Implementing Outcome Based Education (OBE) in Textile Engineering Undergraduate Program in Bangladesh

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Abstract— Outcome-based education (OBE), is considered as quality-based education, is an academic concept that includes all the areas of an educational system around goals or results. It has become the necessity of the global academic system at present. Outcome-based education ensures the student and teachers knowledge exchange. It will also satisfy the requirements of the stakeholders during OBE placement. The employers can easily choose the graduates based on the graduate attributes after the end of their four years engineering study period. It is evident that inclusion of Outcome-based education will have a positive impact on the graduates after their four years of study period that can be applied for the stakeholders. In this paper it was tried to assist the faculty members to prepare themselves for the OBE based education for the department of textile engineering of different universities in Bangladesh.

Keywords— OBE – Outcome Based Education CO- Course outcomes, PO - Program Outcomes, PEO - Program Educational Objectives, CQI - Continuous Quality Improvement, SAR Form – Self Assessment Report Form.

I. INTRODUCTION

As there is no particular rule for implementing outcome-based education for a particular program, it is slightly uncomfortable for the faculty members to implement the OBE based programs, different ideas and visions were generated by the different resource persons to implement the outcome-based education in Bangladesh. They usually follow the rules of Washington Accord. BAETE also organized a conference in 2019 for the universities to make the OBE implementation process user friendly. The European Union already started education plan to focus on outcome-based education around the EU. Washington Accord was established in 1989 and this was an effort to promote the undergraduate engineering programs.

In this regard the Board of Accreditation For Engineering And Technical Education Board(BAETE) of accreditation for technical education has taken initiative for the first time in Bangladesh, which is a section of IEB, our neighboring countries like India, Sri Lanka Malaysia already started the implementation process of OBE from since 2008 to 2009 and Australia, USA another countries have started this process Long back the process involves several sequence which the faculty members of the department at the beginning, finds difficult to implement to avoid this difficulties by BATE has organized number of seminars and workshops for the faculty members of the different universities of different universities of different departments, as it is result The faculty members of different department of the universities started to think that the process is not that difficult is it looks by design organization, who has continuously tried to make the process easy to the faculty members of different universities of Bangladesh mentioned that earlier to get accreditation OBE system was not required for the universities based on that different universities took the opportunity and accredited accordingly without the OBE system till 2017 after 2017, the activation Process without OBE was lifted by BAETE But from 2017, June by the instruction of BAETE, the universities of Bangladesh started to follow the second edition of BAETE. All the Universities have to submit SAR Self-Assessment, which is attached in chapter

7. The SAR includes the University administration, academic activities, extra and co-curricular activities the Alam, the stakeholder are the industries. OBE system for the engineering department has 12 graduate attributes or program outcomes which are set by the Washington Accord. The department highlights the program outcome as per the courses offered to the students of the department in the four years' time. information that are required in the self-assessment report requires specific data entry to complete the SAR report. The academic teaching learning process is different than the regular teaching learning system this is one of the reason that the faculty members or the teachers are uncomfortable with the new method of teaching, which is included in the OBE system.

There is no particular method of teaching or evaluation in OBE system, however, classes and evaluation assist the students to accomplish the definite results. The part of the faculty members turns them into trainer, motivator or influencer based on the outcome-based system.

Comparison between General/Traditional and OBE-based education

General/Traditional	Outcome-based Education System
Input-based education	Outcome-based education
Faculty/Teacher-centered teaching	Student-based education
Summative assessment-based teaching	Formative assessment
Teaching-based education	Teaching by Learning.

Aims of Accreditation

In all-purpose, the accreditation of a program authenticates and accepts the value of converting a student into a talented engineer with sound knowledge of basics and an satisfactory level of professional competence. The accreditation process is also important as a medium of endorsing quality by inspiring healthy competition among different degree programs at the same university and among similar programs at different institutions.

NO OBE

=

NO QUALITY STATNDARD

=

NO ACCREDITATION

=

NOT CREATING PROFESSIONAL ENGINEERS

=

NO JOBE AT OTHER SIGNATORY COUNTRIES

Bloom's Taxonomy

Blooms Taxonomy was introduced created in 1956

There are there of the taxonomy

- Cognitive domain: mental skill (knowledge)
- Affective domain: growth in feelings or emotional areas (attitude, self)
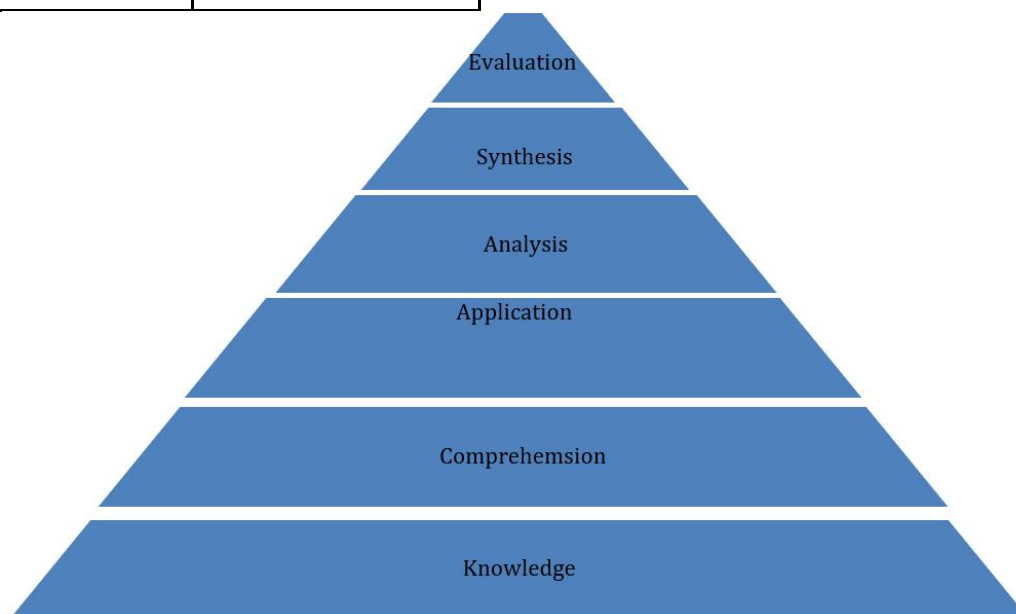- Psychomotor domain: manual physical skills (skills)

Fig.1- Blooms Taxonomy : Cognitive Domain

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VISION

Vision is represents the goals of a university /department would attain within a extensive span of time, such as-

- Produce extraordinary engineers.
- To be the top ranked university that spreads the knowledge in the highest form of technology.
- To become the hub of quality education and research which will produce leaders in technology, management, finance marketing and in all areas of science.
- To reach in a position where knowledge is generated in all aspects of technology.
- To reach among the highest ranked universities in the world.

MISSION

Missions are basically the means to attain the vision. A university may select a number of missions to attain the vision of the university. The missions will assist the faculty members in teaching.

Program Educational Objectives (PEO)

It is Observed when the graduates are working with the stakeholders. It can be evaluated monitoring the achievements of the outcomes after 3-5 years of graduation.

PEO - EXAMPLE

Practice the profession of engineering in an ethical and responsible manner Excel in research and innovation.

PEO - EXAMPLE

The Program Educational Objectives (PEOs) of the B. Sc. in Textile Engineering program of a university:

PEO 1: Graduates will be able to fulfill the need of technical manpower in the textile sector locally and globally.

PEO 2: Graduates will grow the ability of applying scientific and technical concepts for solving problems in textile and its allied sectors.

PEO 3: Graduates will be able to comply with scientific multidisciplinary approaches for supporting the research and needed change towards development of the textile sector.

PEO 4: Graduates will be able to work in a team by developing communication skills, leadership, entrepreneurship with ethics and values. Hence, graduates will be able to fit in the Textile (knitting and weaving), Apparel and Fashion Industries.

II. METHODOLOGY

The following steps should be taken for OBE Implementation/Accreditation

Tasks to be followed by the faculty members:

1. OBE based course file preparation which will include i) Class Test ii) Quiz iii) Assignments iv) Midterm and v) Final examination.

2. Preserving the exam script for 03 semesters based on which the Accreditation Application (SAR) was submitted. Better to preserve all the exam script i) Class Test ii) Quiz iii) Midterm and iv) Final examination.

3. Will have to prepare the CO's.

4. CO and PO mapping along with the course file.

5. PO and PEO mapping.

6. Concept of Bloom's Taxonomy.

It is very important to have a clear idea on the manual version 2.1 which was effective from June 2022. There are 10 criteria or chapters in this manual and the manual includes the academic and administrative information for university. The department should carefully go through the chapters or criteria and put their information as per the requirement of the individual chapters. It will reduce the load of the teachers if the chapters are distributed among the teachers. Suppose if two or three teachers or one teacher is engaged for one chapter, so if there are 20 teachers, then two teachers for one chapter may be included, which will surely reduce the load of the faculty members. After completing the chapters as per the requirement, all the chapters may be compiled so then there will be a complete picture for the department and this will help the evaluator to study the self-assessment report during the evaluation.

III. DISCUSSION

It has to be remembered that the faculty members need to study the credit manual very carefully before they start the process of preparing the course file because without the course file a faculty member might not be able to prove his or her participation in the accreditation process. The entire process is a huge task and it is entirely based on team collaboration or teamwork. So, everyone should encourage everyone to complete the process preparation and the teacher's or faculty members should help each other during the process.

To implement the outcome based education system there are 10 criteria number one criteria is organization and governance financial and physical resources. Faculty

number and students number, five- Academecic facilities and technical support number six curriculum and teaching learning assessment process number seven Program Educational Objective number eight program outcomes and assessment number nine- continuous quality improvement and number 10 is interactions with the industry.

Department after applying has to follow the above criteria starting from criteria number 1 to 10 most of the faculty members are uncomfortable at the beginning after going through the criteria mention in the manual so what the faculty department has to do is to make two or three teams or four teams to gather the information that are mentioned in the criteria 1 to 10 group will collect information of the from the administration of the university regarding organization and governance one group collect the information from the accounts department and one group will input the information regarding the faculties. Another group will collect information of the students, other group will collect their academic facilities and technical support information and one group will put the curriculum and teaching learning processes and one group collect the Program Educational Objectives information when one group will assist in the assessment of program outcomes one group will input the continuous quality improvement and one group will input the information regarding the industrial visit and communication with the industry personnel.

Graduate Attributes

The Graduate Attributes (GA) or Program Outcomes (PO) for B.Sc. in Engineering: POs are brief ideas that what the students will achieve at the end of their graduation period.

PROGRAM OUTCOME (PO)

PO1 - **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering prOBElems.

PO2 - **Problem analysis**: Identify, formulate, research the literature and analyze complex engineering prOBElems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

PO3 - **Design/development of solutions**: Design solutions for complex engineering prOBElems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

PO4 - **Investigation**: Conduct investigations of complex prOBElems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5 - **Modern tool usage**: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - **The engineer and society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7 - **Environment and sustainability**: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PO8 - **Ethics**: Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.

PO9 - **Individual work and teamwork**: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

PO10 - **Communication**: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

PO11 - **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

PO12 - **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change [7].

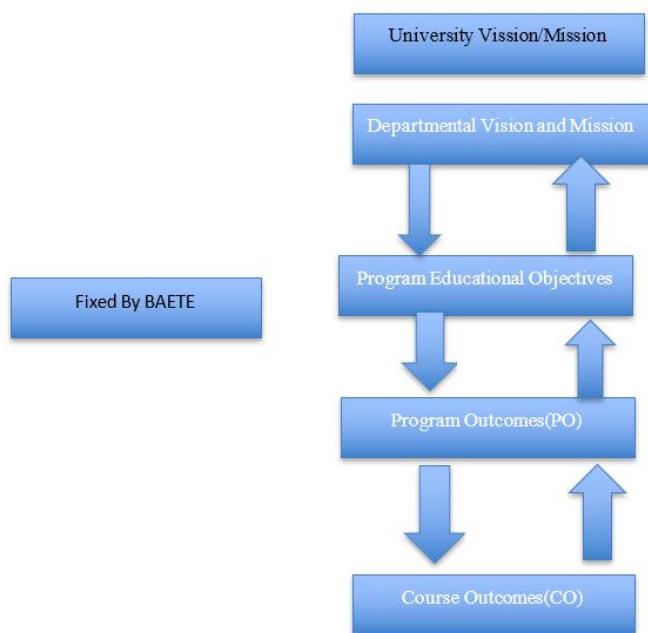**'Flow Process of OBE Implementation:'**

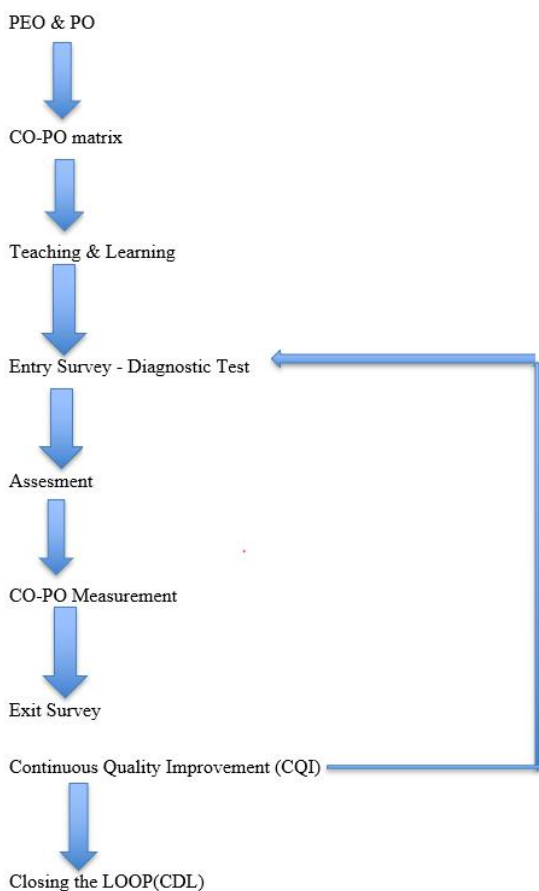*Fig.2 – OBE flow process*

IV. OBE IMPLEMENTATION FLOWCHART

Fig.3 – OBE flow process with CQI

V. CONCLUSION

There is no specific criteria for the department of textile engineering on a textile engineering program to comply with the textile engineering program with the OBE system but the process is almost the same compared to the other engineering programs. So, if the faculty members start in time the accreditation process may become easier for the faculty members and this is a process which needs time. So the more time is offered or engaged for this process, the accreditation activation process will be easier so it will take at least 2 to 3 years to understand the whole process by the faculty members. So, the faculty member should have the patience to prepare the course files. If the teachers do not have a proper idea of the OBE system, then they cannot explain it to the students.

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