# OUTCOME BASED EDUCATION: A STEP TOWARDS QUALITY IMPROVEMENT IN HIGHER EDUCATION OF PAKISTAN

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## Abstract

*The need for outcome based education is of paramount importance as outcome based education system is a student-centric teaching and learning approach in which course delivery and assessment are planned to attain certain well defined objectives and outcomes. It emphases on assessing student performance i.e. outcomes at different levels. Due to its immense benefits to the students, adopting outcome based education is a favorite choice of curriculum planners, curriculum developers, faculty, employers and students. This paper describes a basic framework of assessing outcome based education which may be implemented by the higher education commission of Pakistan in degree awarding institution across.*

**Keywords:** Outcome based education, program educational objectives, student learning outcomes, course learning outcomes

## Introduction

Post-secondary education in Pakistan is traditionally being carried out by designing a syllabus describing what needs to be taught. This is a teacher centric methodology resulting in a focus on what a teacher should be teaching rather than what a student should be learning. Since there is no formal mechanism of quality assurance of education in the traditional teacher centric approach currently in practice in higher education institutes, there is a need to change the years old teacher centric methodology to outcome based methodology commonly known as outcome based education (OBE). OBE necessitates to define certain graduate attributes (GAs') called the student learning outcomes (SLOs')/program learning outcomes (PLOs')

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which a program is expecting from its students to attain at the time of their graduation. These GAs' may include communication skills, modern tool usage, team work, lifelong learning etc. OBE lay emphasis on a curriculum having peculiar learning outcomes. The curriculum of a particular degree would determine what kind of skills students are expected to attain at the time of their graduation. For example, one of the learning outcomes of graduates of a BS in economics may be to utilize micro and macro-economic theory to appraise a specific economic scenario in an institution.

Further down to the course level, all courses have course learning outcomes (CLOs') which are Bloom's Taxonomy based peculiar statements a student should be expected to do at the end of each course. Course instructor keeps track of attainment of CLOs' as well as the SLOs'/PLOs' based on a certain threshold value and if he/she observes an anomaly, he/she will initiate a corrective action.

Each educational organization sets up its own GAs'. In OBE system, educational organizations postulate any outcome (skills and knowledge). Some standard models of SLOs'/PLOs' include the Washington Accord's 12 GAs' for all the engineering programs, Accreditation Board for Engineering and Technology (ABET) GAs', National Science Education Standards etc.

Since Pakistan engineering council (PEC) is a member of the Washington Accord so it has successfully implemented the OBE system in engineering programs under its umbrella. Rest of the higher education undergraduate programs such as computer science, physics, etc. are still taught based on traditional teacher centric approach.

Spady (1988) has defined OBE as a technique of crafting, developing, delivering and documenting the whole program in terms of GAs'. Spady (1994) further elaborates OBE as

> "Outcome-Based Education means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences."

As compared to the traditional teacher centric system practiced in Pakistan (input based education) were the emphasis is on objectives, the purpose of OBE is based on two prong strategy.

- Designing program specific SLOs' around which entire academic system may be designed
- Establishing implementation strategies for the students to attain these SLOs'/PLOs'.
  OBE system can be implemented successfully by defining the following

**Institutional Requirements**
- A well-defined vision and mission of the institute incorporating its principal, business and ethical values.
- Vision and mission should entrust the stakeholders including employers

**Student Learning Outcomes**
- A curriculum based on suggestions of all stake holders
- Program educational objectives and student learning outcomes of the program with input from the employers and other stake holders
- Mapping of SLOs'/PLOs' to the PEOs'

**Course Learning Outcomes**
- Development of CLOs'
- Mapping of CLOs' to the SLOs'/PLOs'
- Assessment process for attainment of CLOs' such as faculty course assessment report (FCAR)

**Assessment Process**
- A well-defined assessment process indicating key performance indicators (KPI) for individual as well as cohort level.

**Need for Assessment**
- Enhance Student Engagement
- Continuous improvement of Curriculum, Instruction, and Student Performance
- Promotes Professional Community (inquiry, reflection, scholarship of practice)
- Enables students, faculty, programs, and institutions to Self-Advocate i.e. able to participate in data-based decision-making
- Better reflects the complexity, extent, and impact of faculty work
- Helps achieve institutional mission
- Develops Public Trust

## Literature Review

Student-centered learning (SCL) is a topic of argument among educators in education especially in higher education for many years. In an important study, Tyler (1949) emphasized the importance of curriculum design based on SLOs'/PLOs'. In his book Spady (1994) emphasizes that American education system needs a paradigm shift from the teacher centric to student centric. Davis (2003) in his study underlined that OBE is a system in which the curriculum is designed based on SLOs'/PLOs' and students are expected to attain these at the end of a particular program. Harden et. al. (1999) in his

study observed that SLOs' should evidently describe sort of students a program is producing with desirable competencies and skills. Zitterkopf (1994) pointed out that difference between being outcome based and simply producing outcomes is significant. course Harden et. al. (1999) observed that although definition of OBE seems simple but it is difficult to implement the as the essence of OBE system is a curriculum based on certain SLOs'/PLOs' and students are expected to achieve these at the end of a pogrom. An OBE based curriculum should be aligned with Bloom's taxonomy based CLOs', teaching methods, student focused learning environment, pedagogic intermediations and evaluation parameters for it to successful. Spady (1994) is of the view that emphasis should be on the action oriented verbs when defining SLOs'/PLOs' for a curriculum. Barr and Tagg (1995) observed that purpose of OBE system is to act as learners, continuously learning to produce more learning. Cannon and Newble (2000) found SCL as ways of learning activities centered around students rather than teachers. SCL emphasizes on student accountability and activity as compared to teacher regulated course. In this approach more is required from students than learning course content to clear an exam. An OBE system is based on active rather than passive learning, profound learning and understanding, culpability and responsibility and independent thinking. Wright (2011) in her book elaborates various dynamics of SCL namely

- balance of power in a classroom,
- course content,
- student Vs teacher role,
- obligation of learning,
- evaluation purpose and processes.

OBE and student learning are correlated as OBE system demands students to be learners instead of being observers, student participation in an OBE system is imperative for its successful implementation. According to Rao (2020), OBE system may be divided in to three levels namely PEOs', SLOs'/PLOs' and CLOs'.

In 1997, following nearly a decade of development, ABET adopted engineering criteria 2000 (EC2000) that focused on outcomes (what is learned) rather than what is taught. EC2000 asserted the importance of engineering programs making meaningful objectives and assessment processes so that it can equip its graduates with the required skill based on industry demand.

By eliminating the inflexibility of earlier accreditation criteria which was based traditional teacher centric approach, EC2000 enables program innovation instead of stifling. It encourages novel assessment processes to further improve an engineering program.

ABET relentlessly promoted the EC2000 approach with other accreditation bodies. It has also promoted global education and career

mobility through mutual recognition agreements (MRAs'), including the Washington Accord, the Seoul Accord, the Sydney Accord and the Dublin Accord.

Under the umbrella of Pakistan Engineering Council (PEC), OBE system has been successfully implemented in all the engineering degree awarding institutions in Pakistan and by doing so, Pakistan has become a permanent member of the Washington Accord, a multi-lateral accord among organizations responsible for accreditation and recognition of engineering qualifications within their jurisdictions agreeing to work together to assist the agility of professional engineers as stated by International Engineering Alliance (2021).

Rest of the higher education programs in Pakistan are governed under the traditional input system in which focus is on objectives instead of leaning outcomes. As a result, students lack the required skills as demanded by the employers nationally and internationally.

In this paper a basic structure of OBE system is explained with the help of different assessment tools and strategies and it is desired that HEC may work on these lines to streamline its educational system and be compatible with rest of the developed world.

**Outcomes Assessment (OA)**

It measures an educational program's quality and provides a persistent teaching and learning environment. OA focuses on delivering a meaningful and relevant student learning experience. OA is generally linked to educational institution mission statement.

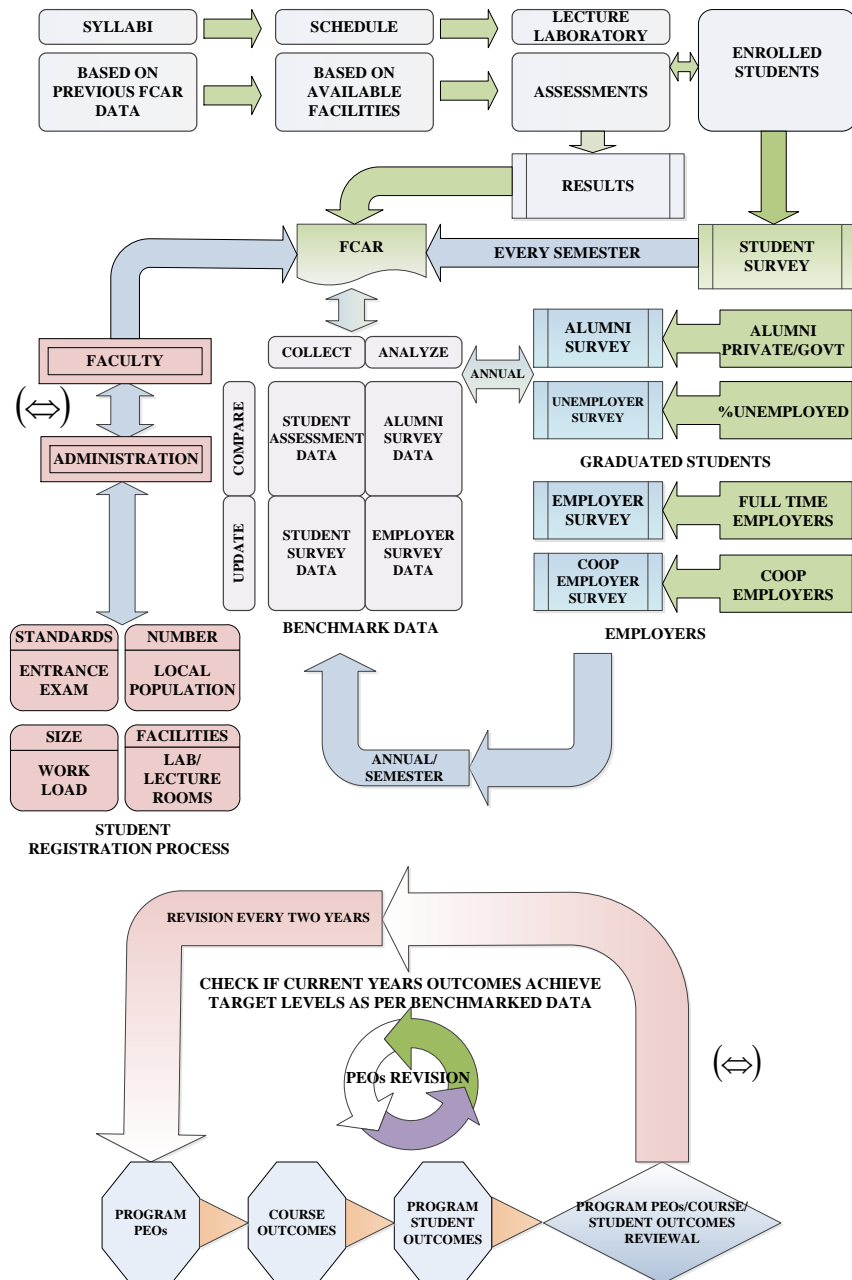Figure.1 shows a general outcomes assessment process.

Figure 1: Outcomes Assessment Process.

**Assessment Levels**

Assessment of a program may be in to three levels namely, PEO) Assessment, SLOs'/PLOs' Assessment and CLOs' Assessment.

**PEOs' Assessment**

PEOs' are the attributes and abilities that the graduates are expected to demonstrate in their career life few years after graduation. PEOs are direct translation of an institute and program mission, and are developed by the involvement of all stakeholders. The PEOs stipulate the high-level program objectives and provide a broad framework to design program-learning outcomes, curriculum and its provision.

Due to importance of PEOs in the OBE system, a formal mechanism of taking input from internal (students, faculty) and external stakeholders (industrial representatives) must be invoke for developing and approving the PEOs'.

From the program perspective, the SLO should be used as a guide to steer students towards the PEO after graduation. Once SLOs' data is assessed, action items generated should then be used to further assess if the PEOs are achieved. As shown in the flow cycle, it is termed as PEO assessment. Since PEOs' are reviewed 4 years after graduation, assessment cycle for this level should be conducted once every four years. This cycle is adequate enough to measure the PEO relevancy to a program's constituents.

The PEOs of a program are developed in a manner to inculcate the ability of accomplishments that the graduates are expected to demonstrate after graduation. The selected PEOs should also be aligned with vision and mission of the university and the program. While measuring the attainment of these PEOs, the diversity in choices of graduates in selecting their employment after graduation should be kept in mind.

Graduates of a program may go for entrepreneurship, industry, higher education or other professions later on. Program performance indicators (KPI) are tailored such that deviations in choices are taken into account. Certain minimum requirements are kept as KPIs' so that success of program can be established and measured with each review cycle. Benchmarks are also identified that define various measures of success, which would be used over next 4-5 years to quantify the achievements and progress of the program.

Therefore, the overall process of PEOs assessment and evaluation can be divided into the following main steps:
a) Collection of Alumni and Employer data through survey.
b) Analysis and evaluation of collected data against KPIs and drawing conclusion about PEOs continual quality improvement (CQI).

Continuous assessment and evaluation are mandatory to ascertain whether teaching and learning processes achieve the goals and objectives

defined for the program. For a program, the evaluation of achievement of PEO may include the following steps:

1. Data through alumni and employer's feedback will be collected after four years of graduation. The collected data will be used for assessment of the corresponding batch after 4-5 years of graduation.
2. A thorough evaluation of collected data will be carried out by the quality enhancement cell-program team (QEC-PT) against KPIs
3. Evaluation of the data helps QEC-PT to prepare a comprehensive report via corrective action form and recommend corrective actions if required. QEC-PT reports the collected data to HoD along with recommendations for improvement.
4. The corrective actions if required are initiated by HoD over QEC-PT report.
5. The corrective actions include:
    a. Revision of PEOs
    b. Revision of KPIs for PEOs
    c. Revision of assessment methods
    d. Revision of curriculum/strategies
6. The recommendations encompassing corrective actions in curriculum, assessment methods and revision of KPIs for PEOs should be further discussed in curriculum review committee (CRC) through HoD and QEC-PT. Input from PIAC and PSAC will also be a part of this process. The corrective measures agreed by CRC are forwarded to relevant academic bodies i.e. (BoS, BoF and AC) meetings for implementation.
7. However, if it is decided that the PEOs need to be revised, the case should be forwarded to the program industrial advisory committee (PIAC) and program student advisory committee (PSAC). The finalized recommendations will be forwarded for discussion and approval of implementation in BoS, BoF, and AC meetings.

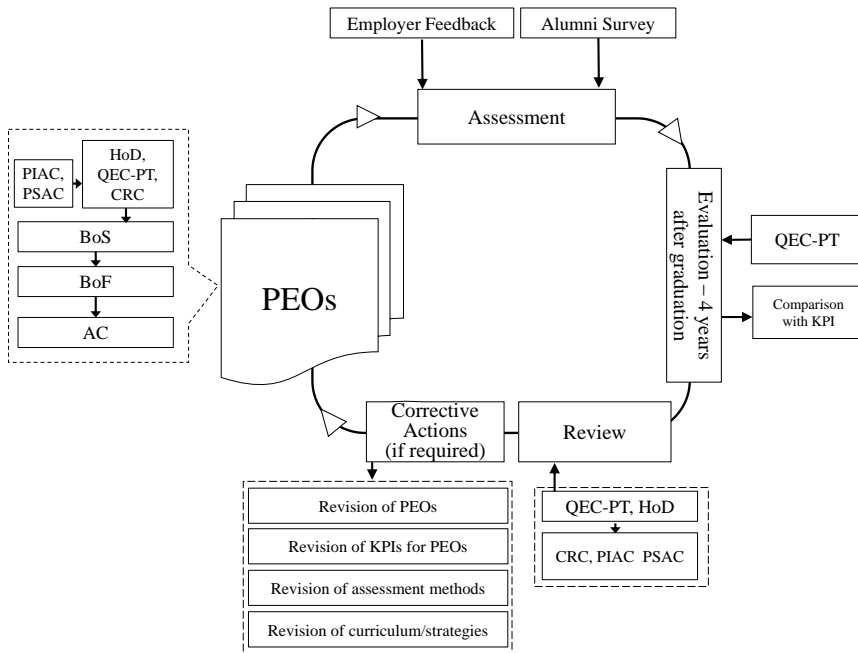The PEO evaluation and review process is part of the overall CQI process.

Figure 2: CQI Process for PEOs.

**Level 2: SLO Assessment**

SLOs broadly describe the skills, knowledge, and behaviors that the students acquire in their program of study, which are intended to foster the achievement of PEOs. Therefore, it is important to relate each SLOs'/PLO with PEO for the intent of promoting its achievement. SLOs'/PLOs' that can be measured by the time of graduation, are the way by which the program prepares its graduates to achieve PEOs'.

**SLOs'/PLOs' Evaluation Process**

Efforts are made for achievement of SLOs'/PLOs' in the department through CLO-PLO mapping. SLOs'/PLOs' will be assessed directly through curriculum and indirectly through internship feedbacks and exit surveys. Evaluation of achievement of SLOs'/PLOs' should have the following steps:

1. Data is collected and analyzed at various stages during the academic program, while evaluation and review of SLOs'/PLOs' for a certain batch is carried out at the graduation stage by QEC-PT.

2. The stakeholders involved in the assessment of SLOs'/PLOs' are university (faculty), students and the industry/employers. Faculty is involved through teaching and direct assessment of SLOs'/PLOs', students through exit surveys and industry is involved through input in the form of internship feedback.

3. QEC-PT evaluates the collected data (faculty report, exit survey, and internship feedback) at graduation against the selected KPIs for cohort level and initiate CQI if required and decide if any corrective action is required. Partial evaluation through excel spread sheet is also carried out at the end of each semester to check SLOs'/PLOs' attainment at individual level and decide for corrective actions.

4. Evaluation of the data helps QEC-PT to prepare a comprehensive report via corrective action form and recommends corrective actions if required. QEC-PT reports the collected data to HoD along with recommendations for improvement.

5. The corrective actions required are decided by HoD over QEC-PT report.

6. The corrective actions include:
   a. Revision of curriculum/strategies
   b. Revision of KPIs for SLOs'/PLOs'
   c. Revision of assessment methods
   d. Revision of SLOs'/PLOs'
   e. Administrative Actions
   f. Revision of CLOs to SLOs'/PLOs' mapping

7. The recommendations encompassing corrective actions in curriculum, assessment methods and revision of KPIs for SLOs'/PLOs' are further discussed in CRC and PIAC committee through HoD and QEC-PT. The corrective actions are forwarded to relevant academic bodies i.e. (BoS, BoF and AC) meetings for approval of implementation as shown in Fig. 3.
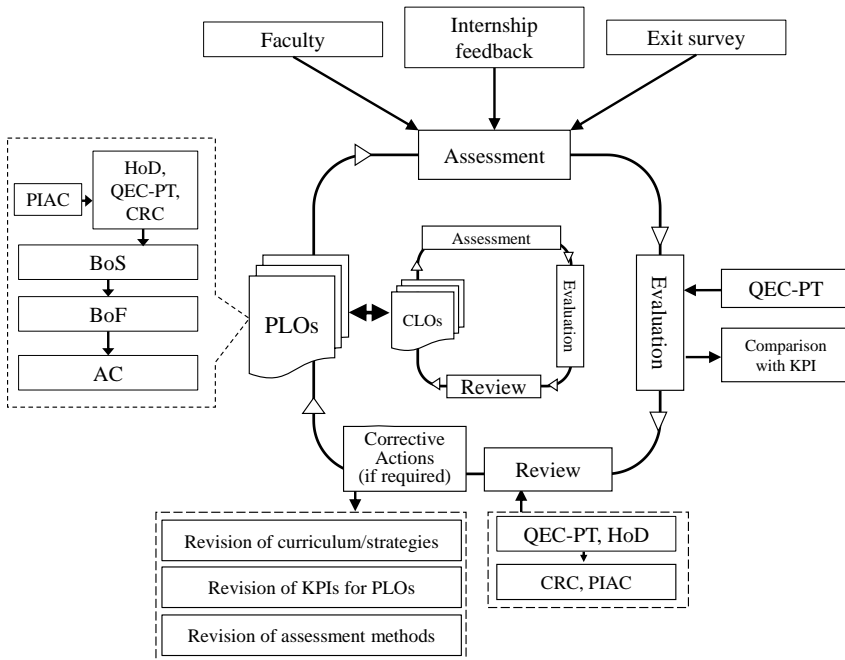
Figure 3: CQI Process for SLOs'.

## Mapping of Courses to SLOs'/PLOs'

To ensure that all SLOs'/PLOs' are covered adequately through courses in the curriculum, the courses are systematically designed and tailored to be mapped to the relevant SLOs'/PLOs'. The mapping shows achievement of SLOs'/PLOs' directly through CLOs as defined in various courses. Therefore, it becomes important to monitor the achievement of CLOs.

## CLOs Evaluation Process

Course outline incorporates course information, pre-requisites if any, course objective, definitions of CLOs as per learning domain (cognitive, psychomotor and affective) and Bloom's taxonomy level, relevant SLOs'/PLOs', mapping of CLOs to SLOs'/PLOs', detailed course content, text books/reference material, and assessment methods. Figure. 4 shows Bloom's taxonomy with some action verbs.
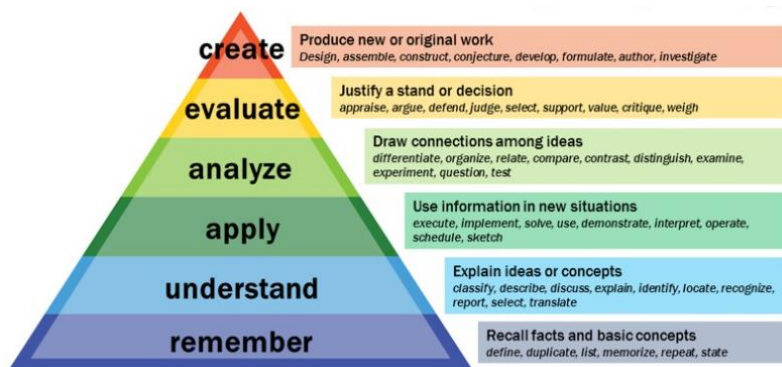
Figure 4: Bloom's Taxonomy.

The evaluation of achievement of CLOs' may be carried out through an elaborative process given in Figure. 5 having the following steps:

1. Data will be collected at the end of each semester by QEC-PT from the direct assessment of CLOs' by each faculty members through course review reports and OBE spread sheet.
2. A thorough analysis and evaluation of collected data will be carried out by the QEC-PT against the listed KPIs for each CLO.
3. Evaluation of the data helps QEC-PT to prepare a comprehensive report via corrective action form and recommends corrective actions if required. QEC-PT reports the collected data to HoD along with recommendations for improvement.
4. The corrective actions if required are initiated by HoD over QEC-PT report.
5. The corrective actions include:
   a. Revision of CLOs
   b. Revision of KPIs for CLOs
   c. Revision of assessment methods
   d. Revision of curriculum/strategies
6. The recommendations encompassing corrective actions in curriculum, assessment methods and revision of KPIs for CLOs' are further discussed in curriculum (CRC) review committee through HoD and QEC-PT. Input can be taken from industrial representative as well. The corrective measures agreed by CRC are forwarded to relevant academic bodies i.e. (BoS, BoF and AC) meetings for discussion and approval of implementation as shown in Figure. 5.
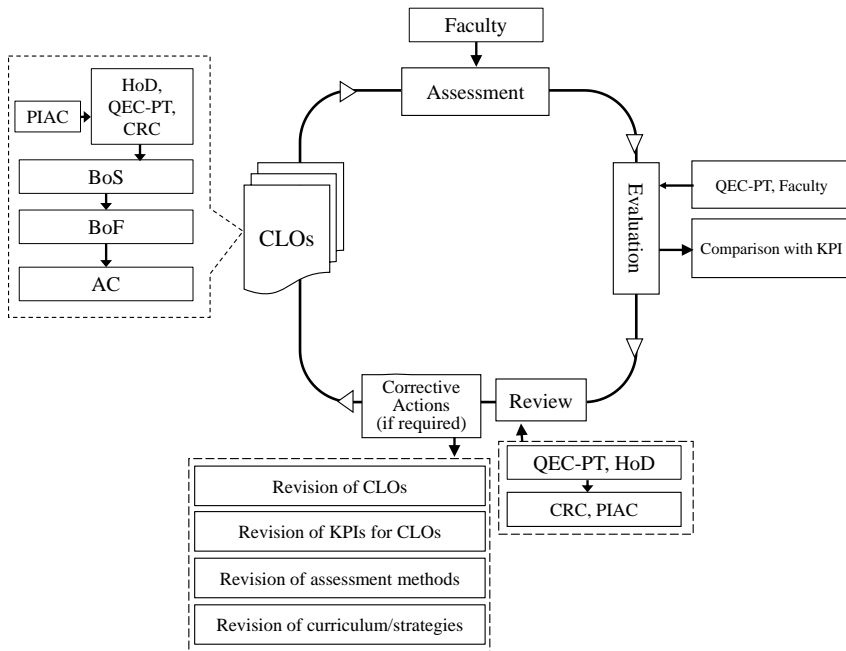
Figure 5: CQI Process of CLOs.

## Conclusion

The need for outcome based education is of paramount importance as outcome based education system is a student-centric teaching and learning approach in which course delivery and assessment are planned to attain certain well defined objectives and outcomes. It emphases on assessing student performance i.e. outcomes at different levels. Due to its immense benefits to the students, practicing OBE system is the choice of curriculum planners and developers, faculty, employers and students. In this paper a basic structure of OBE system is explained with the help of different assessment tools and strategies and it is desired that HEC Pakistan may work on these lines to streamline its educational system and be compatible with rest of the world.

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