expanding rapidly. The type of education which delivers distinct practical knowledge of technologies and skills is known as TVET. Technical education offers an excellent opportunity for employment at home and abroad.

According to a study of Anjali Vyas (2019), "Educating students on the basis of theoretical knowledge must be implemented parallel with soft-skills development for better prospects & career. Combination of 'Soft-skills' and 'Education' results in a better career opportunities and employability."

Earlier in this year (April 2023) we conducted a social qualitative research with an objective to find the Soft skills need, supports and readiness of the TVET graduates to meet challenge of 4IR. Six Government Polytechnic Institutes and six Private Polytechnic Institutes from Dhaka division was chosen for our study. Feedback was taken from total 109 current students and 196 graduates of these institutes. Faculties of polytechnic institutes, representatives of different industries & employers, related personal of Bangladesh Technical Education Board (BTEB) and Directorate of Technical education (DTE) participated in FGD and KIIs. Our respondents expressed that, to be competent for job market, soft skills is essential for all our TVET graduates. We found that, the current level of

TVET graduates' soft skills is not up to what is expected from them. Our graduates face challenges that need to be resolved.

So, there is scope of further research to find the key soft skills essential for diploma engineers and appropriate pedagogical approaches that can be adopted in our teaching delivery method to incorporate soft skills. This is the main rationale of this study.

1.4 General Objectives of the study:

The main objective of this research is to find ways to integrate Soft Skills into Diploma in Engineering Curriculum. We tried to find the particular Soft Skills diploma engineering graduates need to possess, currently practiced pedagogical approaches that can enhance soft skills, and means to integrate Soft Skills into Diploma in Engineering Curriculum considering our context. Finally, provide some recommendations based upon the findings of this research.

Specific objectives of the study:

The general objective can be segregated into following specific objectives:

a) To identify the soft skills that are most relevant and essential for the Diploma graduates.

b) To explore existing pedagogical approaches employed in TVET programs to enhance soft skills.

c) To analyze the effective ways of integrating soft skills into Diploma in engineering curriculum through pedagogical approaches

Research Question: How to integrate Soft Skills into Diploma in Engineering Curriculum?

Specific Question:

The followings research questions are considered for our research:

1. What are the key Soft skills most relevant and essential for the Diploma graduates?
2. What existing pedagogical approaches are employed to enhance soft skills?
3. How can we integrate soft skills in Diploma engineering curriculum through pedagogical approaches?

1.5 Visible impact on TVET

In today's competitive world employers seek employees, who can ensure sustainability and continuous growth. For this reason job seekers need to develop some qualities like communication, leadership, situation handling, problem solving skills, etc. These qualities are referred as soft skills. Soft skills are a set of

interpersonal qualities that can help a person take challenges, adopt changes and handle exceptions.

Report on TVET graduate tracer study 2020 conducted by DTE shows that, a big number of their respondents are Not in Education, Employment, or Training. The report also shows that most of the graduates are employed in the private sector .This indicates that we need to equip our diploma graduates with these soft skills for better placement opportunities. These will not only lead to growth and development of individuals, but also in increasing efficiency of businesses.

In this modern age employability can be achieved with a combination of Education and Soft skills (Anjali Vyas (2019)). The soft skills elements are very important in order to produce skilled workers suitable with the industry. Our students' should have clear conception about the soft skills needed by industries.

Possible ways should be figured to cultivate soft skills into our diploma graduates. So that they can meet the expectations of the employers and cope with the fast changing work environment.

In this research we investigated the relevant soft skills for diploma graduates, reviewed the existing pedagogical approaches that helps foster soft skills and finally tried to identify the means to integrate soft skills into Diploma engineering curriculum.

The implications of this research will play significant role to increase quality and employability of diploma graduates and contribute in achieving self-reliance and becoming developed country by 2041.

1.6 Definition of operational Terms:

Soft skills:

Soft skills are learnt behaviors based on individual's predispositions that can be acquired from psychological traits, preferences, experience, and background, which makes their development slower and more complex than hard skills (Balcar, 2016).

The following are some branches soft skills essential for self-improvements.

Communication Skills: Effective verbal and written communication is essential for conveying ideas, collaborating with colleagues, and interacting with clients or customers.

Leadership: The ability to lead, motivate, and inspire others, as well as to delegate tasks and manage teams effectively, is highly valued in many industries.

Adaptability: Industries are constantly evolving, and employees need to be able to adapt to changes, learn new skills, and thrive in dynamic environments.

Problem-solving: The capacity to analyze problems, think critically, and develop innovative solutions is crucial for overcoming challenges and driving business success.
Collaboration: Working well in teams, being able to listen to others, share ideas, and collaborate effectively toward common goals are essential skills in many industries.
Creativity: The ability to think creatively, generate new ideas, and approach problems from different perspectives can lead to innovation and competitive advantage.
Emotional Intelligence: Understanding and managing one's own emotions, as well as empathizing with others, building relationships, and resolving conflicts constructively, are key aspects of emotional intelligence.
Time Management: Being able to prioritize tasks, manage workload efficiently, and meet deadlines is crucial for productivity and success in any industry.
Adaptability: In rapidly changing industries, the ability to learn quickly, adapt to new technologies, and embrace change is highly valued.
Resilience: The capacity to bounce back from setbacks, cope with stress, and maintain a positive attitude in challenging situations is important for long-term success.
Cultural Competence: In an increasingly globalized world, understanding and respecting diverse cultures, perspectives, and backgrounds is essential for effective communication and collaboration.
Networking: Building and maintaining professional relationships, as well as leveraging networks for career advancement and opportunities, can be crucial in many industries.

TEVT:

UNESCO (2015) defines TVET as education, training and skill development involving a wide range of occupational fields, production, services and livelihoods. It is a part of lifelong learning for recipients to acquire awareness, knowledge, skills and attitudes necessary for occupations in various sectors of economic and social life. It is a job-oriented training that is designed to develop the appropriate knowledge, skills, attitude and understanding in all recipients.

In Bangladesh, Primary responsibility for overseeing the Technical and Vocational Education and Training (TVET), is with two agencies: Directorate of Technical Education (DTE) and Bangladesh Technical Education Board (BTEB). DTE is responsible for setting the overall policy framework of the entire TVET system. BTEB, a statutory agency, is responsible for maintaining the qualifications framework for TVET: setting training standards and relevance to the labor market,

student assessment, certification of results, and accreditation of institutions. BTEB covers all accredited institutions, both government and non-government

BTEB is formulating a 4th Industrial-Revolution-based curriculum to prove its worth in line with the demands of the changing labor market. According to the curriculum prepared by BTEB there are 4 levels of TVET, which are - 1. Short course, 2. Certificate course 3. Diploma stage, and 4. Degree stage.

Courses in Diploma in Textiles, Diploma in Fisheries and Diploma in Agriculture Technology including Diploma in Engineering are running in various government and non-government institutions.

At present TVET in Bangladesh is going through various reforms to achieve demand driven curriculum and to improve industry involvement.

1.7 Diploma in engineering curriculum:

Bangladesh Technical Education board (BTEB) has developed 4 years long Diploma in engineering curriculum. It is designed to produce skilled Mid-level managers for the industries. BTEB has the sole responsibility for conducting update/modifications of the curriculum as per requirement. Curriculum is updated through a number of workshops were TVET practitioners and representatives from the industry take part.

Diploma in engineering courses are offered by 50 Government polytechnic institutes and 569 private polytechnic institutes. A total of 34 technologies are taught in Diploma engineering, namely- automobile, power, mechanical, architecture and interior design, computer science, telecommunication, ceramics, chemical, civil, electrical, electronics, electro medical, food, environmental, refrigeration & air Conditioning, surveying, etc.

The Diploma engineering curriculum finalized in 2022 is well formed and effective. It provides course structure of each technology is divided into two categories, technical subjects, and related subjects. There are also courses like economics, management, etc. For computer literacy computer office application is a completely practical course included in the curriculum. For professional development there is a course called innovation and entrepreneurship. This curriculum contains some courses that will help our students to develop soft skills besides hard skills. Besides these, there are many co-curricular activities like, different national day celebrations, scout, English club, Debate club, Science club etc. There is a scope developing language and communication skills through courses like Bangla and English.

Pedagogical Approach:

Pedagogy is the art and science of teaching. It can be refers to the way of teaching students. It is a relationship between the culture and techniques of learning.

The main aim of pedagogy is to build on previous learning of the students and work on the development of skills and attitudes of the learners. It makes the students understand the subject and helps them to apply their learning outside of the classroom.
The five major approaches are Constructivist, Collaborative, Integrative, Reflective and Inquiry Based Learning.

Constructivist:
In this approach, the students are allowed to be present in the process of understanding and gaining knowledge rather than just passively receiving information. This encourages critical thinking among the students and gives a learning environment in which they can connect with what they are hearing.
Collaborative:
Here, the students form groups of learners that learn together and work to solve a problem, build strategies, ideas, create products or complete a task. This is a joint intellectual effort by the students among themselves or with the help of the teachers.
Integrative:
For the integrative approach, the students are given a learning environment that helps them in connecting with their learning across the syllabus. The four objectives of integration include-

- Understanding the process of learning
- Differentiating issues by relevance
- Making use of the lessons in practical scenarios
- Associating the concepts in regular lives

Reflective:
As per the reflective approach, the students are expected to evaluate themselves. It means observing the activities of the teachers and other students in the classroom and analyzing why they do it and how it works.
Inquiry-Based Learning:
In the inquiry-based learning method, the educators are expected to not just answer the queries of the students, but also build a culture where their ideas are explored, challenged, improved, and refined. It aims to take the students from the position of wondering about a question to understanding the answer and then questioning it further.

1.7 Outline of the Report:

This report consist of total five chapters. The outline of the following chapters are given below.

Literature Review: In the 2nd chapter of this report the relevant literature review is depicted in. Secondary sources of data was analyzed to find answer of our research questions. This study reviewed various national policies, Diploma engineering curriculum, syllabus, course structure, related journals and articles.

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Methodology: It reveal the details of methodology of the study. Details of research design, sample size, target population, sampling techniques, data collection tools. Ethical considerations, limitations are discussed here.

Results and interpretations: The results and findings of the research.

Conclusion: This is the last chapter of this research report. Findings, contribution to the knowledge, implications of this research, limitation and future scope for research is discussed here.

Chapter 2: Literature Review

All over the world technological advancements are changing job roles and requirements. To keep pace with this transition, our workforce need to be equipped with technical skills and some generic skills commonly known as soft skills. 4-year long Diploma in engineering is awarded in a specific branch of engineering aimed to make efficient supervisor and mid-level manager. With the development of technology, huge changes in the workplace are faced by diploma graduates

2.1 Essence of Soft skills:

Now a day's education is not just academic learning, it is the development of professional and vocational skills, and the soft skills that will allow these to be used productively (Wijensingha, 2010). Harvard University reported that 85% of success at the work place is attributed to Soft skills and only 15% to technical skills.

Top 15 skills for 2025 was ranked in Future of jobs report (2020). They are (1) analytical thinking and innovation, (2) active learning and learning strategies, (3) complex problem solving, (4) critical thinking and analysis, (5) creativity, originality and initiative, (6) leadership and social influence, (7) technology use, monitoring and control, (8) technology design and programming, (8) emotional intelligence, (9) resilience, stress tolerance and flexibility (10) reasoning, problem solving and ideation.

In his review article S. Vasanthakumari (2019) stated that, Soft skill is an umbrella term for skills under three key functional elements: people skills, social skills, and personal career attributes.

Soft skills are fundamental set of skills for preparing students for life long and work in today's global world. Knowledge, innovation and creativity play key functions in developing human capital, which is a core driver of economic progress and sustainable development globally. These skills include analytical and problem-solving skills, numeracy, confidence, time management, team working, communication skill, information technology, and monitoring skills. (Learner, 2012). According to Toland (2011), soft skills are non-discipline specific, economically valuable skills required to get initial employment, progress in a job, as well as securing another job when desired. These skills are professional competency sought after by employers which students are helped to develop alongside subject/discipline. So, there is a growing recognition of the importance of soft skills in the professional success of TVET graduates. Soft skills encompass a wide range of interpersonal, communication, and problem-solving

abilities that contribute to individual employability, adaptability, and overall career growth.

The WEF report also identifies the top 10 skills that will be in demand in the job market by 2025. The list includes critical thinking and analysis, problem-solving, creativity, leadership and social influence, technology use and monitoring, resilience, stress tolerance and flexibility, emotional intelligence, reasoning, and complex problem-solving. These skills require individuals to up skill and re skill regularly to keep up with the rapidly changing job market.

2.2 Why soft skill is important:

The Fourth Industrial Revolution (IR 4.0) has changed the nature of work and job roles with the increasing use of automation, artificial intelligence, and other digital technologies. Productivity, efficiency are increased by these changes but at the same time they also present challenges and competitiveness but for diploma graduates.

The World Economic Forum (WEF) report (2020) shows that by 2025, 85 million jobs may be displaced by a shift in the division of labor between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labor between humans, machines, and algorithms. This shift in the job market highlights the need for individuals to up skill and deskill to remain competitive.

Cole (2011) recommends five soft skills every leader should practice: sensitization to follower expectations, inspiring others, building positive effects, communicate and listen and individuation. It is observed that different authors adopt different types of soft skills in their studies to measure the degree of soft skills competence. The implementation of soft skills for academic programs are very important. However, in recent times many of the graduates produced by higher education have no work skills required by the industry. So, there exists a gap in the preparation of graduates who meet the needs of the industry (Studies by Stanford Research). A public interest study conducted by McDonald's in UK predicted over half a million people will be held back from job sectors by 2020 due to lack of soft skills.

Institute and the Carnegie Mellon Foundation among Fortune 500 CEOs established that 75% of long term job success resulted from soft skills mastery and only 25% from technical skills. Researchers at Boston University, University of Michigan's Ross School of Business found that workers with soft skills training are 12% more productive than those without them. Many surveys show that Communication skills is the main soft skills required by industries followed by team work, motivation and negotiation.

2.3 Soft Skills for Diploma Engineers:

The selection of soft skills needed for a particular profession depends on the nature of the profession and the culture (Ketter, 2011). Mrs. Anjali Vyas (2019) marked interpersonal skills, leadership skills, conflict management skills, strategic skills, adaptability skills, presentation and decision making skills, etc as the most demanding soft skills for management students. She suggested that, these can be instilled within the students by brainstorming, role playing, seminars, conferences, case studies, workshops and adding of soft skill courses.

A study of Infographic(2020) identified 10 Characteristics of Successful Engineers Teamwork, Continuous learning, Creativity, Problem solving, Analytical ability, Communication skills, Logical thinking, Attention to detail, Mathematical ability, & Leadership.

An European union funded report titled "The pedagogical basis to teach and assess soft skills" stated that, teaching and evaluation of soft skills, and their incorporation into the curriculum, can be done by: (a) As separate courses for students, or long-life courses to employees; (b) As specific subjects within the curriculum and (c) Incorporation in the teaching and evaluation methods of hard skills.

Ashok Kumer (2022) stated that, Students should acquire soft skills both for the benefit of their education and for the sake of their professional employment since they are directly related to greater academic accomplishment. Students who acknowledge the importance of soft skills early on are better able to master their studies, finish their student obligations with ease, make more connections with people who may be important in the future, as well as present themselves more effectively to professors who may play a key role in their career prospect.

Mrs. Jane Itohan Oviawe (2020) showed that, TVET teachers should balance direct instruction with project-oriented instructional delivery. They should illustrate and put to practice how a deeper understanding of subject matter can actually promote problem-solving, critical thinking, creativity, communication, teamwork, etc. the study suggested to introduce Cooperative Learning Model, Integrated and contextualized Learning Approach, Providing spaces for social activities and Use of technology in TVET system to incorporate soft skills.

Mohamad, M.M (2017) stated that, the mastery of soft skills among students should be imbued to produce graduates who are not only proficient in technical fields but also high value of soft skills in producing workforce to develop the country in the future. The study showed that differences in the level of mastery of soft skills happens as a result of different methods of application of

creative lecturers as well as the diversity of the level of intelligence of students in mastering the soft skills. In classroom activities students should understand the relevance of soft skills when the curriculum assessment distribute into few parts will cover the soft skills element. The teaching and learning activities in the classroom such as presentations are able to improve the quality of communication skills as well as presentation of students especially in accuracy and feedback when discussions take place. Creative thinking skills also can be applied through the working in group because the group assignment given by a lecturer more challenging than individual assignment. This situation requires that each student discussing with a friend in the group solving the assignment. Creative thinking skills will also be one of the criteria in obtaining jobs. Interpersonal skills require student must be very high internal motivation, courage and independent for their self-development. It also relates to decision making skills and it will create very effective working environment.

Helen Akolgo-Azupogo exhibit a conceptual base and showcase a range of examples, mainly on Africa, where improvement of soft skills has not only helped individuals and businesses but entire sectors of the economy.

To cope with tomorrow in sustainable ways, teachers need to offer teaching of creativity and soft skills more critical place in education and individual lives. This can be achieved by enhancing the development of soft skills.

2.4 Integrating Soft Skills in Diploma in Engineering Curriculum:

In today's dynamic professional landscape, engineers are not just required to possess technical proficiency but also a spectrum of soft skills to effectively navigate complex work environments. However, traditional diploma in engineering programs often prioritize technical knowledge over soft skills development. According to LinkedIn's 2019 Global Talent Trends report (The Importance of "Soft Skills" In Today's Workplace, Ray Williams), 92% of talent professionals and hiring managers say that soft skills are just as important–or more important–than hard technical skills. Research conducted by Harvard University, the Carnegie Foundation and Stanford Research Center has concluded that 85% of job success comes from having well-developed soft and people skills, and only 15% of job success comes from technical skills and knowledge.

World Bank's skills survey report (March, 2018) shows that, critical thinking, problem solving, leadership, communication, work ethics, and team work are becoming essential and highly demanded by employers in Bangladesh. In the tracking survey from employers shows that, numeracy skills, English skills of polytechnic graduates appear to be satisfactory and problem-solving skills and communication skills for workplace are area need to be developed.

Technical and Vocational Education and Training (TVET) institutions play a crucial role in equipping students with the necessary technical skills for the workforce. However, in today's dynamic and competitive job market, employers also demand strong soft skills from potential employees. According to a survey by Talent Q, "nine in 10 employers believe that graduates with soft skills will become increasingly important." (The Importance of "Soft Skills" In Today's Workplace, Ray Williams). Another study on 'skills employers look for' conducted by zety shows that the employers give emphasize 61% on soft skills for the time of recruitment.

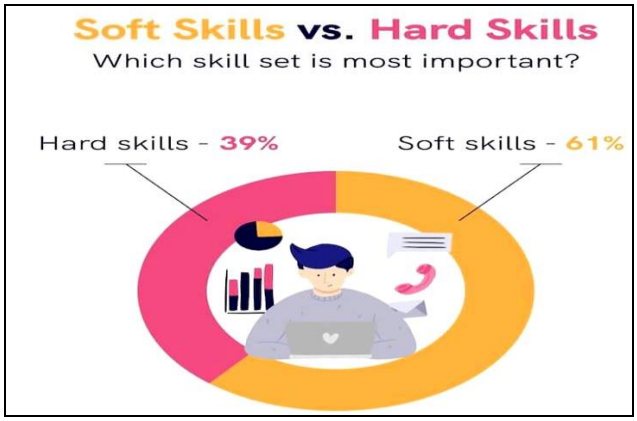

Figure 2.1: ***Essential-soft-and-hard-skills-most-valued-by-recruiters***

Source: https://www.humanresourcesonline.net/10-essential-soft-and-hard-skills-most-valued-by-recruiters

According to Charles M.M. Ondieki (2019), the failure of TVET institutions to provide life skills results in graduates who, even when they have the requisite technical skills, are not able to succeed at work or in developing their own business and lack the resilience to recover from inevitable setbacks. This has in turn led to employers who are usually deeply dissatisfied with the public TVET system and often must invest their own resources in training their staff. The study suggested integration of Life Skills in TVET curriculum, the teaching and learning process, and assessment method

Today education is not just academic learning, it is the development of professional and vocational skills, and the soft skills that will allow these to be used productively (Wijensingha, 2010). In his review article S. Vasanthakumari (2019) stated that, Soft skill is an umbrella term for skills under three key functional elements: people skills, social skills, and personal career attributes. Researchers at Boston University, University of Michigan's Ross School of Business found that workers with soft skills training are 12% more productive than those without them.

The integration of soft skills, including communication, teamwork, problem-solving, and adaptability, into the Diploma in engineering curriculum is

essential to prepare graduates for success in the modern workplace. Producing engineering graduates equipped with a well-rounded skill set, enhancing their employability and career prospects.

These skills are fundamental for all individuals who hope to participate in the global labor force. The need for promoting soft skills in TVET is to participate meaningfully in this continuously changing dynamic global workplace.

TVET graduates need to adapt to the 'new' almost daily like new ideas, new behaviors, new application or a new way to learn are happening globally.

TVET teachers should incorporate opportunities for practicing soft skills because they have the power to transform the quality of instructional delivery in all classrooms across all subjects (Fisher & Berliner in Gerenstein, 2016).

The integration of soft skills into diploma in engineering education has gained significant attention in recent years, aiming to produce well-rounded graduates capable of thriving in diverse workplace environments. The strategies to integrate soft skills into diploma in engineering education may be:

Fostering a more collaborative and innovative engineering culture within educational institutions and the broader industry.

Embedding soft skill development throughout the existing engineering courses rather than adding separate modules.

Incorporating project-based learning, case studies, and interdisciplinary projects to promote teamwork, communication, and problem-solving skills.

Providing training and workshops for faculty members to enhance their understanding of soft skills and incorporate them into their teaching methods.

Encouraging collaboration between engineering and humanities/social science departments to leverage expertise in soft skill development.

Implementing a variety of assessment techniques, including peer evaluations, self-assessments, and rubrics tailored to assess soft skill proficiency.

Using real-world scenarios and simulations to evaluate students' application of soft skills in practical settings.

Collaborating with industry partners to identify the specific soft skills required in the workplace and aligning curriculum objectives accordingly.

Providing internship opportunities and industry projects to allow students to practice and refine their soft skills in a professional setting.

2.5 Pedagogical Approaches for integrating soft skills:

The integration of soft skills training into TVET programs not only enhances the employability of graduates but also equips them with the necessary tools to adapt and thrive in an ever-changing workplace environment. Ultimately, a pedagogical

approach that combines technical proficiency with robust soft skills can contribute to the holistic development and success of TVET students. These approaches are based on existing research and best practices up until September 2021. Here are some key pedagogical approaches:

2.6 Integrate soft skills into Curriculum Design:

Charles M.M. Ondieki, Ndungu Kahihu, Sharleen Muthoni conducted a study named "Integration of soft skills Into the TVET curriculum in Kenya" published in 2019. The study explores failure of TVET institutions to provide life skills results in graduates who, even when they have the requisite technical skills, are not able to succeed at work or in developing their own business and lack the resilience to recover from inevitable setbacks. This has in turn led to employers who are usually deeply dissatisfied with the public TVET system. The objective of this research was to test the potential for integrating life skills curriculum in the public TVET system by introducing the module to a selected number of Vocational Training Centers in Kenya and assessing the impact on beneficiaries' learning and course completion outcomes against a chosen control group. Generally, there was a positive trend with the treatment group, which can be attributed to the life skills that had been offered to the students. The difference in proportion of change between the treatment and control groups was significant and the direction towards the predicted change indicated that the life skills training had a positive impact on the youth.

Embedding soft skills development within the existing technical curriculum by incorporating specific modules or courses dedicated to soft skills training.

Experiential Learning: Providing hands-on experiences, practical activities, and real-world simulations that allow students to apply their technical knowledge and develop soft skills in authentic contexts.

Problem-Based Learning: Engaging students in problem-solving activities, case studies, and projects that require them to collaborate, communicate, think critically, and make informed decisions.

Collaborative Learning: Encouraging teamwork, group projects, and cooperative learning activities to enhance interpersonal skills, communication, and the ability to work effectively with others.

Role Plays and Simulations: Using role plays, simulations, and scenario-based activities to simulate workplace situations and help students practice communication, problem-solving, and decision-making skills.

Communication Skills Development: Incorporating activities that focus on oral and written communication, such as presentations, debates, discussions, and

writing assignments, to improve students' ability to express ideas clearly and effectively.

Reflective Practices: Promoting self-reflection, critical thinking, and meta cognitive strategies to help students develop self-awareness, identify areas for improvement, and engage in continuous learning.

Industry Engagement and Internships: Facilitating partnerships with industry stakeholders, employers, and professionals to provide students with real-world exposure, mentorship, and opportunities to apply and develop their soft skills in professional settings.

2.7 Roles of TVET Teachers in developing Soft Skills:

According to International Educational Advisory Board (IEAB, 2015) today's students spend five to six hours each day saturated in social media, print, electronic, digital, broadcast and news media. They listen to and record music; view, create and publish Internet content; play video games; watch televisions; talk on mobile phones and instant message every day. Indeed, they are more concern with how to download, upload, share files and take selfie pictures. So, the students of this generation are surrounded by digital media. ICT has always been part of their lives. They prefer to use the internet in searching for information globally to learn about new things. They are naturally incline to it. These inherent attributes of today's students make it imperative for the global teachers to look for innovative ways of enhancing the development of the soft skills among TVET students. Stubbs (2013) identified some tips to promote students' learning experiences among TVET students towards developing soft skills. Such as: Focus on the soft skills, content knowledge and expertise, Build understanding across and among academic programs, Emphasize deep understanding rather than shallow knowledge, Engage students with real world information, tools and experts they will encounter in schools, in the world of work and life. Soft skills are not actually a new concept. This can be done through the application of innovative teaching methods. Instructional method for fostering soft skills should be the reverse classroom methodology which focuses on developing global learners and soft skills by incorporating the use of technology, creativity, research inquiry, and self-management. By combining these strategies, the teacher is able to create a classroom that differentiates instruction, accommodates diverse learning styles and ability levels.

Today's teachers have greater advantage than teachers of yesterday. Because today's teachers are always in pace with the rapid changes in the global world. Cox (2016) stated that the global teachers are aware of the ever-

changing trends in technology and are in tune of what the future may bring to education. These teachers keenly look forward for novelty and are very concern with ICT tools and facilities that can assist their students become skilled better and acquire knowledge faster, certainly, they are concern with how to transform the instructional environment. They are familiar with the most excellent ICT tools and how, when and where to apply them. Palmer (2015) stated that any teacher to qualify as a global teacher who is capable of producing global students, he/she must demonstrate the following attributes: Adaptive and innovative, Learner-Centered, Lifelong learner, Collaborate effectively with others, Use the social media, Go digital etc. The soft-skills development of a modern teacher includes the following components: communication skills, critical thinking, self-control skills, professional flexibility and compliancy, emotional competence, leadership, teamwork, social harmony, and social contacts (Developing Teachers' Soft Skills within the New Educational Paradigm: Competences, Values, Indicators, Results, Acta Paedagogica Vilnensia, vol. 49, pp. 23-42, 2022)

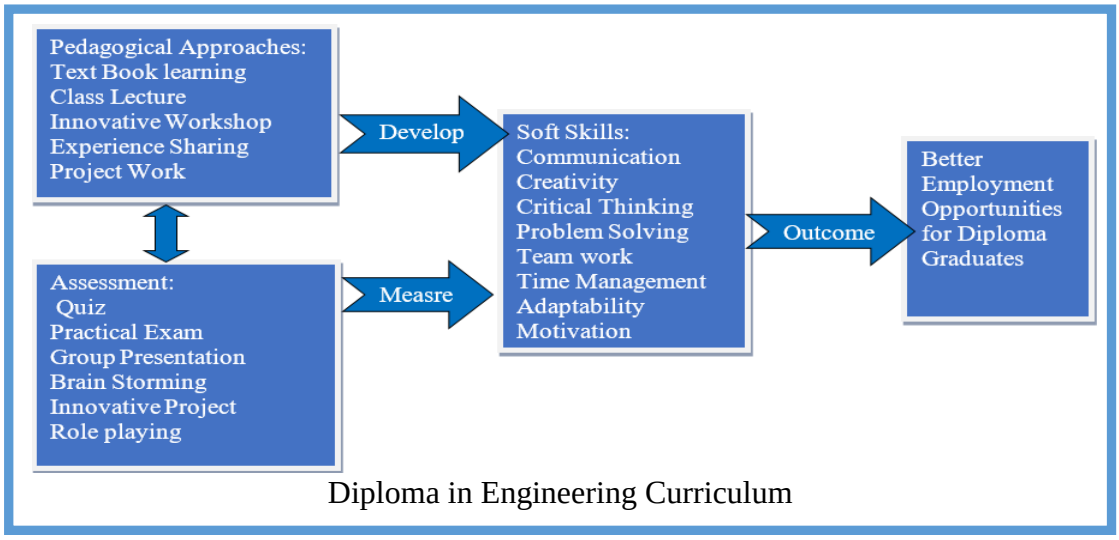

Figure 2.2: ***Conceptual framework of the research***

2.8 Conceptual Framework of the Research:

This study aims to investigate and identify effective pedagogical approaches for enhancing the soft skills of TVET students in Bangladesh. By understanding the most valued soft skills in the local job market and evaluating existing pedagogical approaches, this research will provide valuable insights and recommendations to enhance the quality of TVET education in Bangladesh and improve students' employability prospects in the country's workforce.

Figure 2.1 shows the conceptual design of the research. Here Pedagogical approaches and Assessment techniques are independent variables, soft skills are the mediator variables for the better employability opportunities for the diploma graduates (dependent variable).

Chapter 3: Methodology

This chapter discusses the Methodology of this research. In the next sections research design, Scope of the study, Sample and sample size, Data collection tools, methods of data analysis are discussed.

3.1 Research Design:

This is a social research conducted in mixed method, with an objective to find the Pedagogical approaches to integrate Soft skills into the diploma engineering curriculum. By analyzing the subject, the research considered three dimensions – essential soft skills for diploma engineers, existing pedagogical approaches and means to integrate soft skills into diploma in engineering curriculum.

To address the problem, the study has gone through both primary and secondary data sources. The Polytechnic graduates, teachers, principals, employers, industry representatives and representatives of the concern agencies including DTE and BTEB were considered as primary data source. For secondary data source Diploma in Engineering curriculum, course structure, different national policy papers and related research and survey papers were reviewed as secondary literature.

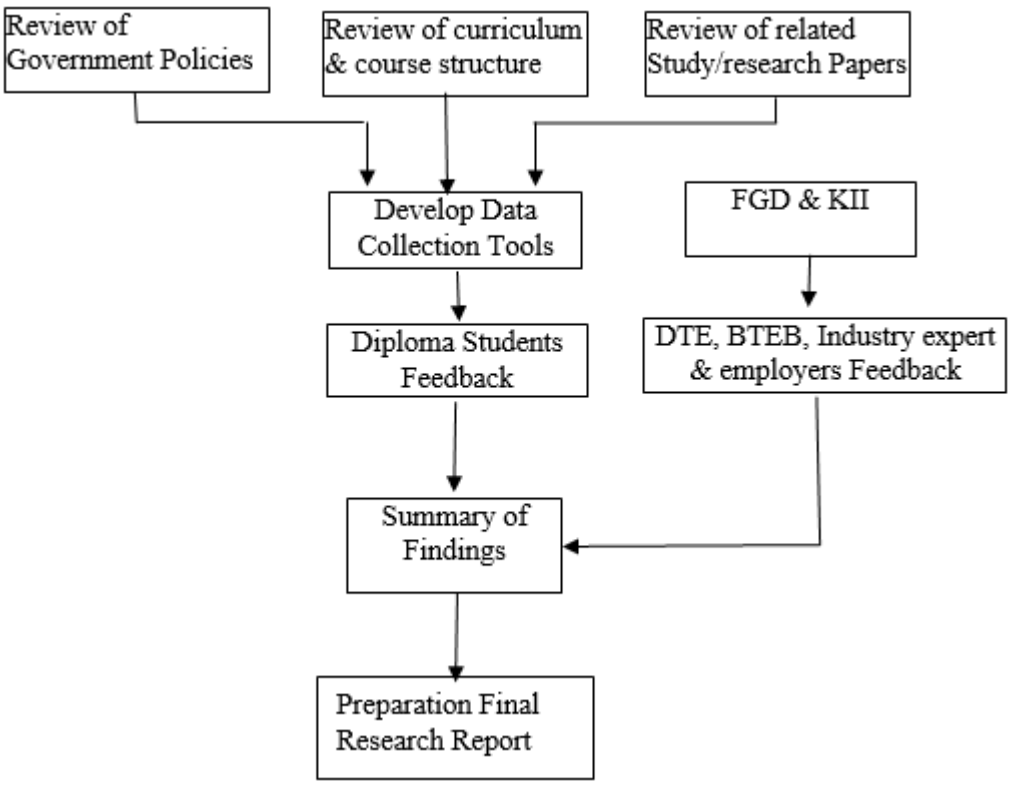

Figure 3.1 Research Design

The Research design was developed as shown in Figure 3.1 to begin the study. Relevant Government policy papers, Diploma engineering curriculum, course structure, related papers, articles and journals were reviewed to gather initial knowledge. Data collection tools for conducting survey, FGD and KIIs were designed. Separate questionnaire was designed for diploma graduates and Faculty members of Diploma Engineering institutes known as Polytechnic institutes. Different FGD checklist were prepared for different stakeholders from DTE, BTEB, polytechnic teachers and industry representatives. Different polytechnic institutes were visited physically to collect the student feedback and to conduct the FGDs with the faculties & principals. For reaching the diploma engineers and collecting their feedback, we took help of Google form. The passed out graduates were tracked with the help of the respective polytechnic institutess using email, social media and other communication Medias.

Some industries were visited to get their feedback and conducted online zoom meetings to conduct FGD with BTEB & DTE officials. KIIs were done face to face with the high officials and employers.

After the data collection, the data was posted into SPSS software for statistical analysis. Descriptive analysis was done.

This research is to identify the suitable ways to integrate soft skill into Diploma Engineering curriculum. It will also tend to find specific soft skills required for Diploma Engineering graduates for better placement and existing pedagogical approaches that helps to enhance students' soft skills and finally means to integrate soft skills into the curriculum.

By nature this research is a qualitative social survey. The study conducted in six different districts of Bangladesh. To ensure better participation the study selected equal six number of Government and private polytechnic institutes from six districts - Dhaka, Cumilla, Tangail, Rajshahi, Chapainawabganj and Naogaon.

3.2 Scope of the Study:

The scope of this study can encompass various aspects. There are some potential areas of investigation: soft skills assessment of TVET graduates, integration of soft skills into TVET curriculum, effective teaching and learning strategies for developing soft skills in TVET programs, collaborative efforts between TVET institutions and industries to foster the development of soft skills in graduates, conducting longitudinal studies to track the career trajectories of TVET graduates in IR 4.0 industries and best practices and case studies of TVET institutions or organizations that have successfully integrated soft skills development into their programs. Hence the principal scope of this study is to mitigate the gap

between TVET institutions (polytechnic) graduate and industrial soft skill demand. This research will be a document to improve the quality of TVET graduates. This study will assist to take measures to incorporate soft skills in the traditional institutional delivery process.

Overall, the aim of this research to provide evidence-based insights, practical recommendations, and actionable strategies that can enhance the preparation and competitiveness of graduates in the evolving job market

3.3 Sample and Sample size:

Focus group discussion with different industries was conducted. For data collection three technology from each polytechnic institute were considered. Three students and six passed out graduates of each technology from each institute were targeted for survey. Civil, Electrical, Computer science, Electronics, Food, Refrigeration & Air Conditioning, Mechanical, Power and Textile Technologies were considered as different disciplines of diploma engineering.

Table 3.1: ***Sample size & Technique***

Data Source	Sample Size	Sampling Technique	Tools Used
Diploma graduates	132	Snowball	Survey questionnaires
Polytechnic Institute faculty	128	Conveniently	Survey questionnaires
Head of polytechnic institute	12	Conveniently	KII
Employers	5	Conveniently	KII
Industry Representatives	30	Conveniently	FGD
BTEB Representatives	5	Conveniently	FGD
Officials of DTE	5	Conveniently	KII/FGD

3.4 Sampling Techniques:

Diploma Engineering courses are offered by Polytechnic institutes. There are 50 public and 569 private polytechnic institutes operating under the supervision of Bangladesh Technical Education Board (BTEB).

To conduct this study we needed to select polytechnic institutes as primary data source. According to our research design we need to survey the Diploma Engineering faculties and graduates to reveal the answers to the research questions.

In this study, Convenient Sampling procedure have been chosen as sampling technique for sampling the diploma engineering institutes (Polytechnic

institutes). Due to geographical proximity, availability at the given time. Also this method is cheap, simple and easy to implement.
Reaching the Diploma graduates were another challenge for the researchers. Snowball sampling were chosen to reach the graduate respondents. Because, it allows the researcher to reach populations that are difficult for other techniques. The process is cheap, simple cost-efficient and needs little planning and fewer workforce.

3.5 Data collection Tools:
Survey questionnaires, focus group discussion (FGD) and Key Informative interview (KII) were conducted as data collection tools.
Survey questionnaire:

Separate survey questionnaires were developed for collecting data from the diploma graduates. Each questionnaire contains three sections. First section gives the consent and introductory information of the population like name, gender, status, etc. Second section contains the Essential soft skills for diploma engineers Existing pedagogical approaches are employed to enhance soft skills. The last section Integration of soft skills in Diploma engineering education through pedagogical approaches

To communicate and taking feedback from the diploma graduates For collecting data from graduates, a Google form containing the survey questionnaire were developed. Sample survey questions are attached with this report.
Focus Group Discussion (FGD):

The study organized FGD with Faculties of polytechnic institutes, representatives of different industries, related personnel of Bangladesh Technical Education Board (BTEB) and Directorate of Technical education (DTE).
Key Informative Interview (KII):

KIIs were conducted with Principals of the selected 12 Polytechnic Institutes- Alhaj Ayesha Khatun Polyticnc Institute, Ahsanullah Institute of Technical Education and Training, Graphic Arts Institute, Bangladesh Institute of Glass and Cermics, Cumilla Polytechnic Institute, CCN Polytechnic Institute, Tangail Polytechnic Institute, Institute of Business and Technology, Rajshahi Polytechnic Institute, Rajshahi Mohila Polytechnic Institute, Naogaon Polytechnic Institute, Chapainawabganj Polytechnic Institute,

Director (Planning & Development) of DTE, Principal (Technical Teachers Institute), TVET Specialist, Director (Curriculum) BTEB also took part in KII.

Head of HR, Fair group, Head of HR & Production Manager, DAN Cake, Head of HR, Confidence group, Director, Meghna Group toojk paart in KII as industry representatives.

3.6 Use of Data collection Tools

For primary data collection, the study gathered feedback form both current students and passed out graduates of the total twelve selected polytechnic institutes through survey questionnaires. FGDs and KIIs were done with Principals, employers, industry representatives and representatives of the concern agencies including DTE and BTEB.

For secondary data collection this study reviewed various national policies, Diploma engineering curriculum, syllabus, course structure, related journals and articles.

Survey Questionnaire for Diploma Graduates:

Survey Questionnaire for Diploma Graduates were developed to identify the experience of polytechnic institutes for diploma graduates and their recommendations for inclusion of soft skills in their diploma curriculum.

Survey Questionnaire for Diploma Teachers:

Survey Questionnaire for Diploma teachers were developed to identify opportunities for skill development of students in existing curriculum in Diploma Engineering, different learning methods, required training of instructors, their experience and their recommendations for inclusion of soft skills in their diploma curriculum.

Focus Group Discussion:

Focus group discussion was conducted with representatives of diploma engineer recruitment industries, Directorate of Technical Education and Bangladesh Technical Education Board. The representatives of the industrial institutes gave feedback on their expectations to the diploma engineers, applicable qualifications, terms and conditions and their experience. The officials of the Bangladesh Technical Education Board and Directorate have given opinions on the current curriculum, teachers' training, government's future action plan, communication with the domestic and international labor market and other issues.

Key Informative Interview (KII):

Director (Planning and Development) of DTE, Director (Curriculum) of BTEB, principals of selected polytechnic institutes and important persons involved in the recruitment process of industrial institutions were interviewed.

3.7 Data Analysis Techniques:

For the Data analysis of this research, initially coding the Questionnaires were done and separate SPSS files were created for data entry from graduate and teachers questionnaire. After Data entry, Data cleaning and validation was done carefully. Tabulation of data were completed and tabulated data were analyzed according to

analysis plan. The results of data analysis was shared with DTE. • Presentation on draft report Transcription of KIIs and FGDs • Content Analysis of qualitative data

SPSS (Statistical Packages for Social Scientist) method is applied for data analysis of this study. Analyzing through SPSS will help to know the rank of challenges to acquire soft skills besides competencies for TVET students. Findings will be presented in tabular form. Different types of chart or bar diagram can be used to present the analysis.

3.8 Ethical Consideration

There five principles for Ethical considerations in research designs and practices. These includes voluntary participation, informed consent, anonymity, confidentiality, potential for harm, and results communication.

Voluntary participation

Voluntary participation was insured in this research. At the beginning of our questionnaire the purpose and scope were disclosed and consent was taken. Respondents were not forced to participate or pressured into doing anything they didn't want to.

Informed consent

Informed consent were taken from all our Survey respondents in the survey questionnaire. For conducting FGD and KII official letters were issued to the participant organizations informing about the scope of the study, Contact information for the researcher and with sample FGD/KII Check lists.

Reiteration of the participant's right to withdraw from the research project at any time without penalty was ensured in the data collection instruments.

The best way to go about this is by using a consent form. Make sure you

Anonymity

Anonymity means that participants aren't identifiable in any way. This includes: Name, Address, Email address, Photographs etc.

Name, Address, Email address of our respondents were taken for further calcification of their opinions (if required). But, to anonymize research data digital ID for participants were created so that, it can't be traced back to individual participants.

Confidentiality

Confidentiality helps to protect the privacy of research participants. Information gathered during this study is kept confidential. The respondents' information isn't disclosed to unauthorized individuals.

Potential for harm

The potential for harm is a crucial factor in deciding whether a research study should proceed. An ethical review was conducted to identify possible harms like-

Psychological harm, Social harm, Physical harm and Legal harm. As we are conducting a survey research for quality improvement of the diploma engineers there is no such potential harms.

3.9 Limitations of the study

This study was conducted under the direct super vision of DTE research cell, within given timeline and budget. Limitations of the study are as follows:

Sample size and representativeness: Limited sample sizes and representativeness, which may not adequately represent the entire population of TVET graduates. A small sample size can affect the statistical power and generalizability of the findings. Additionally, the characteristics and demographics of the selected sample may not fully reflect the diversity of TVET graduates.

Self-reporting bias: Self-reported data from participants, which can introduce biases. Participants may overstate or understate their skills, leading to inaccurate results. Social desirability bias may also impact responses, as participants may provide answers they believe align with societal expectations.

Measurement challenges: During this study we use various assessment methods, such as surveys, questionnaires, or observations, but these methods may not capture the complete complexity and nuances of soft skills. Additionally, the validity and reliability of these measurement tools can vary.

Industry relevance: This study was focusing on specific sectors or technologies which may not fully capture the diverse challenges and soft skill requirements across various industries. Therefore, it's crucial to consider industry-specific context and collaborate with different sectors for a comprehensive understanding.

Timeframe: This research was conducted within a short period which may not capture the long-term impact of soft skills on graduates' career success and adaptability. So it’s needed more time for rigorous consultations and workshops.

External factors: Curriculum is vast topic for research. Curriculum development does not occur in isolation but it involves series of works including workshops, consultation with validation and fine tunings.

Chapter 4: Results and Interpretation

This chapter reveals the results and interpretation of all three research questions of our study, on the basis of data collection using different tools of data collection. In this process here we tend to present the results and findings regarding the research questions regarding soft skills required for the diploma engineering graduates, existing pedagogical approaches and possible ways.

Pedagogy plays an important role to help teachers understand the best ways to conduct a classroom. It gives them insights into how students learn differently in different topics so that they can conduct lessons to suit these needs. It aims to improve the quality of education for students.

The curriculum is the content you teach in traditional education, while pedagogy is how you teach it. In education, pedagogy and curriculum blend as understanding how to teach and why you teach in a certain way.

4.1 Essential soft skills for diploma graduates:

Soft skills are particular abilities that can improve one's employment performance and career prospects. Soft skills help students develop their employability skills and make them confident to work in a performance oriented work environment as a critical lifelong learner.

To discover the most valued and essential soft skills required for the diploma graduates we surveyed the Diploma Graduates experience about Skills asked in job circulars, their nature of work, Workplace environment, and Challenges they face.

The majority of our diploma graduate respondents agree that soft skills are most important for the kind of employment that TVET graduates are hired for. Almost 78 percent students ranked communication skill as the most important soft skill. Communication skills are crucial in both personal and professional context, enabling individuals to convey ideas effectively, build relationships and achieve goals.

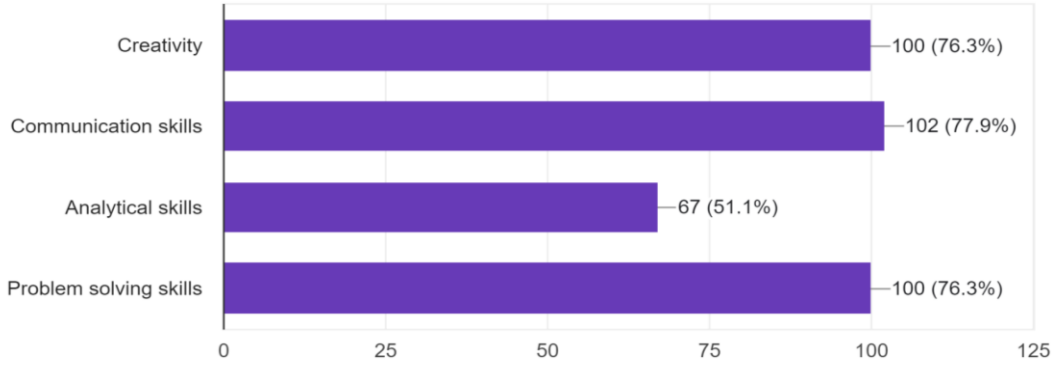

Figure4.1: Most valued soft skills for the diploma graduates

4.1.1 Skills asked in job circulars

In this era technical or hard skills are not the only requirements that need to be full filled to get a decent job. As employers seek special qualities from the candidates that will give their company stability and sustainability.

In this challenging situation it is no longer sufficient for our diploma graduates to have only knowledge of an academic subject. "It is required for student to increase the skills which will enhance their prospect of good employment"(RAJ, W., 2012).

In response to a question asked about the skills asked in the job circulars for diploma engineers our respondents mostly voted for practical skills, followed by communication, computer literacy and English Proficiency. Most of the graduates (78 %) respondent agreed that soft skills are asked in job circulars besides practical skills. English speaking, computer literacy, communication skill and leadership are the most preferred soft skills for the employers. 51 percent students mentioned that communication skill is asked in job circulars.

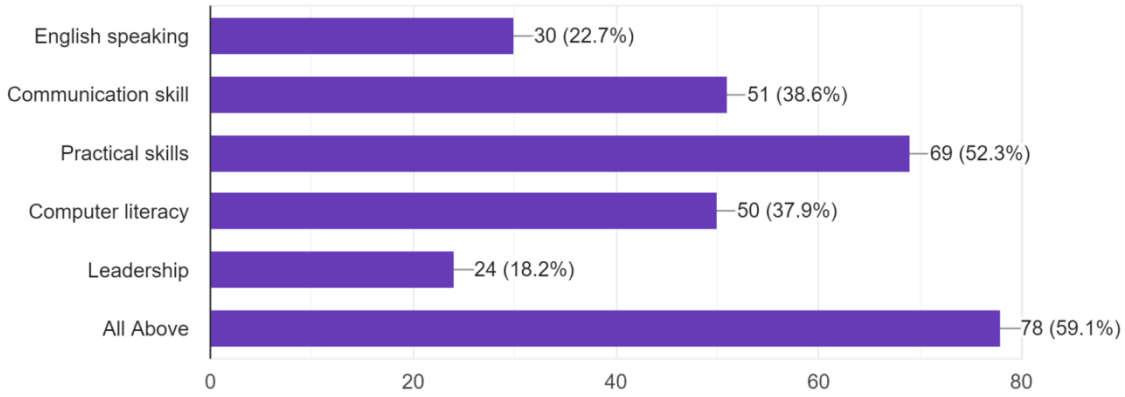

Figure 4.2: Skills asked in job circulars

Graduates described a combination of technical skills and soft skills required for the job. 50 percent graduates said that a balanced combination of technical skills and soft skill required for the job vacancies.

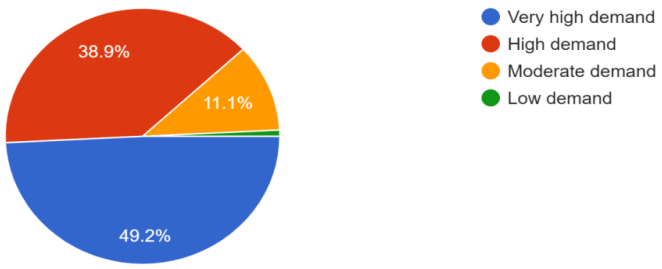

Figure 4.3: Combination of technical skills and soft skills required for job

Graduates' feedback about which Soft skills are demanded in job circulars for diploma engineers' recruitment is shown in the following figure. Technical expertise, communication skills, digital literacy are found in job circulars.

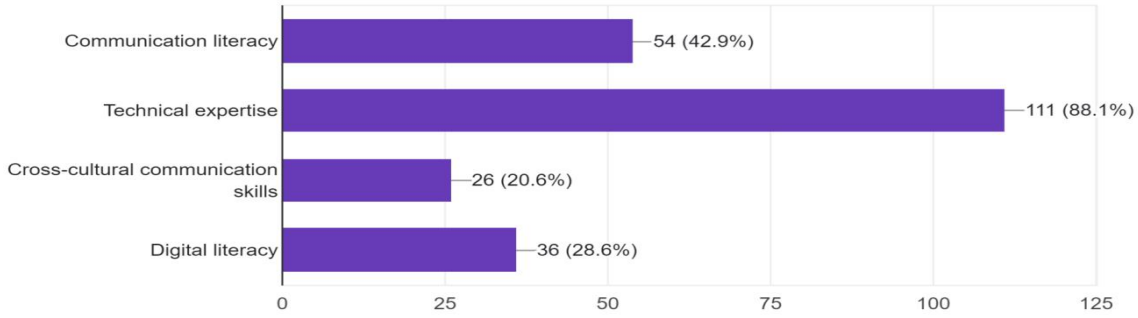

Figure 4.4: Soft skills asked in job circulars for diploma engineers' recruitment

4.1.2 Nature of Work:

Nowadays, the demand for the development of the personalities of children is more than ever visible. Alongside with the established requirements for educational institutions to acquire knowledge, competencies, and abilities, employers seek the so-called 'soft' skills of students and graduates. This is expressed in an increasing demand for unconventionally-thinking teachers who can respond flexibly to changes in the professional environment, who can conduct constructive dialogue, creatively solve pedagogical problems, etc. In this regard, in diploma education, it is necessary to correlate the requirements of employers and professional-pedagogical standards with the abilities of future teachers.

With regards to this point, it is incumbent upon educators to prepare their graduates to be competitive in the forthcoming economic world. The growing concern among the employers for graduate soft skills in the workplace, thus look into the importance of soft skills, soft skills hunted by employers, soft skills lacking in graduates, mismatch of the soft skills and different aspects of soft skills to teach and assess by the educators. Students with soft skills like positive attitude, effective communication, problem solving skill etc. have much more better chances of survival in the critical corporate world compared to the students who are lacking in these skills. (Md. Abdullah-Al-Mamun, 2012)

In addition, the attributes (knowledge, attitudes and abilities) of the graduates seems to be very decisive in the workplace which ultimately empowering the student as a critical life-long learner (Harvey L, Locke W, Morey A). These attributes of students, sometimes known as the soft skills, are extremely important that special attention to the development of those soft skills should be

given in study plans (Redoli J., Mompo R, Mata DL, Doctor M. DLP). Soft skills as defined in scholarly literature are nontechnical skills, abilities and traits required to function in a specific employment environment (Conrad CA, Leigh WA, 2012). Moss and Tilly (Moss P, Tilly C, 1996) defined soft skills as 'skills, abilities and traits that pertain to personality, attitude and behavior rather than to formal or technical knowledge'. However, soft skills are more than simply individual traits and dispositions. For example, Hurrell (Hurrell SA, 2009) defines soft skills as 'involving interpersonal and intrapersonal abilities to facilitate mastered performance in particular contexts'. CEDEFOP (2012) explains soft skills are context-dependent and attained from abstract and implied knowledge with actual experience and one's own reflection.

4.1.3 Workplace Environment and Challenges Faced:

The current status of our diploma graduates are shown in Figure 4.5. It shows that 47% of our respondents are in service, 24% are job seekers and only 8.5% are self-employed. Remarkably 20.2% are in higher study.

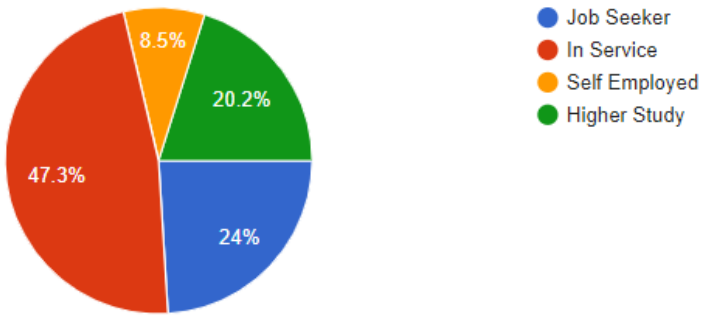

Figure 4.5: Current status of Diploma Graduate respondents

From these results it is clear that majority of diploma engineers produced are facing difficulty in getting good jobs. They are seeking higher education to build confidence to get a decent jobs. Also, self-employment rate is low due to lack of entrepreneurship quality.

A BTEB tracer study (2022) mentioned the major reasons for pursuing higher study are to increase knowledge and skills related to their technologies and jobs; to extent the job opportunities; to get reputed in job field, to get promotion, ensure better salary, and to get opportunities to study in abroad.

While responding to our survey, the majority of the diploma graduates ranked the workplace environment and their salary satisfactory. They described positively about gender equality, job security, workplace culture, governance of low, employee friendly policies, on the job training facility and salary.

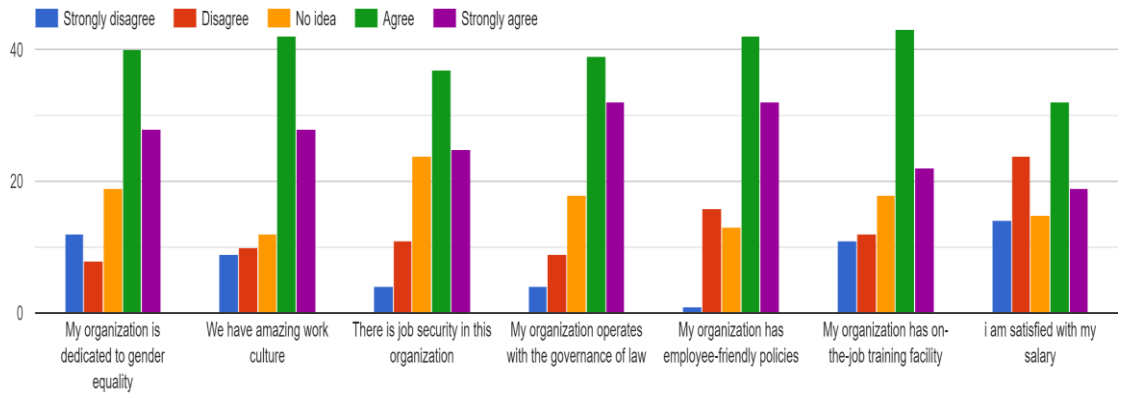

Figure 4.6: Workplace environment

Challenges faced by diploma engineers in the workplace are shown in the following figure. They described technological advancement highest (74%) and automation (55%) as the second highest challenge in workplaces.

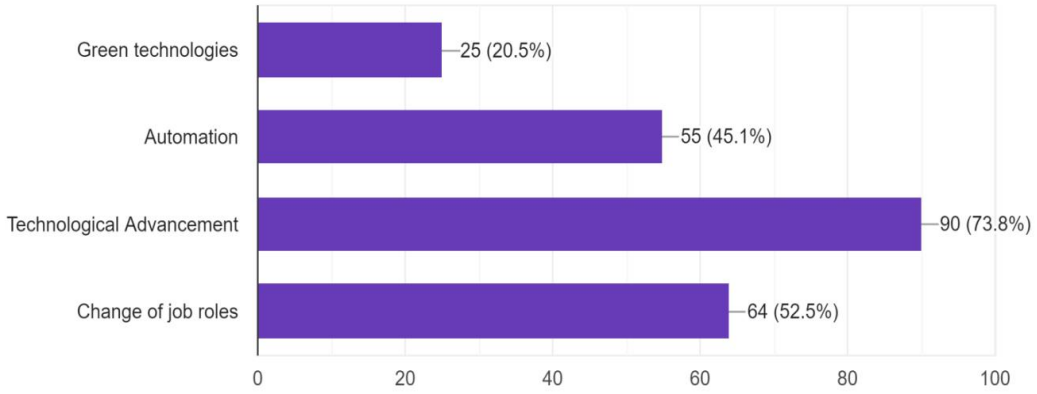

Figure 4.7: challenges faced by diploma engineers in workplace

With the increasing use of automation and digital technologies, many jobs require new skills and competencies. As such, institutes and industries need to provide opportunities for training and development to help employees acquire the necessary skills to adapt to the changes in their jobs. Almost all the students Identified soft skills are necessary to meet the challenges of automation. They preferred adaptability the most (70%). Adaptability involves being flexible, open-minded, and responsive to evolving situations. Individuals who are adaptable can quickly learn new skills, handle unexpected challenges, and thrive in dynamic environments.

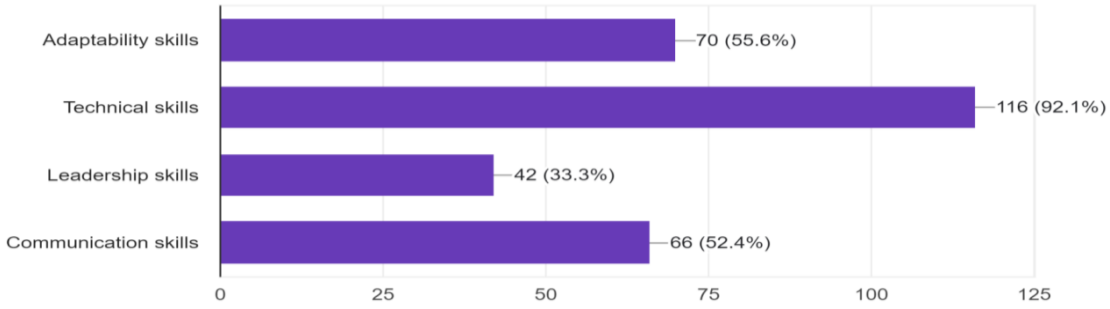

Figure4.8: Soft skills necessity to meet the challenges of automation

Diploma graduates' feedback on causes affecting job security are expressed in the following figure. Lacking of communication skill, teamwork, problem solving skills, workplace safety and automation can affect job security.

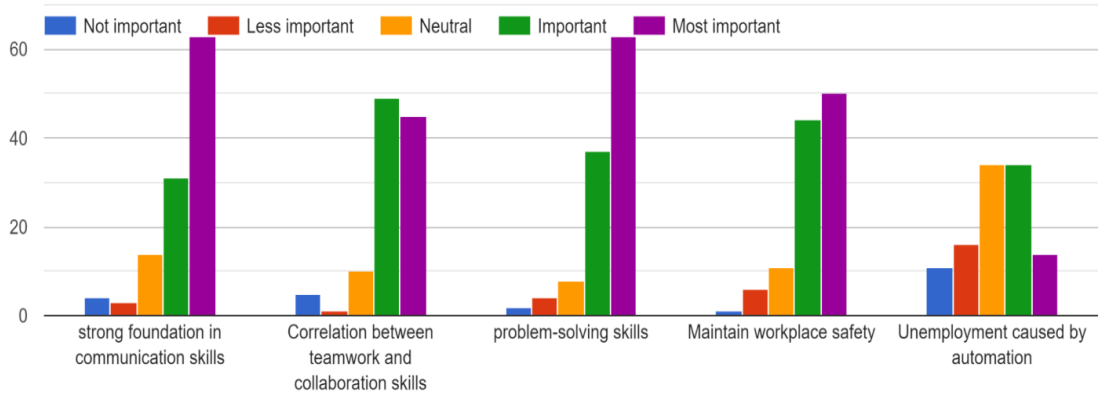

Figure 4.9 Job security affecting causes for Diploma graduates

Overall, job rule changes for TVET graduates will be crucial in ensuring that they are equipped with the skills and knowledge required to meet the demands of IR 4.0. This will not only benefit individual graduates but also help drive economic growth and innovation.

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2017) stresses that in order to align what is demanded in the labor field and university education, what is taught must be relevant and pertinent, as these are key characteristics for advancing towards growth. In addition, Sustainable Development Goal (SDG), 8 of the Millennium Development Goals (MDGs), looking forward to the year 2030, recognizes that the financial crisis has affected workers, increasing the level of poverty.

The relationship between universities and productive organizations is undeniable because it is in these where graduates will seek opportunities for labor insertion and obtaining their first job, hence they are raised as a social requirement that universities fulfill the mission of being guarantors of scientific and technological progress of the country, by providing the tools for young

Peruvians to be innovative in their field of work and can overcome the uncertainties of the contemporary world (Loayza, 2018). Therefore, interpersonal soft skills are necessary to access the formal labor market, as well as to favor the development of successful enterprises in a society where the informal economy is very high. In this regard, the National Education Project (National Education Council, 2020), in accordance with the learning actions to achieve the SDGs (UNESCO, 2017), aims to overcome visions of education out of step with reality that generate certifications with zero social value because they are far from the needs that people currently demand, among which are those related to employability.

4.1.4 Labor Market factors:

Soft skills are often considered just as important as technical skills when it comes to recruitment and career advancement in today's competitive job market. However, at the time of entering the labor field it is observed that the competencies acquired by students do not correspond to those they need to face the labor world. In the same order, the research conducted by Abelha, et al., (2020) points out that one of the main problems found is that the competencies obtained by university students are not congruent with the expectations and demands of employers.

"A Tracer Study Matching Diploma in Engineering Curriculum for Local and Global Employability(2021)" conducted for BTEB found that, diploma graduates of different technologies need to have adequate practical training, software knowledge, management skill, communication skill, English language skill, presentation skill to fulfil client's demand. The study also found that, pedagogies using in the classroom are not modern and scopes of getting opportunity to share their experiences during a class are not available.

Similarly in our study, most important employability skills described by the graduate respondents are shown in the following figure. 84 percent student preferred Communication skill as employability skill.

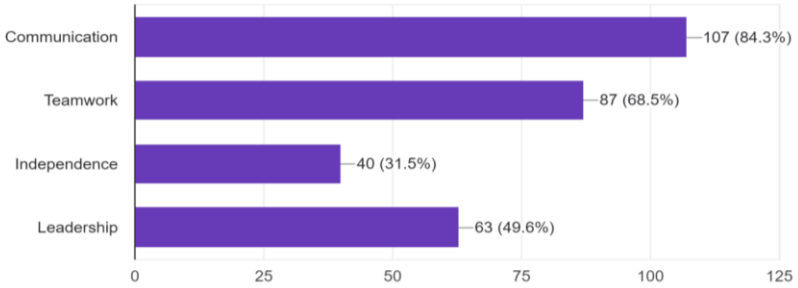

Figure4.10: Employability skills for Diploma Engineers

Skilled diploma engineers need to survive in the international labor market described by the graduates in the following figure. Without problem solving skill, communication skill, leadership and adaptability no one can survive and 81 percent described problem solving skills as the most important one.

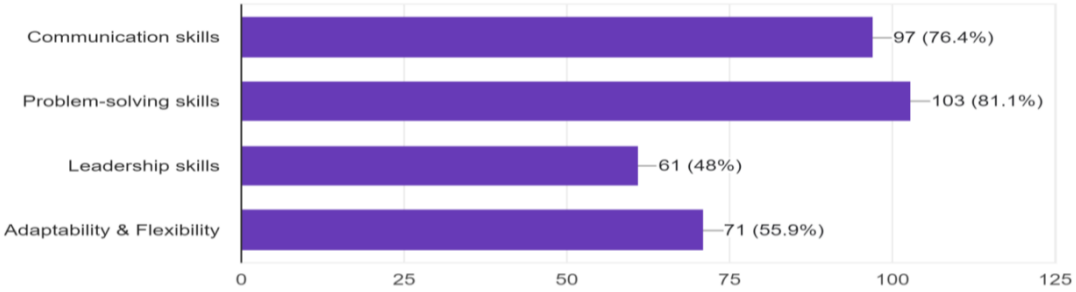

Figure4.11: Skills Diploma engineers need in international labor market

An important element to highlight is that, according to the findings of the company Udemy (2020) in different countries in Asia, America and Europe between 77% and 94% of workers surveyed in India, Brazil, Mexico, United States, Spain, France and Mexico consider that there are gaps in terms of training. This skills gap affects the performance of their work. In the case of Peru, the situation is worrying, the results of the Survey of Skills to Work (ENHAT) 2017-2018: Causes and consequences of the skills gap in Peru conducted by Novella, Alvarado, Rosas & González Velosa (2019) specialists working at the Inter-American Development Bank (IDB) shows how a large percentage of companies (95%) indicate that part of their staff does not demonstrate the expected competencies for their position in view of the fact that they do not possess certain socioemotional skill, among which are: (a) teamwork, (b) responsibility, (c) leadership, (d) communication skills, (e) kindness, (f) problem solving skills, (g) creative thinking (h) emotional balance, (i) critical thinking, among others. At the time of selecting a person to fill a vacancy these skills also become an obstacle because the applicants do not possess them. All this affects the performance of the company within its sector and restricts its growth possibilities. socioemotional skill, among which are: (a) teamwork, (b) responsibility, (c) leadership, (d) communication skills, (e) kindness, (f) problem solving skills, (g) creative thinking (h) emotional balance, (i) critical thinking, among others. At the time of selecting a person to fill a vacancy these skills also become an obstacle because the applicants do not possess them. All this affects the performance of the company within its sector and restricts its growth possibilities.

4.1.5 Employer's Expectation:

In this section based on the categories established for the study, the following findings are presented from Focus Group discussion with the representatives from Industries: With respect to the objective one of key soft skills, we conducted FGD with the representatives from industries where they show that critical thinking, communication, English speaking, adaptability, problem solving and leadership are essential for the diploma graduates. In industry for the fresher's they have some fundamentals on the job training to help them in facing the challenges. For the industrial job CV writing, computer literacy, English speaking and professional antiquates plays a vital role besides technical skills during recruitment.

The graduates should have clear concepts about their career goal and future prospects. They also should have introductions with the updated technologies and positive attitude to work in the plant side. Social acceptance and status improvement will change the scenario to a remarkable extent. Some of the employers prefer experience and innovative personalities also. Diploma engineers work as mid-level officers. On the basis of skill, sometimes they lead a team on the floor. They have to report and communicate to the higher authority. Gradually they were promoted to a higher rank. After analyzing and compiling feedbacks from different industry persons we can say that the following are soft skills that are generally sought after by recruiters: Communication skills, creative thinking, emotional balance, (i) critical thinking Problem solving, Networking

In summary, employers may need to re-evaluate their job requirements to ensure that they are attracting and retaining qualified workers who possess the necessary skills for IR 4.0. Furthermore, there may also be a need for greater collaboration between TVET institutions, industry associations, and government bodies to identify emerging trends and prioritize the development of relevant skills. This could include initiatives such as apprenticeships, work-integrated learning programs, and industry-academic partnerships.

4.2: Existing Pedagogical Approaches

Pedagogy refers to the science. Art of education. Pedagogical Approaches are methods that educators used in teaching-learning process. Pedagogical approach includes course design, teaching delivery and assessment process. Pedagogical approaches can help improve teaching and promote different learning styles for students. Pedagogical approaches help educators to use suitable techniques according to the merit of the subjects taught by them.

Here we present the results of survey, FGD, KII and secondary literature review about existing pedagogical approaches diploma engineering educators practice.

Most of the results collected from survey questionnaires constructed for teaching faculties of the Government and non-government polytechnic institutes.

4.2.1 Scope in Diploma Engineering curriculum

Curriculum is the basis of any course. It is the content that need to be taught and pedagogy is the ways to teach the content.

Soft skills are becoming increasingly important for TVET graduates, especially for the diploma engineers. Employers not only seek candidates with technical expertise but also with strong interpersonal & managerial skills to compete with the challenges of economic and technological transformation.

Diploma in Engineering is a four-year (8 semester) course under BTEB is offered by polytechnic institutes. It is focused on practical and skill oriented. Students get admitted to diploma in engineering after completion of their secondary school certificate. Diploma is awarded in specific branch of engineering.

The Diploma Engineering curriculum includes 60% engineering subjects, 15% social science subjects, 15% science and 10% mathematics. computer application, bangla and english.

The percentage of theory and practical subject is 40: 60 in this curriculum. Both theory and practical subjects are assessed merging the continuous assessment and final exam. Continuous assessment of a subject includes presentation and assignments along with midterm exam, quiz test and class test in the Diploma Engineering Probidhan 2022. Also, after completion of each practical job students need to produce a report and face viva exam on the job. It is done to improve the pupil's soft skills. At the final year, sixteen-week industrial attachment (Internship) is mandatory in Diploma engineering.

After the completion of industrial attachment each student need to submit a project, produce a report and give presentation on the project. Three-member committee comprising of Head of the department, guide teacher and external examiner will assess the project jointly. This will help the students gain self-confidence and generate innovative ideas.

In response to a question about the existing courses that enhance soft skills Diploma teachers selected Communicative English mostly (52.3%) and Entrepreneurship (47.7%).

Table 4.1: ***Existing Courses that can enhance soft skills***

Existing Courses that can enhance soft skills	Agreed	Percentage
Communicative English	67	52.3
Social Science	18	14.1
Computer Application	44	34.4
Entrepreneurship	61	47.7

From the results of questionnaire survey for diploma engineering faculties, most of the respondents (71.9%) agreed that existing Diploma in engineering curriculum has enough scope for development of soft skills.

From the results of questionnaire survey for diploma engineering graduates, most of the respondents (49.2%) agreed that soft skills can be developed through academic courses.

To improve the teaching delivery related Teacher's level based pedagogical training is initiated by Directorate of Technical education.

4.2.2 Pedagogical Approaches in practice, assignment & assessment

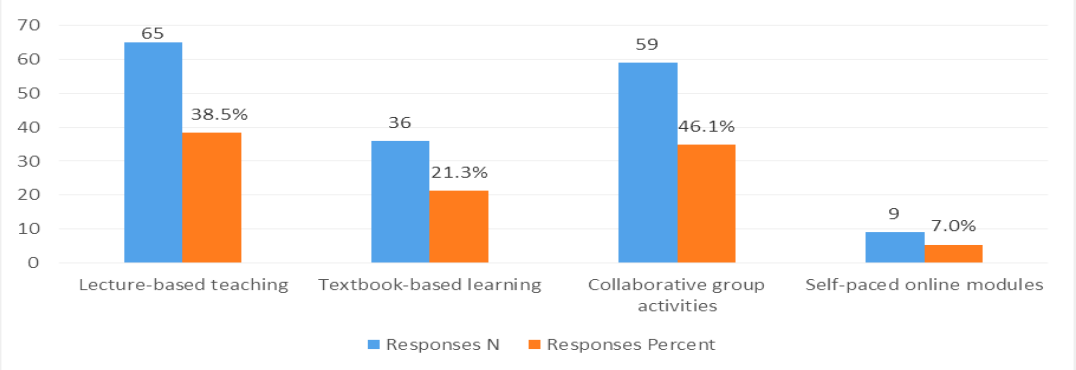

Figure 4.12: Most Commonly used Pedagogical methods in TVET institutes.

Survey results of a question regarding the pedagogical method most commonly being used now in TVET institutions shows that lecture based reaching is most popular. Interestingly Collaborative group activities is the next choice. This result indicates our TVET teachers are still following traditional styles and norms.

Different study shows that today's modern learners are easily distracted, Impatient, Social Learners, Independent and Thirsty for Knowledge. Diploma Students are no exception to this. To meet their thirst for knowledge and to guide them in the right track modern Pedagogical approaches like learning by doing, blended learning can be popularized.

So, to TVET teachers specially the diploma in engineering faculties can start practicing modern teaching technology based blended form

4.2.3 Pedagogical approaches required for soft skills development & Assessment

In response to our survey question about the required pedagogical approaches for enhancing soft skills our diploma faculties selected the appropriate methods across the area of soft skills. Their responses are summarized and presented in

table 4.3. From these data we can see that most rated method for enhancing soft skills is problem solving activities, Innovative project work, Interactive workshop and Experience sharing. The highest rated pedagogical approaches for the soft skills considered are marked in blue color.

Table 4.2: ***Pedagogical approaches for soft skills development***

Area of Soft Skills	Lecture Method	Text book learning	Innovative project work	Problem solving exercise	Interactive workshop	Brain storming activity	Experience sharing
	Agreed	Agreed	Agreed	Agreed	Agreed	Agreed	Agreed
Communication	36	9	37	35	**85**	41	50
Creativity	8	15	**92**	52	49	64	26
Problem solving	19	22	24	**96**	35	54	24
Adaptability	23	31	31	36	48	35	44
Critical Thinking	12	9	60	66	25	**81**	22
Team Work	13	7	70	53	60	32	28
Time management	39	19	32	**46**	35	34	28
Motivation	**45**	16	28	29	42	18	28

These modern pedagogical approaches need to be followed in TVET classrooms to make study interesting for the smart learners of today.
This backed by the recommendations of the BTEB tracer study (2022): "In order to make the curriculum of diploma courses more practical oriented, the lab facilities need to be increased with modern and technology related equipment; practical skills of teachers need to be enhanced through intensive skill-oriented training and workshops".

According to Oviaw (2020), "Instructional method for fostering soft skills should be the reverse classroom methodology which focuses on developing global learners and soft skills by incorporating the use of technology, creativity, research inquiry, and self-management".

In response to a question about the soft skills assessment techniques our diploma engineering faculties identified the appropriate assessment techniques against the soft skills. The results are shown in figure 4.13. The most ranked techniques for assessing soft skills are group presentation, Brain storming sessions, Role playing exercises, Problem Solving exercises etc.

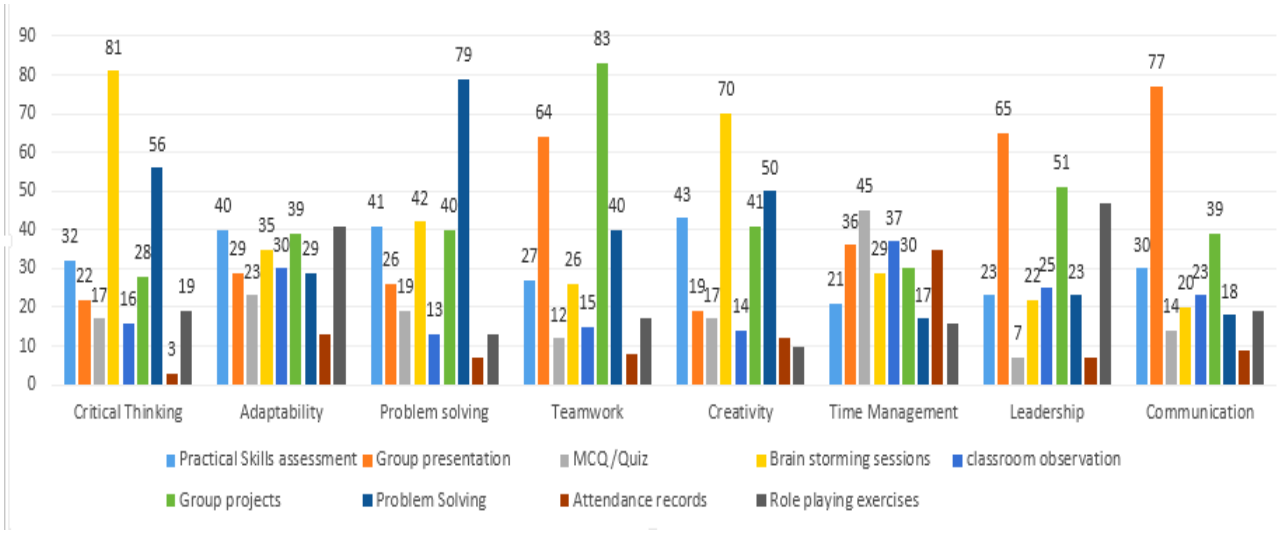

Figure 4.13: Assessment techniques of Soft skills.

4.2.4 Role of Extra-Curricular Activities

In response to our survey question about extracurricular activities that enhance students' soft skills, teachers selected skills competition mostly, followed Innovation fair and scouting.

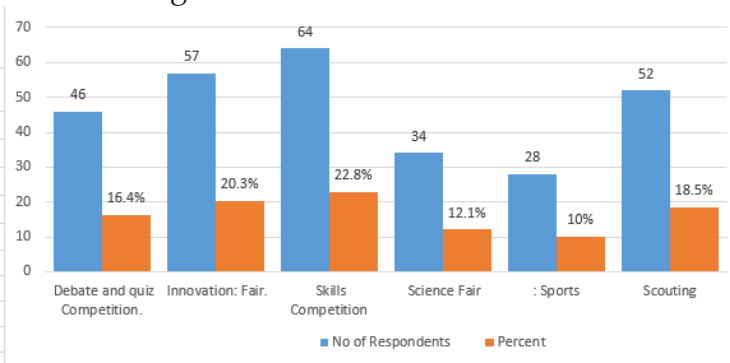

Figure 4.14: Extracurricular activities that enhance soft skills

In comparison our diploma engineer respondents suggested mostly for Entrepreneurship workshops and Community service activities can be practiced to enhance soft skills.

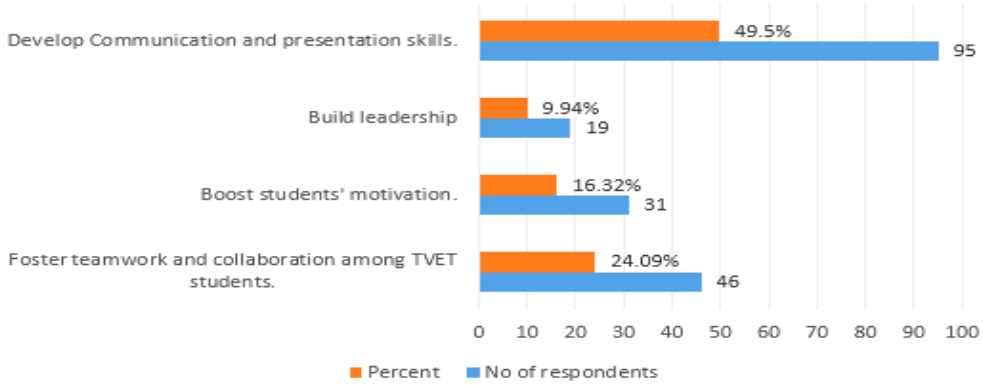

Figure 4.15: Role of Extracurricular activities

Figure 4.15 shows the Role of extracurricular activities on students. Our teacher mentioned that extracurricular activities can communication and presentation skills mostly, foster teamwork and collaboration,

4.3 Means for integrating soft Skills:

In this section we tried to find the answer of our 3rd research question. Possible ways to integrate soft skills into diploma engineering curriculum is analyzed in respect of student engagement, curriculum mapping and Networking.

Table 4.2 shows the summery of feedbacks from Diploma Faculty regarding reason for integrating soft skills into diploma engineering, here majority (51.4%) wants to integrate soft skills to develop well-rounded diploma engineers who will be prepared and equipped to take the future challenges. In the present system focuses on technical subject, course duration is not enough to complete.

Table 4.3: ***Reason for integrating soft skills into the TVET curriculum.***

Reason for integrating soft skills	Responses	Percent
Current system is enhancing technical knowledge only	38	26.4%
Developing well-rounded individuals	74	51.4%
Insufficient course duration	10	6.9%
Current system focusing solely on theoretical concepts	22	15.3%

4.3.1 Determine suitable courses & Student Engagement

In the diploma engineering curriculum approved in 2022, soft skill is incorporated in the course structure and there are scopes for practicing soft skill related activities. Social subjects like sociology, accounting, entrepreneurship, management and physical education & life style are included in course structures of all disciplines of diploma engineering. For communication and language proficiency of the students Bengali and Communicative English are included in the course structure. By applying appropriate pedagogical approaches these subjects can play vital role to flourish soft skills of the diploma engineers.

In this study Diploma engineering teachers suggested new courses like Professional courses, Basic ICT, Innovative projects, spoken English, communication & career development courses, presentation, soft skills training that you feel are crucial for soft skills development

Similarly the diploma engineers suggested that Spoken English, Languages, basic Computer, Departmental specific subjective training course,

Office Application, Digital Marketing, Presentation, Project Management etc are courses that can contribute for soft skills development.

Integration of soft skills requires more application of modern pedagogical techniques that will foster

4.3.2 Determine Pedagogical Approaches

Diploma in Engineering courses generally have total of 150-160. Credit points allocated. About 10-15% for social skills, 15-17% for science and mathematics, 10-12% for related engineering, and 58-60% for core engineering subjects are allocated for each technology. 8th semester which is the final semester allocated for industrial attachment in industry and polytechnic campus. The students are assessed through mid-term exam, class test, quiz test, assignment, presentation and final exam for theory part. For the practical part students are assessed through practical experiment, report preparation and viva voce.

When asked to give opinions about the suitable pedagogical approaches to integrate soft skills most of our diploma engineering faculty members voted for project work.

Table 4.4: Suitable pedagogical approaches to integrate soft skills

Pedagogical approaches to integrate Soft skills	N	Percent
Traditional lecture-style instruction	3	2.1%
Self-directed learning through textbooks	28	19.2%
Incorporating soft skills in practical projects	95	65.1%
Excluding soft skills from TVET education	20	13.7%

In response to the most preferred teaching method for TVET students the diploma graduates voted mostly for Hands on Workshops followed by group discussions.

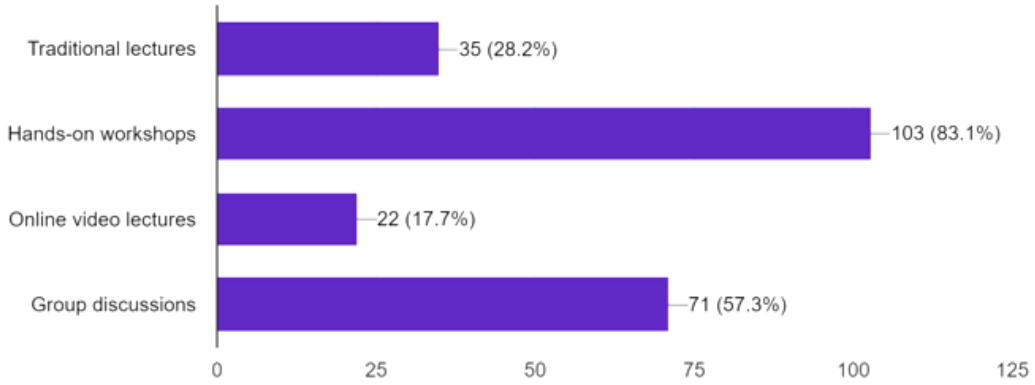

Figure: 4.16: ***Preferred teaching method for TVET students***

Table 4.6 demonstrates the feedback given by the diploma graduates to a question regarding what measures to be taken to integrate soft skills in Diploma Engineering curriculum.

Table 4.5: ***Measures to integrate soft skills in Diploma Engineering curriculum***

Measures to integrate soft skills	Agreed	Percentage
Include Group Presentation	60	51%
Introduce Term Assignments/ Projects	64	54%
Introduce Field visit/Industrial tour	69	59%
Engage students for organizing events	52	44.4%
Organize special activities like debate, Quiz, skills competition, innovation fair, etc	79	67.5%
Introduce counseling and career guidance	60	51%

Student engagement in teaching-learning process is very crucial in soft skill development. In this modern age student engagement can be ensured by applying techniques like interactive sessions, experience sharing, role playing and learning by doing, etc.

In response to the question about approaches that can be incorporated to increase TVET student engagement graduate respondents feedback is shown in figure 4.17

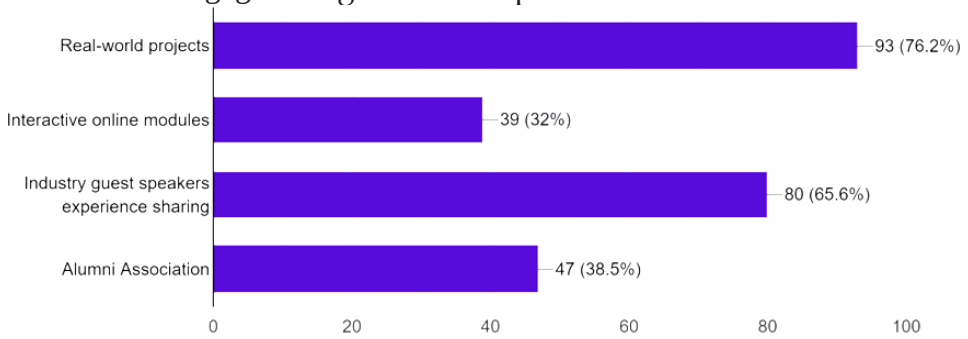

Figure: 4.17: ***Approaches to increase student's engagement***

According to the Diploma engineering Curriculum, Industrial attachment compulsory for students of all technologies. It allow students to gather knowledge of probable workplace and get chance to introduce with new machinery.

In response to the question, how industrial attachment help students overall learning outcome the 98 of 132 graduate respondents agreed that it gives workplace experience, 81 respondents agreed that it helps develop professionalism, 62 respondents agreed Exposure to Real world 49 respondents agreed about provide career pathways.

Our graduate respondent's feedback on what can be done to increase the effectiveness of industrial attachment is shown in figure 4.18

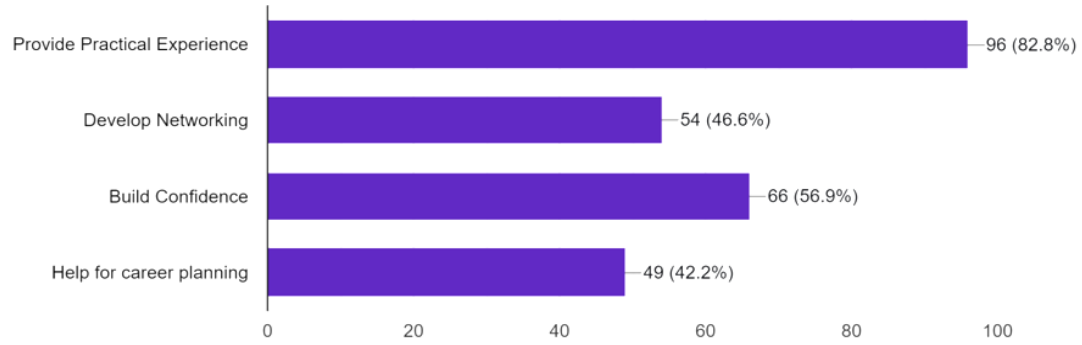

Figure: 4.18*: Initiatives to increase the effectiveness of industrial attachment*

During conducting FGD and KII with industry representatives, they expressed that industrial attachment will be more effective and transparent with proper monitoring and supervision. The teaching method is still traditional. Most of the participants said that the teaching method needs to be modernized. Teachers need to conduct proper follow up with the industries to ensure effective attachment programs.

The BTEB tracer study recommended to ensure effectiveness of attachment program in multiple phases.

From the analysis of the data obtained, 86 running students said that their academic courses improve soft skills and 23 said no. Among graduates 95 said their academic courses match the requisite for 4IR and 68 said No, need to be modified. Some of the industrial experts said that Foundation courses can be included to provide knowledge about professional attitude. Frequent industry tours and classes with the industry experts will be very helpful. Officials from BTEB and DTE suggested the more effective application of the curriculum and strong monitoring.

4.3.3 Industry Collaboration

Industry Collaboration is very important for TVET institutes in producing quality engineers. As industries are the workplace for majority of the Diploma engineers.an area were polytechnic institutes as well as all other TVET institutes in our country suffer.

Teachers in their feedback said that industry collaboration helps to develop student's soft skills. Among them 35.6% described Industry collaboration builds students confidence, teach professionalism, develops interpersonal skills and besides these provide practical knowledge.

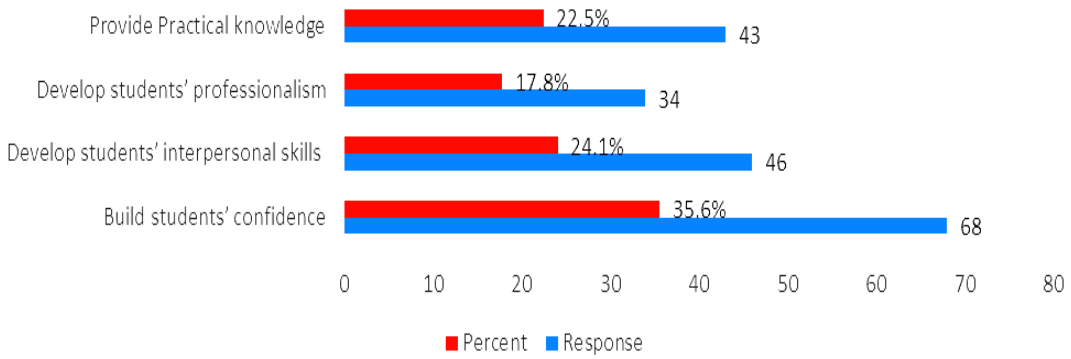

Figure 4.19: Role of industry collaboration for developing soft skills

Most of the graduate respondents (38%) think industry linkage have moderate impact on students' quality and 26.7% of them think industry linkage have substantial impact.

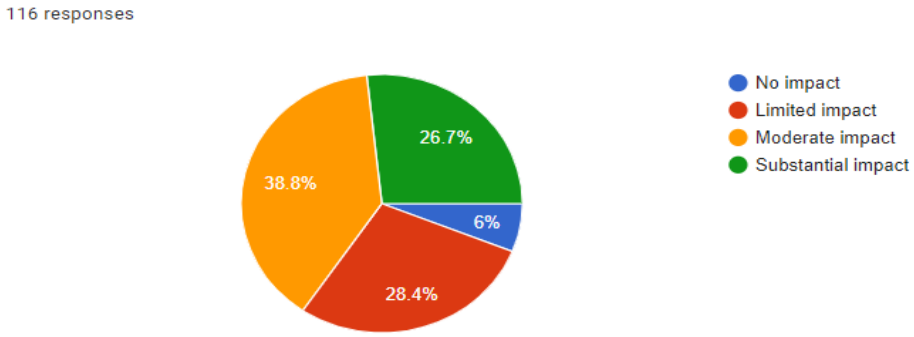

Figure 4.20: Impact of industry linkage on Student quality

During the FGD with the industry representatives, the supervisors where asked to make comment on the current skill level of our TVET graduates. The supervisors stated that, in most cases TVET graduates are good in time management and sincerity. TVET graduates are generally motivated and obedient. But, their confidence level, communication skill, situation handling and skill on simple machine operation needs improvement.

The above discussion proves that the analysis of the results of the self-assessment carried out by the students and engineers are giving us appropriate indications.

As the results show that our pupil's satisfactory level for negotiation, computer literacy, cyber security and machine operation are not up to the mark, these areas need to be focused. We should also take initiatives to flourish their leadership and communication skills.

4.3.4 Means for integration: Faculty Involvement & Training

During our survey we observed that teachers are not well aware of aspects and importance of Soft skills and its implication on the diploma graduates. They also have limited idea about the modern pedagogical techniques that is used in different.

Teachers should be provided more training on soft skill development among the students. Facilities and institutional capacity should be increased in order to spread quality technical education. Skilled human resources with ethical values suitable for domestic and international labor markets should be created and every institute needs to modernize its labs to meet the challenges of the fourth industrial revolution. In this purpose, direct funding for support programs can play a very important role. TVET providers and industry are the two major allies that can take forward the national economic growth by establishing linkage between them. The mutual understanding between the TVET Providers and industries is strengthened through close collaboration and integration of resources. Institutional networking and internationalization is one of the institutional Key Performance Indicators (KPI). Students get various assistance from the institute to develop their soft skills besides hard skills.

Table 4.6 ***Role played by faculty involvement***

	Responses	
Faculty Involvement	**No**	**Percent**
Providing personalized support, motivation and mentoring.	50	28.6%
Faculty interaction to encourage Critical thinking.	31	17.6%
Faculty can build team spirit among the students.	32	18.2%
Faculty-led brainstorming sessions and workshops can foster creativity	63	35..2%

The responses to survey question about role played by faculty involvement for soft skills development are summarized and presented in the Table 4.6.

Similarly 35% of our diploma graduates respondents agreed that mentorship has positive impact on their career development.

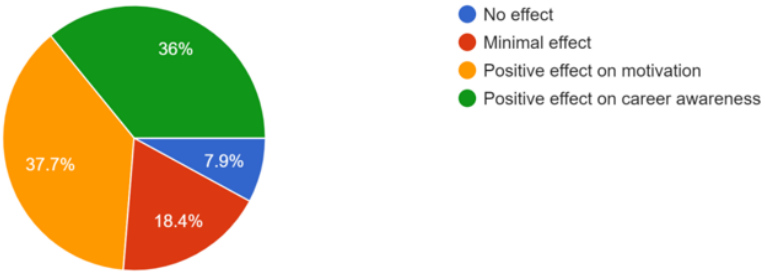

Figure4.21: How mentorship is helpful for TVET student's career development

These results implies that Faculty involvement is correlated with the development of student's soft skills and career development.

Faculty members need to have clear concept about the soft skills required for the diploma engineers to success in their workplace.

During KII TVET experts expressed that the first requisite to produce quality diploma engineers is trained teachers. Training is a continuous process of teacher's quality development.

In response to a question about what kind of training required for the faculties, 39.4% of them identified Soft skills development, 30.9% Pedagogical training, 21.2% advanced technical skills and the rest identified Administrative tasks training was necessary for them.

Answering a question about existing for faculty trainings that helps them to develop student's soft skills, most the respondents mentioned Level based pedagogical training(36.2%), followed by Hands on training (23.7%), Professional training courses (22%) and Standardized workshops (18.1%).

Directorate of Technical Education develops a yearly training plan every year according to the revenue budget allocated. Level based pedagogical & subjective training is organized for teachers for the teachers of Government TVET institutes. But, there is no scope for training the teachers of the private sector.
According to the

4.3.5 Networking:

Institutional networking with national and global job market is very important. Networking develops competency, focusing on mobility, regional collaboration. The role of networking and internationalization in the context of TVET is very important for contributing to staff mobility, research, and technical and life skills development. Networking can change the TVET and unemployment scenario to a great extent.

According to the National Skills Development Policy (2011), the government committed to working with industry and development partners to develop the network of Industry Skills Councils (ISC), make their operation sustainable, and have them established as the primary point of contact for industry skill issues in Bangladesh.

The changing skill needs in industry and understand the latest employment and technology trends are transmitted through ISCs. ISCs organize industry along sectorial lines to provide specific advice on occupations and skills in demand, and to identify key skills priorities in sectors. They ensure a tripartite approach to continuously improving the skills development system by bringing employers, workers and government representatives together.

Students of Government Polytechnic Institutes and Government TSCs can study under scholarships in various technical educational institutions in China at the B.Sc.-Diploma Engineering level in the field of technical education.

Through FGD many respondents from the industries suggested formation of a national body to maintain a flawless networking at national and international level. Professional development of staff means to upgrade all those skills required to execute a task of TVET staff in transferring knowledge, expanding networking and improving their competency in a particular area. It means that staff maintains, improves and broadens their knowledge and skills to develop their required competencies.

BTEB tracer study (2022) recommended to enhance the scopes of work in local market, creating technology based jobs/posts in the industries through collaboration; introduce a central database of graduates to recruit or promote skilled graduates for relevant jobs; arrange on-campus job fair on regular basis and invite the industries to promote job facilities and recruit skilled graduates; create internship opportunities in the local industries; develop a national policy to recruit diploma graduates in the govt. and non-govt sectors; to ensure effective communication with the local industries and smooth placement of graduates to the relevant industries

4.3.6 Challenges in integrating Soft skills:

In our survey, TVET teachers identified the barriers for integrating soft skills. The summary results of their feedback given on the survey questionnaire are shown in the table 4.8. These results indicate that we need to increase the awareness among teachers to introduce pedagogical approaches that can enhance soft skills.

Table 4.7: ***Barriers in integrating soft skills***

	Responses	
Barriers	Agreed	Percent
Existing Teaching methodology.	57	44.5%
Lack of teachers' awareness	30	23.4%
Lack of Funding	10	7.8%
Lack of teachers	31	24.2%

As other facts some of them mentioned lack of teachers.

During the KII & FGD with the industry representatives, they expressed that to handle the technological advancement caused by Industrial revolution 4 will reduce some laborious jobs but it will increase scope for new jobs related to technologies like machine learning, artificial intelligence, big data analysis. They mentioned funding, lack of training, lack of motivation and knowledge gap of the workers as their biggest challenges. Some of them mentioned work ethics and employee satisfaction as their challenges.

Chapter 5: Conclusion

5.1 Discussion of results:

We had three dimensions in our research area. Firstly, the most valued and essential soft skills for the diploma graduates, the existing pedagogical approaches for soft skill enhancement and Means for integrating soft skills into diploma engineering curriculum.

Soft skills are special human qualities that can be achieved like degrees. It can be nurtured and practiced. Soft skills are required for job seekers, diploma engineering graduates are no exception. From the literature reviews and data collected in this survey we identified communication skills, innovation skills, critical thinking skills, creativity, problem-solving skills, adaptability, motivation, collaboration skills, etc. as the most essential soft skill for the Diploma in engineering graduates.

Nature of jobs and job roles are changing as technology is changing rapidly. You cannot enter the job field knowing everything. Job candidates need to have some special quality that will empower them to adapt new technologies, handle the change and shift to newer job roles. Employers today not only seek qualified candidates but also persons with soft skills.

5.1.1 Summary of findings:

The key finding of study is summarized and presented in this section.

Key Soft skills: Identified communication, teamwork, problem-solving, adaptability, and leadership as key soft skills essential for diploma engineering professionals of all the technologies.

Skills demand from the employers: Employers of the diploma graduates wants to hire persons who will diploma engineers equipped with soft skills. They need to develop skills in areas such as Basic ICT, Project Management, and digital Marketing.

Nature of work & Challenges in the workplace: Use of automation, artificial intelligence, and other digital technologies has changed the work environment as well as the job role. These changes have led to increased productivity, efficiency, and competitiveness. Due to this changes one major challenge for institutes and industries is updating their equipment and tools to keep up with the changes in technology.

Existing Pedagogical Approaches: This study found that, Lecture based method is still most commonly practiced. Assessment takes place using traditional written exam and viva voice.

Role of Extra-curricular activities: Soft skills cannot learnt from textbooks or achieved through academic degrees. These qualities can be developed through some practices and activities. Extra-curricular activities like event management,

scouting, debate, quiz, competitions can play a vital role for improving student qualities**.**

Means: To meet the challenges and leverage the opportunities of IR4, policymakers, businesses, and workers must take proactive measures to adapt to the changing nature of work and employment. Employability and productivity can be increased by investing in training and up-skilling programs, promoting the development of new skills, and supporting the soft skill enhancement for TVET graduates.

Student Engagement: Student engagement in teaching-learning process is very crucial in soft skill development. In this modern age student engagement can be ensured by applying techniques like interactive sessions, experience sharing, role playing and learning by doing, etc. These activities need to be practiced by the teachers to enhance student quality.

Faculty involvement: Faculty involvement is very crucial for soft skills development. Students follow their teachers naturally as they are the mentors. So, teacher's quality development is prerequisite to student's quality development. From discussions and responses of our survey tools it is obvious that faculties need to be trained in soft skills and modern pedagogical approaches that can enhance student's soft skills.

Promote entrepreneurship: Our research show that private sector is the largest employer of TVET graduates. The rate of becoming entrepreneur is not satisfactory. Diploma graduates need to be encouraged to become entrepreneurs to reduce the extra pressure on the job market.

Networking: Strong networking with the local and international job market, industries and employers association need to be established. This will enable the policy makers to know about the growing skills need and trends and take measures accordingly.

Barriers: Our Diploma engineering faculty respondents mentioned Existing Teaching methodology, Lack of teachers' awareness and lack of teachers as the main barriers for integrating soft skills.

5.1.2 Stake holder Feedback:

During FGD and KII TVET experts and BTEB representatives revealed that curriculum is an outline of any course, it covers the contents. To conduct the courses different teaching-learning methods can be used following the curriculum. In support of the Diploma in Engineering curriculum there are operational guidelines called "Diploma in engineering probidhan" and separate course structures for all the technologies. It is possible to include activities, modern teaching techniques and assessment process by including it in the probidhan and

include new subjects in the course-structures that will enhance the soft skills of the diploma graduates.

According to our respondents, diploma graduates soft skills can be nurtured through interactive workshops, brain storming sessions, experience sharing of guest lectures from industry/professionals. Frequent arrangement programs to meet with successful diploma graduates & share their experience boast their confidence and motivation.

Employers expressed that overall they are happy with the quality of the diploma graduates as they are active and sincere to their work. But, still they lack in confidence and problem solving activities. Often the diploma graduates tend to higher studies to get confidence and increase performance. Some employers mentioned that diploma graduates lack of theoretical and practical knowledge and they also need to develop their sense of responsibility. Nevertheless, it is important that the graduates are weak in English.

Both graduate and industry representatives highlighted that, Industrial attachment & engagement with industry from early part of academic life can helpful for the graduates. To prepare TVET graduates for the workplace, institutions can provide exposure to real-world scenarios and they can easily know the industrial culture. This can also be done through simulation exercises.

According to the industry representatives, monitoring & evaluation of industrial attachment need to be strengthened for both hard and soft skill quality. For, effectiveness and seriousness of this program, guide teachers need to frequently visit the industry and online monitoring system can be developed for getting regular feedback about the performance of the students from industries.

To improve the teachers quality subjective trainings along with pedagogical and professional training are mentioned in the KII with the Principals of Polytechnic institute.

The Principals of private Polytechnic institute expressed that there is no scope of government intervention for their teachers training or infrastructure development. They have very limited scope of industry linkage.

BTEB representatives from the CBT Cell mentioned that, 20 generic skill modules for occupational competencies of CBT (Competency Based Training and Assessment) has been developed. These modules include practice negotiation, apply critical thinking and problem solving, practice creativity and innovation in workplace, interpret fundamental of entrepreneurship, work in team environment, lead small team, occupational health safety, use of English in workplace, use of ICT in workplace, demonstrate work value, prepare for employment, ensure gender equality and social inclusion, etc. These modules can also be customized and adopted to the diploma engineering course structure.

Feedback from our respondents and key informants show that at the very beginning the teacher need to be aware of impacts our teaching delivery system and assessment techniques can be modified to provide regular feedback and assessment to students to help them identify areas for improvement and track their progress over time.

5.2 Implications:

Soft skills are fundamental set of skills for preparing students for life long and work in today's global world. Knowledge, innovation and creativity play key functions in developing human capital, which is a core driver of economic progress and sustainable development globally. Researches show the positive co-relation between soft skill and employability. The world is changing every day due to effect of industrial revolution 4.0. The corona pandemic worked like a catalyst to accelerate effectiveness of IR4, as it made people more dependent on technology. The way we think or do is changing. Many of the current jobs will be extinct and scope of high tech jobs will be created. To cope with this there is an urgency for adopting policies to flourish soft skills to increase employability.

In this section, we discuss some implications of our research in terms of policy and implementation.

Informing Curriculum Development: The research paper can provide valuable insights to inform the development of TVET curricula that align with the demands of 4IR. By identifying the specific soft skills required in this transformative era, the study can guide curriculum designers in integrating these skills into educational programs.

Strengthening Pedagogical Approaches: The findings of the research paper can contribute to the enhancement of pedagogical approaches within TVET institutions. By understanding the effective strategies and interventions for developing soft skills, educators can refine their teaching methods to create engaging and interactive learning environments.

Supporting Industry-Academia Collaboration: The research paper can facilitate stronger collaboration between TVET institutions and industry stakeholders. This opportunity promotes mutually beneficial partnerships that bridge the gap between academia and industry, ensuring that TVET students are equipped with the skills needed for successful employment in the era of IR 4.0.

Guiding Policy Decisions: The research paper can inform policy decisions at various levels, including government bodies, educational authorities, and funding agencies. This opportunity enables policymakers to create an enabling environment that fosters the growth and recognition of soft skills among TVET students, promoting their employability and long-term career success.

Enhancing Professional Development Programs: This research may contribute to the improvement of professional development programs for TVET educators. By identifying effective strategies and interventions for developing soft skills, the study can guide the design and implementation of training programs aimed at enhancing the pedagogical and mentoring skills of educators.

Improvement of Teaching delivery method: Teaching delivery method need to be updated and teachers need to be trained in project based learning, blended education and pedagogy. Teachers play main role to nourish the student quality. So, they should be made aware of new technologies, challenge and benefits of IR4.

Emphasis on Co-curricular activity: Students can be involved in social activities and event management to develop their responsibilities and leadership. Debate competition, quiz competition on general knowledge can be organized with other cultural competitions.

Student Guidance & counselling: Polytechnic students should be provided exposure to real-world scenarios. Strong Alumni associations can be built for experience sharing with the current students and alumni's. Study tour, excursion, field visit, industry visits, guest speaker, seminar and workshop can be organized. They need to be encouraged to participate in extracurricular activities. Students counseling officer should be added for job market survey, local demand analysis and carrier guidance purpose of the students.

Strengthen Industrial attachment: Sixteen-week industrial attachment program through internship gives the students real workplace experience and it can be helpful for them in selecting career pathway and acquiring the required skills accordingly. To increase the effectiveness of the representatives, monitoring & supervision process of industrial attachment need to be modified and strengthened for both hard and soft skill quality.

Continuous Market Survey & Research: We tend to find a picture of job market demand for soft skills, current level of TVET graduates' soft skills, challenges faced by TVET graduates that can resolved with Continuous Market Survey & Research.

Monitoring & Supervision: A huge budget has been allocated among 50 Government Polytechnic Institutes under DTE for lab/workshop modernization in response to the need for setting up IR4 responsive technologies. Implementation of the budget need to be monitored.

BTEB has been working on developing 4th Industrial-Revolution-based curriculum to prove its worth in line with the demands of the changing labor market. The new 2022 course structure has scope for incorporating soft skills. Strong monitoring & supervision on the implementation of this curriculum is required.

5.3 Conclusion:

The integration of soft skills into the Diploma in engineering curriculum is imperative to prepare graduates for success in the contemporary workforce. By identifying needs, exploring effective pedagogical approaches, and securing the necessary means and resources, engineering programs can enhance the holistic development of their students, ensuring their readiness for successful careers in engineering and related fields

5.4 Future Scope:

Continued research and evaluation are needed to assess the effectiveness of different means and strategies for integrating soft skills into the engineering curriculum. Institutions should prioritize ongoing investment in faculty development, infrastructure, and resources to support the sustained integration of soft skills and ensure the relevance and quality of engineering education in a rapidly changing world.

5.5 Recommendations:

- Include Group Presentation, Introduce Term Assignments/Projects, Introduce Term Introduce Field visit/Industrial tour, Engage students for organizing events, Organize extra-curricular activities like debate, Quiz, skills competition for students, Introduce counseling and career guidance for students for enhancement of the curriculum.
- Develop faculty development programs that address the specific needs and challenges of integrating soft skills into the engineering curriculum.
- Provide institutional support in the form of funding, time allocation, and recognition for faculty members engaged in soft skills integration efforts.
- Foster collaboration and networking opportunities among faculty members, industry partners, and educational experts to share best practices and resources.
- Make Government Policy to provide inceptives for industry partners to allow students to practice and refine their soft skills in a professional setting through internship opportunities.
- Establish strong Alumni Associations in every institute.
- Encourage continuous faculty development programs to equip educators with the necessary pedagogical skills for integrating soft skills into the curriculum.

- Foster collaborations with industry partners to ensure alignment between curriculum objectives and industry expectations.
- Promote student engagement in extracurricular activities, internships, and professional development opportunities to complement classroom learning.
- Conduct periodic reviews and evaluations of integrated programs to identify areas for improvement and ensure ongoing relevance and effectiveness.
- Establish a graduate database for the diploma engineers to ensure employability.
- Disseminate best practices and success stories to inspire other institutions to embark on similar initiatives and contribute to the broader advancement of engineering education.

Appendix A

Survey Questionnaire for Integration of Soft Skills into Diploma in Engineering Curriculum: needs, pedagogical approaches and means.

This survey is designed as a tool to identify the way of Integration of Soft Skills into Diploma in Engineering Curriculum: needs, pedagogical approaches and means. It should take between 5 - 10 minutes to complete. Please remember the feedback you provide will lead to the recommendations for improvement. Please fill in the data and put a tick on the appropriate option. You can withdraw at any time or refuse to answer any question without any consequences of any kind. All information you provide for this study will be treated confidentially.

Section 1: General Information of Participant

1.1. Name of the Participant:
1.2. Name of the Institute:
1.3. Designation:
1,4 Technology:
1.5. Personal e-mail(Optional):
1.6. Personal Mobile No(Optional):
1.7 Teaching Experience (Years):

Section 2: Existing pedagogical approaches are employed to enhance soft skills

2.1 Do you feel Existing Diploma in engineering curriculum has enough scope for development of soft skills?

a) Yes
b) No (If No please specify)……..

2.2 Which existing courses can be effective for soft skills development?

a) Entrepreneurship
b) Computer Application
c) Social Science
d) Communicative English
e) Any other……

2.3 Put a tick (s) on the appropriate pedagogical method for enhancement of the given soft skills in your view

	Lecture-based teaching	Text book learning	Innovative projects	Problem-solving exercises	Interactive workshops	Brain storming sessions	Industry person experience sharing
Communication							
Innovative idea and creativity							
Problem-solving skills							
Adaptability							
Critical Thinking							

Team Work							
Time management							
Motivation							

2.4 Put a tick (s) on the appropriate method of assessment for the given soft skills in your view

Soft Skills	Practical Skills assessment	Group presentation	MCQ /Quiz	Brain storming sessions	Continuous classroom observation	Group projects	Problem solving exercises	Attendance records	Role playing exercises
Communication skills									
Leadership									
Time Management									
Creativity									
Team work									
Problem solving									
Adaptability									
Critical Thinking									

2.5 How do you perceive the role of extracurricular activities in enhancing students' soft skills?

a) Foster teamwork and collaboration among TVET students.

b) Boost students' motivation.

c) Build leadership

d) Develop Communication and presentation skills.

2.6 In your view which extracurricular activities can play a role for students' soft skills?

a) Debate and quiz Competition.

b) Innovation Fair.

c) Skills Competition

d) Science Fair

e) Sports

d) Scouting

2.7 How does industry collaboration help developing soft skills?

a) Working within a professional environment build students' confidence

b) Real assignments for real organizations develop students' interpersonal skills
c) Develop students' professionalism
d) Provide Practical knowledge

2.8 Which pedagogical method is most commonly being used now in TVET institutions?
a) Lecture-based teaching
b) Textbook-based learning
c) Collaborative group activities
d) Self-paced online modules

2.9 In your view which method can be proven more effective for TVET courses?
a) Lecture-based teaching
b) Project based learning
c) Experiential learning and simulation
d) Inquiry-based learning

2. 10 What is the role of faculty involvement to improve TVET students soft skills?
a) Providing personalized support, motivation and mentoring.
b) Faculty interaction to encourage Critical thinking.
c) Faculty can build team spirit among the students.
d) Faculty-led brainstorming sessions and workshops can foster creativity

2.11 Which aspect of faculty training do you believe has the most impact on improving teaching methodologies in TVET programs?
a) Advanced technical skills
b) Soft skills development
c) Pedagogical training
d) Administrative tasks training

2.12 Do you think TVET faculty need specialized soft skills training?
a) Yes
b) No (If No please specify)……..

2.13 Which existing trainings can help the TVET faculty to develop their students' soft skills?
a) Hands-on training in industry.
b) Standardized workshops.
c) Level based pedagogical training.
d) Professional training courses.

2.14 What do you think is the barrier for development of students' soft skills now?
a) Existing Teaching methodology.
b) Lack of teachers' awareness
c) Lack of Funding
d) other……..

Section 3: Integration of soft skills in Diploma engineering education through pedagogical approaches

3.1 Which of the following is reason for integrating soft skills into the TVET curriculum?
a) Current system is enhancing technical knowledge only
b) Developing well-rounded individuals
c) Insufficient course duration
d) Current system focusing solely on theoretical concepts

3.2 In your opinion, which pedagogical approach is most suitable for integrating soft skills into the TVET curriculum?
a) Traditional lecture-style instruction
b) Self-directed learning through textbooks
c) Incorporating soft skills in practical projects
d) Excluding soft skills from TVET education

3.3 Please suggest new courses that you feel are crucial for soft skills development……..

3.4 Which training approach do you believe is most effective for preparing TVET faculty to effectively integrate soft skills into the curriculum?
a) Introduce soft skills in training
b) Short lectures on soft skill concepts
c) Practical exercises in developing soft skills
d) Assigning soft skills training to non-teaching staff

3.5 Which pedagogical strategy do you think can be adopted for developing TVET students' employability skills?
a) Rote memorization of technical terms
b) Field trips to industries and workplaces
c) Intensive theoretical coursework
d) Emphasis solely on academic assessments

3.6 How important is faculty involvement in promoting interdisciplinary collaboration and holistic skill development among TVET students?
a) Using standardized teaching methods for all students
b) Providing personalized support and mentoring
c) Ignoring diverse learning needs to save time
d) Relying solely on student self-assessment

3.7 How do you feel soft skills can be integrated in TVET teaching methods?
a) Introducing simulations and virtual labs
b) Usage of technology in classrooms.
c) Introducing learning by doing
d) Creating of Well-equipped learning spaces

3.8 Which type of faculty involvement do you think will contribute to creating a student-centered learning environment in TVET institutions?
a) Faculty-driven curriculum design
b) Regular faculty-student interactions
c) Faculty-student participation in extracurricular activities
d) Faculty involvement in administrative tasks

3.9 In your opinion, which faculty involvement is most crucial for staying updated with industry trends and technologies in the TVET field?
a) Regular faculty training sessions
b) Faculty involvement in research projects
c) Collaboration with industry professionals
d) Incorporating industry trends due to curriculum constraints

3.10 What do you think will be the barrier for integrating soft skills into diploma engineering curriculum?
a) Scope in the curriculum
b) Traditional Assessment system
c) Faculty training
d) Lack of facilities

3.11 What is your recommendations for Integration of soft skills in Diploma curriculum?

Appendix B

Survey Integration of Soft Skills into Diploma in Engineering Curriculum: needs, pedagogical approaches and means.

This survey is designed as a tool to identify the way of Integration of Soft Skills into Diploma in engineering curriculum through pedagogical approaches. It should take between 5 - 10 minutes to complete. Please remember the feedback you provide will lead to the recommendations for improvement. Please fill in the data and put a tick on the appropriate option. You can withdraw at any time or refuse to answer any question without any consequences of any kind. All information you provide for this study will be treated confidentially.

Section 1: General Information of Participant

1.1. Name of the Participant:
1.2. Current Status: Job Seeker☐ In Service☐ Self Employed ☐ Higher study ☐
1.3. Name of the Institute:
1.4 Technology:
1.5 Name of the Working Organization:
1.6 Workplace Address:
1.7 Personal e-mail(Optional):
1.8 Personal Mobile No(Optional):
1.9 Diploma in Engineering Passing Year:

Section 2 : Key Soft skills essential for the diploma graduates

2.1 What skills are most important for the kind of employment that TVET graduates are hired for?
a) Creativity
b) Communication skills
c) Analytical skills
d) Problem solving skills

2.2 What are the Skills asked in job circulars? (Please put ticks where necessary)
a) English speaking
b) Communication skill
c) Practical skills
d) Computer literacy
e) Leadership
f) All Above

2.3 Please Rank the following statements about your workplace environment using a scale of 1 to 5 : Strongly disagree1, Disagree 2, Neutral 3, Agree 4, Strongly agree 5

Statements about workplace environment	Ranking
My organization is dedicated to gender equality	
Amazing work culture	
There is job security in this organization	
My organization operates with the governance of law	
My organization has employee-friendly policies	
My organization has on-the-job training facility	

2.4 Please rate the causes that affect the job security of TVET graduates using a scale of 1 to 5 with 5 being the most important skill. Not important 1, Less important 2, Neutral 3, Important 4, Most important 5

Issue	Ranking
strong foundation in communication skills	
correlation between teamwork and collaboration skills	
problem-solving skills	
Maintain workplace safety	
Unemployment caused by automation	

2.5 Identify the skills area that TVET graduates need to meet the challenges of automation?
a) Adaptability skills
b) Technical skills
c) Leadership skills
d) Communication skills

2.6 What are the most important employability skills in our context?
a) Communication
b) Teamwork
c) Independence
d) Leadership

2.7 Please mention courses about professional development that you have gone through while studying Diploma?

2.8 How do you think job vacancies require a combination of technical skills and soft skills?
a) Very high demand
b) High demand

c) Moderate demand
d) Low demand

2.9 Which Soft skills are demanded in job circulars for diploma engineers' recruitment?
a) Communication literacy
b) Technical expertise
c) Cross-cultural communication skills
d) Digital literacy

2.10 Which skills do you feel Diploma engineers need to survive in the international labor market?
a) Communication skills
b) Problem-solving skills
c) Leadership skills
d) Adaptability & Flexibility

2.11 What are the challenges faced by diploma engineers in workplace?
a) Green technologies
b) Automation
c) Technological Advancement
d) Change of job roles.

Section 3: integrate soft skills in Diploma engineering education through pedagogical approaches

3.1 Please mention some courses that you feel can contribute for soft skill development:

3.2 Do you feel that your academic courses provide proper guideline for developing soft skills?
a) Yes
b) No (Please specify why)……

3.3 Do you think soft skills can be developed through academic courses?
a) Yes
b) No (Please specify why)……

3.4 In your view, which approaches can be incorporated to increase TVET student engagement?
a) Real-world projects
b) Interactive online modules
a) Industry guest speakers experience sharing
b) Alumni Association

3.5 How did training or attachment benefit you to get a job?
a) Provide Practical Experience
b) Develop Networking
c) Build Confidence
d) Help for career planning

3.6 What can be done to increase the effectiveness of industrial attachment?
a) Increasing duration of attachment
b) Ensure quality of completed tasks
c) Regular Monitoring by the institute
d) Evaluation Process modification

3.7 How does industrial attachment help students' overall learning outcomes?
a) Develop Professionalism
b) Provide Career pathways
c) Exposure to Real world
d) Workplace experience

3.8 Which teaching method do you (TVET students) prefer?
a) Traditional lectures
b) Hands-on workshops
c) Online video lectures
d) Group discussions

3.9 How do you feel mentorship and career is helpful for TVET students?
a) No effect
b) Minimal effect
c) Positive effect on motivation
d) Positive effect on career awareness

3.10 What kind of steps do you think need to be made in the existing diploma engineering course to enhance the soft skills of students?
a) Include Group Presentation
b) Introduce Term Assignments/ Projects
c) Introduce Field visit/Industrial tour
d) Engage students for organizing events
e) Organize special activities like debate, Quiz, skills competition, innovation fair, etc for students

f) Introduce counseling and career guidance for students

3.11 Which extracurricular activity can be practiced to foster TVET students' soft skills?

a) Sports clubs
b) Entrepreneurship workshops
c) Community service activities
d) Creative arts clubs

3.13 How do you feel the TVET institute and industry linkage impact students' quality?

a) No impact
b) Limited impact
c) Moderate impact
d) Substantial impact

3.14 What do you feel should be done to improve students' soft skills?

Appendix C

FGD Check list for Industry:

Date	
Venue/ Location	
Industry name	
Number of participants	
Start Time	
End Time	
Facilitator	
Note Taker	

Employer's Requirement

1. Are you happy with the current level of soft skills of diploma engineering graduates?

2. Which specific skills do you consider most valuable for the workforce?

3. What are the key soft skills that are most relevant and valuable for diploma engineering students to acquire for success in their future careers?

4. How industry stakeholders can input their ideas into the curriculum integration process to enhanced soft skills?

Labor Market factors

5. What are the recruitment factors for your organization?
6. What are the vacancy characteristics for the diploma engineering graduates?
7. What kind jobs are available in the international job market for diploma engineering graduates?

FGD Check list for BTEB:

Date	
Venue/ Location	
Number of participants	
Start Time	
End Time	
Facilitator	
Note Taker	

1. What are the most effective pedagogical methods for incorporating soft skills into diploma engineering level curriculum?

2. How can teachers be trained and prepared to teach and assess soft skills?

3. Do you feel that integration of soft skills in diploma engineering curriculum will increase graduates' employability?

4. Is there any scope of assessing soft skills in current diploma engineering curriculum?

5. How do think soft skills related activities can be added in diploma engineering assessment?

6. What are the challenges and barriers faced by institutions when trying to integrate soft skills into the diploma engineering curriculum?

7. How can these challenges be addressed?
8. How can Industry Collaboration play a role for enhancing soft skills? Does your institute have Connection with the local industry?
9. What is the impact of incorporating soft skills development on students' overall academic performance and motivation?
10. What is the role of faculty involvement for enhancing soft skills?

KII Questions for Principal/BTEB Professional/ DTE Officials:

Date	
Venue/ Location	
Name	
Position	
Organization	
Start Time	
End Time	
Facilitator	
Note Taker	

1. What are the perceptions of teachers, industry experts and students regarding the importance of integrating soft skills into the diploma engineering curriculum?
2. What pedagogical strategies should be employed by institutions to integrate soft skills into diploma engineering program?
3. What challenges and barriers of integrating soft skills into the curriculum, and what recommendations do they have for overcoming these challenges?
4. What kind of role can play Principals/DTE/BTEB for effectively teaching and assessing soft skills within the diploma engineering curriculum?
5. How do BTEB balance between technical and soft skills in the curriculum?
6. Which innovative pedagogical approaches or tools do you recommend for enhancing the development of soft skills in diploma engineering students?
7. How do you feel Industry Collaboration play a role for enhancing soft skills?
8. What is the role of faculty involvement for enhancing soft skills?
9. Does BTEB/DTE have any Collaboration with International labor market for diploma engineers?
10. Does BTEB/DTE have any connection with the Employers' associations

REFERENCES

Akhter, W. (10 Oct), 4th Industrial Revolution: Skills Sets for Employability of Business Graduates in Bangladesh, *International Journals of Multidisciplinary Research Academy.*

Aspire to innovate (2022), Future skills Finding Emerging Skills to Tackle the Challenges of Automation in Bangladesh.

Balcar, J. (2016). Is it better to invest in hard or soft skills? Economic & Labour Market Review. Rev. 27, 453–470. doi: 10.1177/1035304616674613.

Ministry of Education (2023, March), Bangladesh National Qualifications Framework (BNQF).

Bangladesh Bureau of Educational Information and Statistics (2022) Bangladesh Education Statistics 2021.

Cengage (2019 Jan 16), Demand for "Uniquely Human Skills" Increases Even as Technology and Automation Replace Some Jobs. Retrieved from http://www.prnewswire.com/news-releases/new-survey-demand-for-uniquely-human-skills-increases-even-as-technology-and-automation-replace-some-jobs-300779214.html

Calero López, I., & Rodríguez-López, B. (2020). The relevance of transversal competences in vocational education and training: a bibliometric analysis. Empir. Res. Vocat. Educ. 12:12. doi: 10.1186/s40461-020-00100-0.

Charlton, E.(2019 Jan 16), These are the 10 most in-demand skills of 2019, according to LinkedIn. Retrieved from https://europeansting.com/2019/01/16/these-are-the-10-most-in-demand-skills-of-2019-according-to-linkedin/

Cherri, L. H. (2008), The Mathematics of Industry 4.0, Retrieved from htt.ps://medium.com/@luizcherri/the-mathematics-of-industry-4-0-81904d7bd3cb

Cimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. Int. J. Qual. Res. 10, 97–130.

Cinque, M., Carretero, S., and Napierala, J. (2021). Non-Cognitive Skills and other Related Concepts: towards a Better Understanding of Similarities and Differences. Retrieved from: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/non-cognitive-skills-and-other-related-concepts-towards-better-understanding-similarities [accessed on February 1, 2021].

Cooke, B., & Zaby, A. (2015). Skill gaps in business education: Fulfilling the needs of tech startups in Berlin. Journal of Higher Education Theory and Practice.

Diploma in Engineering Probidhan 2022, Bangladesh Technical Education Board. Retrieved from: https://drive.google.com/drive/folders/19gqwGlwCzDkgQrVOxZTqkQSBqLIrzI3o

Dweck, C. S. 2007, Dec 26), Mindset: The New Psychology of Success Paperback.

ELEARNING infographics.com (2016 Sep 16), Soft Skills vs Hard Skills Infographic. Retrieved from https://elearninginfographics.com/soft-skills-vs-hard-skills-infographic/

Elfadil, N., and Ibrahim, I. (2022). Embedded system design student's learning readiness instruments: systematic literature review. Front. Educ. 7:799683. doi: 10.3389/feduc.2022.799683

Hartanto, S., Lubis, S. and Rizal, F. (2017 Jan 13), Need and analysis of soft skills for students of the mechanical engineering department of vocational high school.

Hossain, M. A. (2021), Demand analysis of diploma in engineering (Printing) in current Job Market of Bangladesh, Directorate of Technical Education,

ILO, News (2021 Mar 17), Soft skills improve the employability of youth and job seekers. Retrieved from: https://www.ilo.org/jakarta/info/public/pr/WCMS_776501/lang--en/ index.htm

Infographic (2020, July 20), 10 Characteristics of Successful Engineers, Retrieved from: https://newengineer.com/insight/10-characteristics-of-successful-engineers-1356585

Ismail, J.B., Chik, C. T., & Hemdi, M. A. (2021 Jan 25), TVET graduate employability: mismatching traits between supply and demand, International Journal of Academic research for business & social science.

Kamaruzaman, F. M., Hamid, R., Mutalib, A.A., & Rasul, M.S.(2019), Comparison Of Engineering Skills With Ir 4.0 Skills, International Journal of Online and Biomedical Engineering (iJOE)

LinkedIn 2023 Most In-Demand Skills (2023 Feb 20), Learn the skills companies need most. Retrieved from: https://www.linkedin.com/business/learning/blog/top-skills-and-courses/most-in-demand-skills

Martin, J. P., Skills for the 21st century: findings and policy lessons from the OECD survey of adult skills, Organization for Economic Co-operation and Development, Working Paper No. 166

Mentortec, Anespo, Blick, Cece, Efvet, Pit and Pixel (2018). Soft Skills Framework for The Vocational Education & Training, VET_GPS project. Retrieved from https://www.vetgps.eu/download/Integration%20of%20Soft%20Skills%20in%20VET-Guide.pdf

Mundy, K., & Verger, A. (2015). The World Bank and the global governance of education in a changing world order. International Journal of Educational Development, 40, 9–18. https://doi.org/10.1016/j.ijedudev.2014.11.021 [Crossref], [Web of Science ®], [Google Scholar]

Nakata, S., Nagashima,Y., Rahman, M.M., Rahman, T.R. Chowdhury, A.R. & Rahman, M.A. (2018) Bangladesh Skills For Tomorrow's Jobs: Preparing Youths For A Fast-Changing Economy, The World Bank.

Oviawe, J. I. (2018). Revamping technical vocational education and training through public-private partnerships for skill development. Journal of Higher Education, 10(1), 73–91. https://doi.org/10.4314/majohe.v10i1.5

Okoye, K. R. E., & Chijioke, O. P. (2013). Private-public partnership and technical Vocational Education and Training (TVET) in a developing economy. Arabian Journal of Business and Management Review, 2 (10), 51–61. Retrieved from https://www.arabianjbmr.com/pdfs/ OM_VOL_2_(10)/6.pdf

Powar, K. B. (2004). Internalization of Higher Education: An Aspects of India's Foreign Relations. New Delhi: Gyan Publishing House.

PwC EU Services (2020). Skills for Industry Curriculum Guidelines 4.0: Future-Proof Education and Training for Manufacturing in Europe. Retrieved from: https://op.europa.eu/en/publication-detail/-/publication/845051d4-4ed8-11ea-aece-01aa75ed71a1.

Rashid, S. (2020), Technical Education in Bangladesh: the context of 4th Industrial, Digital and Space Revolution. Retrieved from https://www.researchgate.net/publication/343821753

Rumi, M. H., Rashid, Makhdum1, M. H., & N. U. Nahid, Fourth Industrial Revolution in Bangladesh: Prospects and Challenges. *Asian Journal of social sciences and legal studies.* Retrieved from: https://www.researchgate.net/publication/344444672_Fourth_Industrial_Revolution_in_Bangladesh_Prospects_and_Challenges

Shmatko, N., & Volkova, G. (2020). Bridging the skill gap in robotics: global and national environment. SAGE Open 10, 1–13. doi: 10.1177/2158244020958736.

Skills for Employment Investment Project (SEIP 2017), BIDS study Report- Labor Market and Skills gap in Bangladesh. Retrieved from http://bidslink.bids.org.bd/bidsorgbd/completed_research/LABOUR_MARKET_AND_SKILL_GAP.pdf

Stewart, C., Wall, A., & Marciniec, S. (2016). Mixed signals: Do College graduates have the soft skills that employers want? Competition Forum, 14(2), 276-281.

Talentlms (2020, Jun 25), Employee upskilling & reskilling statistics: Casting light on the trend. Retrieved from https://www.talentlms.com/blog/reskilling-upskilling-training-statistics/

Thapa, A., Willing to know more about Soft Skills?

The World Bank Group (2018), Bangladesh skills for tomorrow's jobs: preparing youths for a fast-changing economy, Education Global Practice.

UNESCO (2015). Shaping the education of tomorrow, 2012 Report on the UN Decade of Education for sustainable development, Abridged. Retrieved on 12 May, 2018, www.unesco.org/.../education/...education-for-sustainable-development/ publications/

Van Dam, N., 4th Industrial Revolution & the Future of Jobs, Bookboon, 2017,

World Economic Forum 2020, Future of Jobs Report. Retrieved from: https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-omorrow-how-long-it-takes-to-learn-them/