

# Implementation Strategy of Outcome-Based Education: A Case Study in Engineering Faculty Diponegoro University

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## Abstract

Outcome-Based Education (OBE) focuses on results, not just the material to be completed. OBE measures learning outcomes and enable students to develop new skills that prepare them at a global level. OBE is an approach that emphasizes the continuity of the learning process in an innovative, interactive, and effective manner. OBE influences the entire educational process of curriculum design, formulation of learning objectives and outcomes, education strategy; learning method design; assessment procedures; and the education environment/ecosystem. OBE is implemented by integrating several curriculum designs, assessments, and teaching and learning methods that focus on what students can do. OBE emphasizes that social, economic, and academic cultural conditions can meet learning outcomes from knowledge, skills, and attitudes. This study aims to describe the journey of implementing OBE in the Faculty of Engineering, Diponegoro University. This research is ongoing and will continue to be carried out to find the best way to implement OBE. Best practices from various universities become a reference in implementing OBE at the Faculty of Engineering, Diponegoro University.

## Keywords

Outcome Based Education, methods, standards, Key Performance Indicators

## 1. Introduction

### 1.1 Background

The learning process has an essential role in the sustainability of educational institutions because, with the existence of learning activities, educational institutions can produce graduates with the competencies needed by the community. The speed of the use of technology and the rapid development of innovation creates a link between education and the needs of human resources in the world of work and society. More and more educators and business people are transforming education delivery because many students only know that they are not satisfied with what they are getting (Alley-Johnson, 1993). The challenge to implementing 21st-century education is the importance of roles and strategies that bridge the educational process in higher education and the world of work (Cuban, 2000).

The new approach used to accommodate education in the 21st century is Outcome-Based Education (OBE) (Akhmadeva et al., 2013). In contrast to traditional learning methods, whose primary focus is on the teaching and learning process, OBE is a learning approach that emphasizes the sustainability of the learning process in an innovative, interactive, and effective manner (Harden, 2007). OBE affects the entire education process, from curriculum design, learning outcomes and objectives, learning method design, education strategy; assessment procedures; and the educational ecosystem/environment (Harden, 1999). Educational institutions that use OBE will benefit as an educational organization that provides relevant and more impactful educational experiences in line with the organization's vision and mission. Students will also get better benefits because the educational services they

receive can be more personalized and according to their needs so that learning is more directed to the educational outcomes to be achieved.

Based on the positive impact of implementing OBE in educational institutions, Hoffman (1996) conducted a study to identify the implementation of OBE standards in educational institutions and the factors that influence the success of OBE implementation. The research is based on 9 OBE standards which are used as guidelines for an educational organization in implementing OBE. The nine standards for implementing OBE consist of mission (standard 1), results (standard 2), curriculum (standard 3), decision making (standard 4), assessment (standard 5), organization (standard 6), culture (standard 7), repair (standard 8), and database (standard 9). Yusof et al. (2017) also researched to ensure students were competitive after graduation by implementing a learning system based on OBE principles. These principles include a focus on learning outcomes (clarity of focus), curriculum design based on achievements (design down), high expectations (high expectations), and broad opportunities (expanded opportunities).

Implementation of the OBE curriculum in higher education requires active participation from all parties, including the Head of Study Programs, lecturers, education staff, students, parents of students, alumni, and alumni users (job owners). However, there are problems in implementing the curriculum, including the diversity of understandings of each head of the study program and lecturers regarding how to design a curriculum, implement teaching and learning activities, and how to assess program education objectives (PEO), program learning outcomes (PLO), and course learning outcomes (CLO). Meanwhile, the change in curriculum design from a teaching center to a student center was not entirely accepted by lecturers and students. Likewise, changes in the assessment process have not been fully understood by the head of the study program, lecturers, and students. Therefore, to increase the understanding of study program heads and lecturers regarding the implementation of the OBE curriculum, the Faculty of Engineering, Diponegoro University, needs to develop appropriate strategies and programs in the form of periodic and structured capacity building.

## 1.2 Objectives

OBE is a learning approach that focuses entirely on student competency. In order to improve the quality of graduates and based on the Regulation of the Minister of Research Technology and Higher Education No. 44 of 2015 concerning National Standards for Higher Education, every university is required to develop an outcome-based curriculum (OBE). The development of the OBE curriculum includes curriculum design, teaching and learning activities, and OBE assessments at both the course and study program levels. This study describes the OBE implementation programs carried out by the Faculty of Engineering, Diponegoro University.

## 2. Literature Review

### 2.1. Outcome Based Education (OBE)

Spady (2004) defines OBE in general as education that focuses on managing all educational organization programs and seeks to provide learning based on the results that students want to show when they graduate in their education. OBE has characteristics in the form of an education system having things such as precise results, and student success is based on the competencies that can be demonstrated, and the needs of each student can be met with various teaching strategies and assessment tools used. If these characteristics of OBE are carried out carefully, then teachers can determine whether they have implemented OBE effectively or not.

#### *OBE Principle*

Spady (2004) states that there are four basic principles in the implementation of OBE. These principles are at the core of OBE. Educators must apply these principles in practice in the classroom effectively. OBE practitioners can apply these principles in four ways: consistent, systematic, creative, and concurrent. The OBE principles, according to Spady (2004) are as follows:

#### 1. Focus on Learning Outcomes (Clarity of Focus)

Clarity of focus is a fundamental principle which means that everything educators do must be focused on what students want to know, understand and do to be successful (Killen, 2003). In addition, Spady (2004) stated that the results to be achieved must be clear before the learning process is carried out. This means that the results must be precise so that students can know what they want to achieve and can be understood by both educators and students.

#### 2. Curriculum Design Based on Achievements (Design Down)

Achievement-based curriculum design means that educators design their curriculum and learning plans based on their students' final results (Spady, 2004). This means that learning outcomes must be known beforehand, and then all activities are planned so that the specified results can be achieved. This means that the results culminate where all learning activities are directed to the desired results (Maree & Fraser, 2004).

#### 3. High Expectations

High expectations are the principle to increase the challenges faced by students (Spady, 2004). Educators must show confidence in all students, given that all students can learn and succeed. Learning standards should be raised for all learners, although slow learners may need more time to achieve them (Maree & Fraser, 2004).

#### 4. Broad Opportunity (Expanded Opportunity)

Broad opportunities mean that educators give students more than one opportunity to learn essential things in showing learning outcomes (Spady, 2004). There are five key dimensions, namely: time, methods and modalities, operational principles, performance standards, access, and curriculum arrangement.

#### *OBE Implementation Standards*

Network for Outcome-Based Schools is committed to implementing a future-oriented “success for all” culture for all members of the OBE community. The Network for Outcome-Based Schools in 1993 approved several standards that educational organizations should apply. The standards for implementing OBE are as follows (Network for Outcome Based-Schools, 1993):

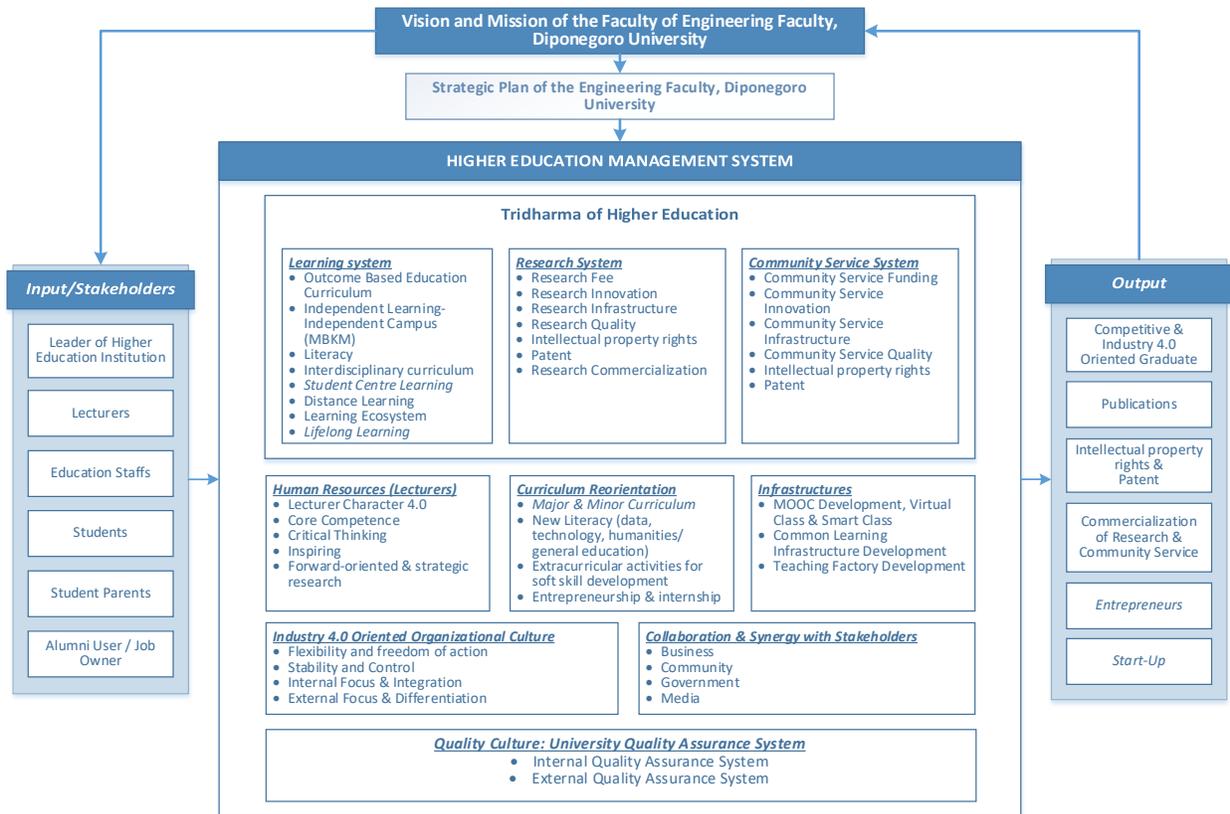
1. Mission (Mission). Statements that are jointly endorsed as a reflection of employee commitment.
2. Results (Outcomes). Educational outcomes are clearly defined and passed down by the community.
3. Curriculum. A detailed framework of the program, lessons learned, and the results to be achieved.
4. Decision Making. A consistent system of decision-making and delivery of learning.
5. Assessment. The assessment system is applied consistently based on criteria, performance standards, student credentials, and reporting.
6. Organization. Organizational system regarding learning and its delivery to students.
7. Culture. Strong organizational culture and climate in the development of students and employees to have high quality.
8. Improvement (Improvement). Continuous improvement programs to ensure the quality of educational institutions.
9. Database (Database). There are regular updates of all students' lecture data and achievement units and other critical indicators used.

## **2.2. Engineering Faculty Diponegoro University Governance Perspective: as A System**

The Vision of the Engineering Faculty is to be an excellent research based Engineering Faculty with an international reputation by 2024. Based on this vision, the Faculty of Engineering, Diponegoro University, developed a strategic plan. One of the programs is the internationalization of the Study Program through international accreditation, opening international classes, and implementing the OBE curriculum. To achieve the vision, the human resources, lectures, staff administration, and laboratory assistants need to build capacity in the research, teaching, and learning area. In addition, the demand from the industry on better quality graduates and accreditation needs the improvement of the quality assurance in the Engineering Faculty, Diponegoro University.

The higher education governance system can be viewed as a systems approach (input - process - output). Inputs in higher education that also act as stakeholders consist of leaders, lecturers, education staff, students, student parents, and alumni users'/job owners. The process of higher education in Indonesia is obliged to have the Tri Dharma of Higher Education, which consists of the Learning System, Research System, and Community Service System. The Tri Dharma College system must be supported by developing human resources, curriculum reorientation, infrastructures, an organizational culture based on continuous quality improvement and industry 4.0 orientation, and collaboration and synergy with stakeholders. Details of entities in the tri Dharma system are presented in Figure 6. Outputs in higher education include competitive and industry 4.0 oriented graduates, publications in reputable international journals and conferences, intellectual property rights and patents, commercialization of research & community service, entrepreneurs, and start-ups.

To ensure the overall higher education system, universities establish a University Quality Assurance System consisting of an Internal Quality Assurance System and an External Quality Assurance System. At the Faculty of Engineering level, there is a QAB in charge of building Quality Culture through the implementation of periodic internal audits accompanied by the implementation of Plan, Do, Check, Act and management review meetings to follow up on audit results and develop risk management in higher education quality governance. With the tagline, make excellent quality a habit, the Faculty of Engineering, Diponegoro University focuses on producing competent and globally competitive graduates through internationalization programs, periodic curriculum reorientation, and sustainable human resource development.



**Figure 1 Engineering Faculty Diponegoro University Framework: a Systems Approach**

Furthermore, this paper will focus on discussing the implementation of the OBE curriculum as a strategy to produce graduates with global competitiveness. OBE is the education process focused on achieving the specified concrete outcome (results-oriented knowledge, ability, and behavior). OBE is a process that involves the restructuring of curriculum, assessment, and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits. The implementation of OBE can be divided into three major stages: the design of the OBE curriculum, teaching and learning activities (TLA), and the assessment of the OBE curriculum, which consists of three levels of assessment: CLO, PLO, and PEO levels. In the implementation of OBE, the understanding of the lecturers, especially the management of the study program, becomes a critical thing.

Realizing that there are still weaknesses and problems in the implementation of OBE in the Faculty of Engineering, the Dean directs various programs to continue to improve understanding and continuous improvement related to the development and implementation of the OBE curriculum. Identification and determination of the learning outcome program are critical in OBE because they will affect the determination of learning methods and assessment planning. This is a part of Plan, Do, Check, and Act in order to enhance the implementation of OBE curriculum. In contrast to traditional learning methods, the main focus is the teaching and learning process with teaching center learning.

### OBE Curriculum Design

OBE is education centered on outcomes, not just material to be completed. OBE measures learning outcomes and enable students to develop new skills that prepare them at a global level. OBE is an approach that emphasizes the sustainability of the learning process in an innovative, interactive, and effective manner. OBE influences the entire educational process from curriculum design, learning objectives and achievements, education strategy; learning method design; assessment procedures; and the education environment/ecosystem. OBE focuses on PLO, backward curriculum design, structured suitability (Learning outcome–learning activities–assessment), facilitating learning opportunities, and the P-D-C-A systematic cycle.

The main stages of OBE curriculum design are described as follows:

1. The determination of the Education Objective (PEO) program which refers to the vision of the University and the Faculty as well as the scientific vision of the study program and is based on the results of tracer studies of graduate users (job owners) and alumni.
2. Based on the PEO, the manager of the study program determines the learning outcome program and compiles a matrix of linkages between PEO and PLO and PLO and the field of study (course).
3. The preparation of course learning outcomes (CLO) and the linkage matrix of CLO and course syllabus.
4. The preparation of performance indicators (PI) for each PLO and the PLO assessment rubric. PI is a reference for lecturers in preparing CLO, while the PLO assessment rubric is a reference for lecturers in making CLO assessment rubrics. The Head of Study Program determines how to assess PLO, both direct and indirect, according to the type of PLO.
5. The preparation of guidelines and planning for continuous quality improvement at three levels of assessment, namely CLO, PLO, and PEO.

All outputs of the four stages are documented in a study program curriculum book. Furthermore, the Rector determines these documents and is used as a reference in the teaching and learning process for 4-5 years, and then will be reviewed periodically. The Dean assigned the Quality Assurance Body to develop OBE audit indicators and carry out audits at the end of each semester and conduct regular monitoring through sampling on several courses. The Dean also assigned the Head of Study Program to conduct PLO and CLO assessments at the end of each semester. The Directorate of Alumni and Student Affairs of Diponegoro University will conduct a PEO assessment of alumni and alumni users (job owners who act as alumni's direct supervisors) who have graduated for four years, and the results will be submitted to the Dean and Head of Study Programs as material for evaluating the OBE curriculum.

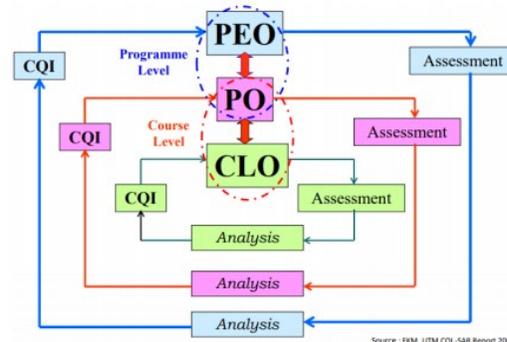
Based on the PLO, the lecturers will prepare the CLO and design learning and assessment methods. Each lecturer makes a course plan containing PLO by the course, CLO, course syllabus, teaching and learning activities (TLA), learning methods, assessment plans, rubrics, and references. Each lecturer is required to explain the course plan to students at the first meeting of the lecture.

### **OBE Assessment and Continuous Quality Improvement**

The OBE curriculum design process can be explained as follows. The initial element of the assessment process is a curriculum that has been revised according to OBE standards (i.e. outcome-based assessment). The program's vision, mission, goals, and learning outcomes have been defined and educational goals developed from the current curriculum. The learning objectives have been coordinated with the learning outcomes according to the requirements for each Study Program. The main components of OBE curriculum design include Program Planning, Program Implementation, Program Assessment, and Program Improvement. Program planning is aimed at evaluating the need to revise the overall educational goals. Evaluation will be carried out every four or five years by the Study Program with input from the Study Program Advisory Development Board. In particular, program planning activities assist in evaluating courses to determine how well the program meets the requirements of the Study Program, program mission, goals, and educational goals. Student chapter advisory, activities, and internships are extracurricular activities important for student leadership and professional development. The advisory process should also be reviewed and evaluated in conjunction with the overall program plan. Program Planning will hold an annual meeting at which significant changes to the curriculum are identified and planned for implementation. Assessments will be conducted at three levels to ensure that the program's educational objectives/objectives, program learning outcomes, and course learning objectives/outcomes are achieved. In addition, the assessment results will be used to continuously improve the quality of the curriculum by updating and/or revising the syllabus/course content and learning methods. Implementation of the Program will begin after the curriculum changes recommended by the Study Program have been approved. Program Implementation Activities include developing new courses, if necessary, and revising existing courses to accommodate recommendations. In addition, the recommendations obtained from the Program Planning regarding the process of providing advice and teaching methods should be implemented as soon as possible. Program improvement tasks will be developed and planned to accommodate the recommendations and feedback obtained from the survey. The correlation between surveys and trends will be evaluated to identify areas for improvement and measure progress towards planned improvements. Feedback data obtained from different assessment tools can indicate where significant changes are needed and can be used as input for program planning. It should be noted that the survey questionnaires (satisfaction survey, exit poll, tracer study) are primarily designed to measure student satisfaction concerning program learning outcomes. The survey results will be used to measure the achievement of the advice process and extracurricular activities. Each major element of program planning (e.g. curriculum, courses, tutoring, and extracurricular programs) has at least two different measures associated with it.

### **The Procedure of OBE Continuous Quality Improvement (CQI)**

The Study Program is required to design the PEO, PLO, and CLO assessment processes. As previously explained, the Study Program conducts assessments at three levels: PEO, PLO, and CLO. The OBE assessment process also must be followed by analyzing the assessment results by comparing the results of the previous semester's assessment, the current semester, and the improvement plan for the next semester. The OBE Continuous Quality Improvement framework is presented in Figure 2.



**Figure 2 OBE Continuous Quality Improvement (Source: FKM, UTM CQI -SAR Report 2008)**

### Continuous Quality Improvement Level

1. Continuous Quality Improvement in Program Educational Objective The assessment process at the PEO level uses an indirect assessment called a tracer study to find out whether alumni users are satisfied with their hard skills, soft skills, and alumni performance as a whole. In Indonesia, tracer studies are coordinated directly by the University. The results of the tracer study are submitted to each study program as a reference in curriculum revision. In addition, assessment and CQI on PEO at the Engineering Faculty UNDIP are carried out through brainstorming with the advisory board. The advisory board is one of the stakeholders who will provide input in evaluating student learning outcomes.
2. Continuous Quality Improvement in Program Learning Outcome There are two continuous quality improvement methods of the outcome based education (OBE) evaluation: direct and indirect. Direct assessment includes assessment of outcomes (e.g., course learning and program learning outcomes). On the other hand, the indirect assessment includes student course completion surveys, exit surveys, alumni surveys, and employer surveys. This assessment process can be used to improve outcomes, course content, curriculum, and educational processes to achieve targeted outcomes. In addition, lecturer evaluation surveys can be used to evaluate lecturer performance. The Study Program compiles PLO, performance indicators, and rubrics to assess performance indicators as a reference for lecturers to develop CLO assessment rubrics.
3. Continuous Quality Improvement in Course Learning Outcome Each lecturer in each semester carries out a self-review of the CLO assessment results and the teaching and learning process. The lecturer determines the achievement target for each CLO based on the results of the CLO assessment in the previous semester and the level of difficulty of the course material. Lecturers are required to analyze the results of the CLO assessment and make improvements and follow-up plans that will be implemented in the following semester. Lecturers are also required to evaluate CLO for a course for several periods to find the steps for improvement in the teaching and learning process. The report must be included in the lecturer's portfolio. Furthermore, the Head of the Study Program must evaluate the portfolio. Each lecturer must compile an assessment rubric according to the assessment and taxonomy bloom for each CLO in the courses being taught. The purpose of the rubric is to assist the objective assessment process. On the other hand, the existence of rubrics helps students to know how to study and complete each assignment and exam.

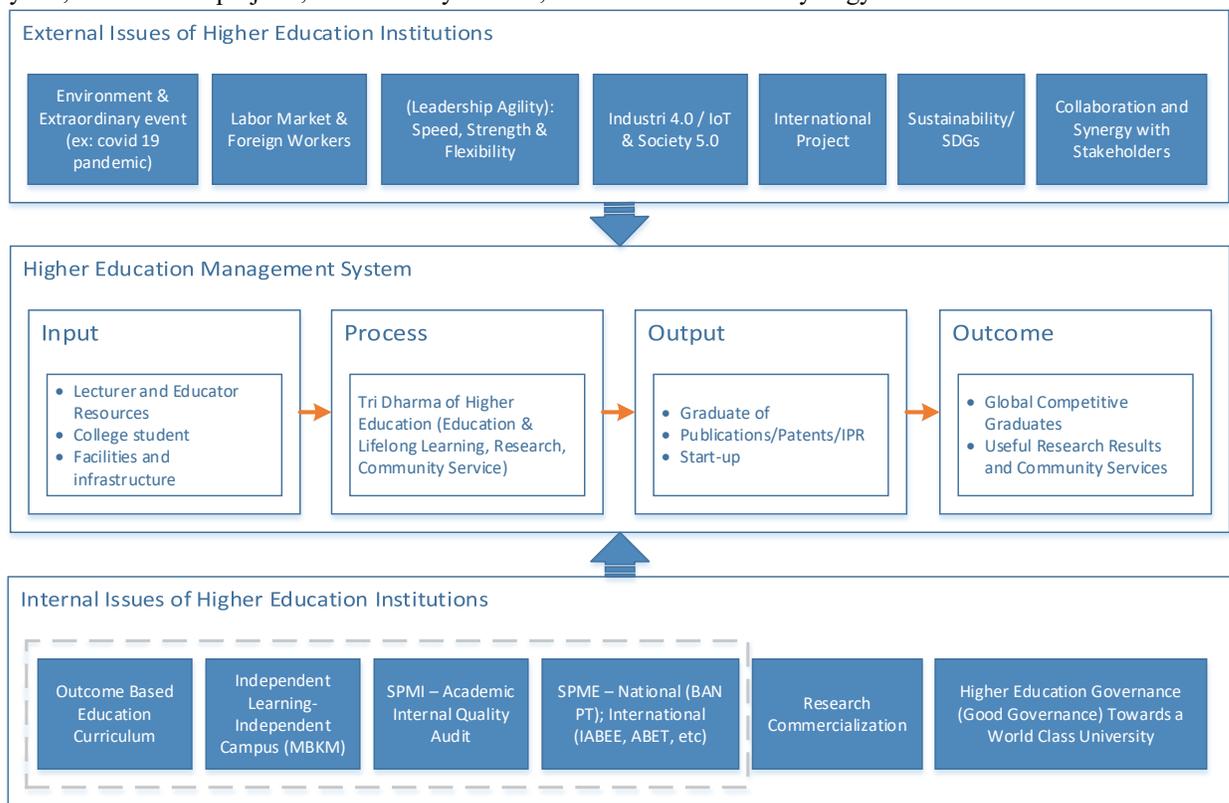
### 3. Methods

This study uses a qualitative descriptive method related to the program and stages of OBE implementation at the Faculty of Engineering, Diponegoro University. According to (Polit & Beck, 2009, 2014), the qualitative descriptive analysis method is to analyze, describe, and summarize various conditions and situations from various data collected in the form of interviews or observations about the problems studied in the field. The descriptive research goal is to describe a phenomenon and its characteristics. This research is more concerned with what rather than how or why something has happened. Therefore, observation and survey tools are often used to gather data (Gall, Gall, & Borg, 2007).

## 4. Data Collection

### 4.1. External & Internal Issues of Higher Education Institutions

Higher Education is viewed with a systems approach described by input, process, output, and outcome. The input consists of lecturer and education staff, students, facilities, and infrastructure; the process consists of the tri dharma of higher education (education & lifelong learning, research, community service); the output consists of graduates, publications/patents/IPR, start-ups. At the same time, the outcomes consist of globally competitive graduates, valuable research results, and community services. To compete in the industrial era 4.0, higher education in Indonesia, especially Engineering Faculty Diponegoro University, analyzed obstacles and challenges and how they can adapt and be agile in the face of speedy environmental changes. Strategic issues faced by higher education are grouped into internal and external issues. Internal issues include changes to the outcome-based curriculum, the Ministry of Education, Culture, Research, and Technology program regarding independent learning, independent campus (“Merdeka Belajar Kampus Medeka/MBKM”), internal quality assurance system, external quality assurance system, commercialization of research and community service, and higher education governance (good governance) towards a World Class University. Meanwhile, external issues include Environment & Extraordinary events (ex: covid 19 pandemics), labor market & foreign workers, leadership agility: speed, strength & flexibility, industry 4.0 / IoT & Society 5.0, international projects, sustainability / SDGs, and collaboration and synergy with stakeholders.



**Figure 3 External & Internal Issues of Higher Education Institutions**

### 4.2. The results of a survey conducted by the Engineering Faculty Quality Assurance Body (QAB) related to OBE to students and lecturers

The Quality Assurance Body (QAB) of the Faculty of Engineering, Diponegoro University, researched student involvement in the Independent Learning Program – Independent Campus (MBKM) program and OBE implementation. The survey was conducted on students and lecturers. The first question is whether the lecturer explains the Course Syllabus, PLO, and CLO at the first meeting of the lecture. The survey results showed that 501 students said yes, 22 students said no, and 32 students answered otherwise. This problem needs to be followed up by making SOPs related to PLO and CLO explanations to students to understand the syllabus and learning methods and assessments that will be carried out for one semester and prepare appropriate learning methods. On whether undergraduate students know about the MBKM program, as many as 437 students said they were aware of the MBKM

program, and 56 others did not know. Of the 555 respondents, 165 respondents stated that they knew about the MBKM program but did not want to participate, 266 respondents stated that they wanted to participate, 14 respondents had participated, and 29 respondents stated that they did not want to participate because it would hinder the study and have no impact on the study. The Study Program needs to follow up on students' understanding of MBKM by conducting regular socialization. The survey results regarding student responses on explanation of the course syllabus and MBKM activities, as shown on figure 4.

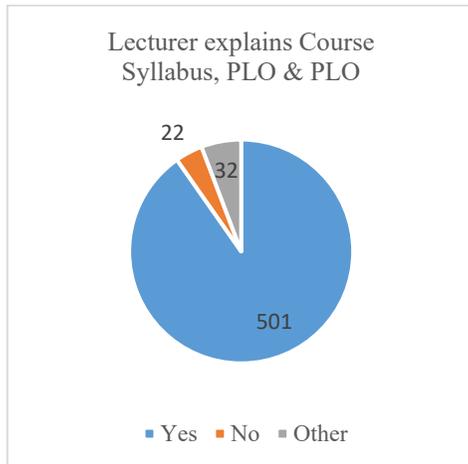


Fig 4a. Lecturer explains Course Syllabus

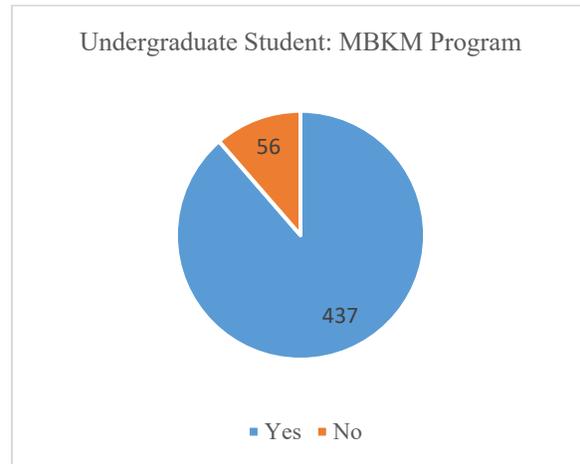


Fig 4b. MBKM Program

**Figure 4 Student Responses on Explanation of the Course Syllabus and MBKM Activities**

Survey to lecturers regarding the policies of the Dean and OBE. The first question is whether the lecturer has compiled a course syllabus for each course. As a result, 87 lecturers stated that all the subjects taught had a course syllabus, while 13 lecturers stated that some had a course syllabus. The second question is whether the course syllabus has been completed with PLO and CLO and the assessment method. Again, 83 lecturers stated that all syllabus courses had been completed with PLO and CLO, 13 lecturers stated no, and four did not know. Based on these results, the study program needs to evaluate the course syllabus compiled by each lecturer by compiling a checklist for the completeness of the course syllabus contents and determining that lectures can be held if they already have a course syllabus. The survey results regarding lecturer's response regarding course syllabus, as shown on figure 5.

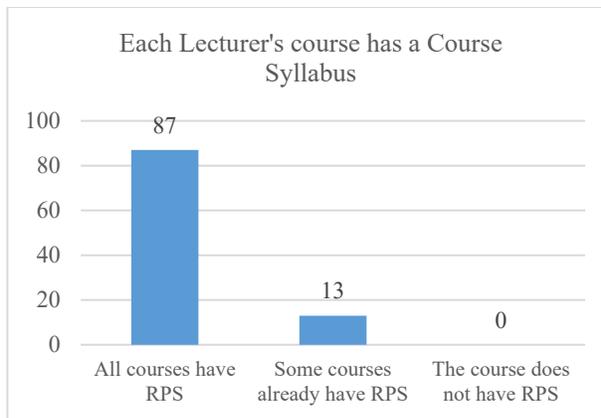


Fig 5a. Each Lecturer's course has a Course Syllabus

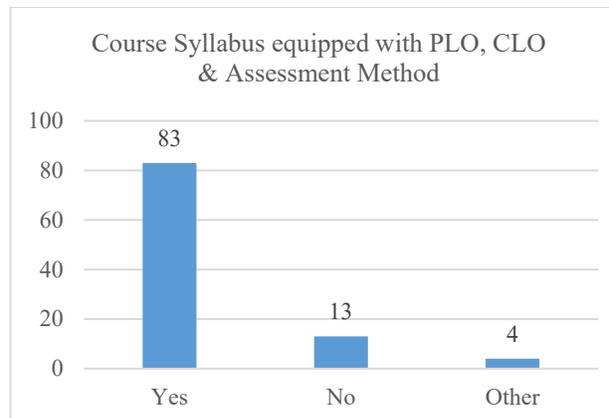
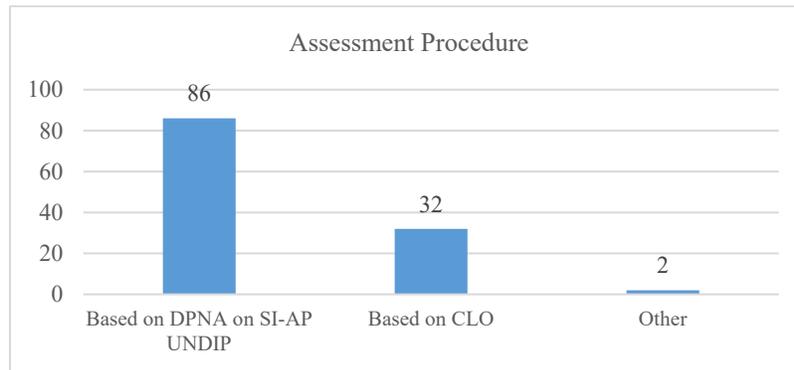


Fig 5b. Course Syllabus equipped with PLO, CLO & Assessment Method

**Figure 5 Lecturer's Response regarding Course Syllabus**

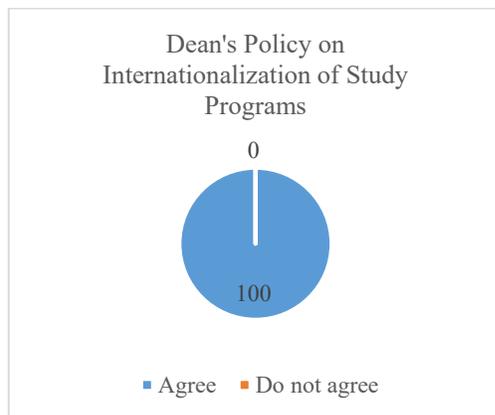
The third question is about how lecturers carry out assessment procedures to assess their courses. As a result, 86 lecturers stated that the assessment was based on DPNA and SIAP UNDIP, 32 lecturers based on CLO, and two lecturers carried out both procedures. Based on these results, the lecturers did not understand the assessment procedure well according to OBE demands. For this reason, it is necessary to direct the SOP for the assessment based on the

OBE curriculum and be accompanied by a policy to conduct an assessment based on the OBE. The survey results regarding assessment procedure, as shown on figure 6.

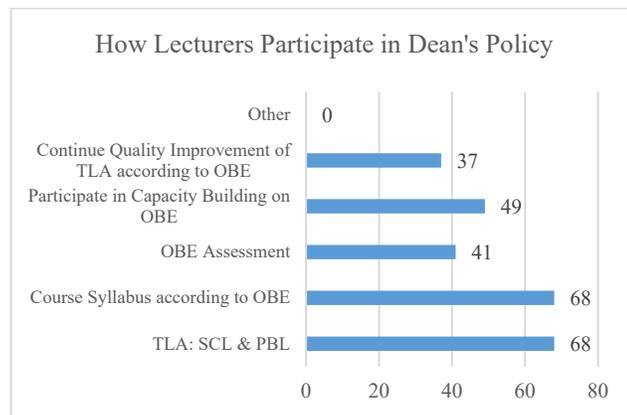


**Figure 6 Assessment Procedure**

The fourth question is related to participation in the vision of the Dean of the Engineering Faculty. The Dean of the Engineering Faculty has launched an internationalization program for the Engineering Faculty through international accreditation efforts for each study program. For this reason, the Engineering Faculty is currently trying to strengthen the teaching and learning activity (TLA) through strengthening the Outcome Based Education curriculum. As a result, 100 lecturers agreed on the vision. Next, the fifth question is how lecturers actively participate in the internationalization program of study programs. The result is that 68 lecturers have carried out learning activities with the type of student center learning and problem-based learning; 68 lecturers have compiled a course syllabus that is by the OBE curriculum; 41 lecturers have conducted assessments according to OBE principles; 49 lecturers participated in capacity building activities carried out by the Engineering Faculty, and 37 lecturers stated that they had carried out continuous quality improvement on TLA by OBE principles. The survey results regarding the Dean's policy on internationalization of study programs and types of lecturer participation are presented in figure 7.



*Fig 7a. Dean's Policy on Internationalization of Study Programs*



*Fig 7b. How Lecturers Actively Participate in Dean's Policy*

**Figure 7 Dean's Policy on Internationalization of Study Programs & Lecturer's Participate Type**

The survey is a preliminary study that will be followed up with monitoring and evaluation of OBE implementation in all study programs. Monitoring and evaluation is a form of continuous quality improvement that aims to improve the outcome-based learning system and produce competent and globally competitive graduates.

## 5. Results and Discussion

Globalization has brought a clear shift in the development of education, teaching, and disseminating expert knowledge to education in building student competencies, including learning to learn and lifelong learning (Sahasrabudhe, 2015). For the University, the statement demands that they focus on understanding the basics of knowledge and learning new skills/competencies that will enable individuals to cope with the demands of a rapidly

changing workplace. OBE gives students the freedom to pick what they want to study and how they want to study it. Consequently, it adapts to a learner's strengths and shortcomings and gives them enough time to become proficient and fluent in the subject. Each student should have accomplished the goal by the end of the educational session. The OBE does not specify a particular teaching or assessment style; instead, classes, opportunities, and evaluations should help students attain specific goals (Spady, 1994). Based on the desired goals, the faculty position changes to instructor, coach, facilitator, and/or mentor. To address this, the Engineering Faculty of Diponegoro University describes experiences, obstacles, efforts, the role of stakeholders, preliminary studies, and follow-up plans for OBE development as follows.

### **5.1. Analysis of External and Internal Problems**

The main problem in OBE design and implementation is the understanding of all stakeholders about the objectives and directions of developing the OBE curriculum and the reluctance of lecturers to change the learning and assessment system that has been carried out so far. OBE focuses on output-based education as expected by job owners. Meanwhile, the traditional learning system focuses more on the teaching center. OBE-based learning focuses on Student Center Learning, which requires active participation from students and lecturers as facilitators to create active learning in the classroom and help students who are less fast in learning adapt to their peers. All of this requires new knowledge for lecturers to learn how to teach well and develop active learning and cooperative learning for their students.

The OBE assessment system is different from the assessment method that lecturers have carried out. So far, the course assessment is based on the list of participants and the final score (DPNA) determined by the Diponegoro University Academic Information System. In DPNA, course assessment consists of case study, practicum, mid-test, and final-test components. The course assessment system cannot be used to measure CLO and is not compatible with OBE-based assessment. Therefore, lecturers are required to change the OBE-based scoring system to assess the achievement of CLO. For this reason, the Study Program needs to conduct socialization and guidance on how to conduct OBE-based assessments to lecturers.

As a course assessment report based on the OBE system, lecturers are required to compile a course portfolio consisting of a course syllabus containing PLO and CLO, teaching and assessment plans, assessment rubrics, references used, mid-test, and final-tests, sample assignments, and answer sheets provided has been assessed, as well as analysis of the achievement of CLO and CQI plans (both as continuous improvement and as an action if the specified CLO is not achieved in the TLA).

The Head of Study Program conducts a PLO assessment using the specified course sample in the next stage. Finally, the Head of Study Program submits the PLO assessment report to the Dean on the OBE audit, conducted at the end of each semester. The report is part of the continuous improvement by QAB with the Dean and will be submitted at the management review meeting. The OBE assess must need to be compiled whether the individual student could achieve the competency in order to fulfill the PEO.

On the other hand, a clear and directed curriculum design process by the Head of the Study Program and the team is the primary key to the success of OBE implementation. Problems will arise if the Study Program curriculum team does not understand the process and fails to design a comprehensive curriculum. In addition to designing the curriculum, Study Program is obliged to conduct PLO and PEO assessments and develop PI rubric standards as a reference for lecturers.

Universities should have clear and directed curriculum design and assessment guidelines and develop an Information System for PEO, PLO, and CLO assessments under the needs of Study Program managers. Universities must also have SOPs for auditing and monitoring, and evaluating the implementation of OBE in each Study Program as a form of Continuous Quality Improvement.

### **5.2. Engineering Faculty Programs related to OBE Implementation**

In curriculum development, lecturers are expected to develop lecture materials based on research results, community service, and the changed of the industry phenomena. The implementation of research and community service also involves students, so that these activities can also be used to measure PLO achievements related to lifelong learning, leadership, teamwork, communication skills, and professional ethics.

This Tri Dharma activity is supported by a good governance system that can support an academic atmosphere and a conducive teaching and learning process. Through the Institute for Research and Community Service (LPPM), the Rector has established several research grants and community service through non-APBN funds and world-class universities. In addition, LPPM manages grant funds from the Ministry of Education, Culture, Research and Technology through the Directorate of Research and Community Service (DRPM), the Education Fund Management Institute (LPDP), and others. The Dean of the Faculty of Engineering determines that grants for research, community

service, education management, and the OBE assessment program. Furthermore, the Directorate of Learning and Student Affairs, the Directorate General of Higher Education, the Ministry of Education, Culture, Research, and Technology has determined in the Internal Quality Assurance System that research activities and community service carried out by lecturers should be able to produce teaching materials as a development of the course syllabus. Thus, research and community service are important in CLO preparation in several courses, especially elective courses.

The Dean also established a capacity-building program for lecturers, academic staff, and students in supporting the implementation of OBE. Some of the activities that have been carried out are as follows. 1) In-house training (IHT) Program for Redesigning and Implementing Outcomes-Based Curriculum, Teaching-Learning-Assessment and Evaluating Systematically (PRIORITIES) for IABEE purpose in collaboration with the Indonesian Engineers Association (PII) in 2020. 2) A training series of curriculum design and assessment OBE and Student Center Learning (SCL): active learning and Designing and Supporting Team-Based Learning using Cooperative Learning in collaboration with the Center of Engineering Education (CEE) Universiti Teknologi Malaysia (UTM) in 2021. In addition, the Dean was assigned QAB to design a capacity-building series for all lecturers of the Faculty of Engineering, especially those who have not had the opportunity to take part in the training series with PII and CEE UTM. The activity will start in early 2022, where the initial socialization has been carried out in July 2021 and will be followed up in October 2021.

Furthermore, the Rector and Dean continue to strive to improve networking and branding in supporting the achievement of the PLO. The improvement of university branding is pursued by achieving university ranking indicators both at home and abroad, which are carried out by various university rating agencies. Branding is expected to leverage the number and quality of collaboration with universities, companies, and other institutions. Through the institutional branding program, Diponegoro University seeks to improve its good reputation to attract customers by increasing the interest of new students and new collaboration opportunities. The existence of prospective students as inputs in the higher education system is the primary entity implementing the PLO.

On the other hand, collaborations with various universities at home and abroad, especially with universities in the QS 100 world ranking, are also continuously developed through research collaborations, publications, lecturer internships, post-docs, scholarships, double degrees, student exchanges, and credit transfer systems (CTS). Furthermore, Diponegoro University also establishes collaborations with other institutions such as government agencies, multinational companies, BUMN, foreign companies, service providers, NGOs, SMEs, industrial estates, etc. This collaboration aims to provide lecturers and students with enriched information and insight into other institutions. The forms of collaboration include lecturer and student research, community service, student internships, lecturer internships, expert consultants, and others. This collaboration aims to support the achievement of the PLO and the MBKM program initiated by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia.

### **5.3. The Role of the Academic Community in Achieving Students Learning Outcomes**

Each academic community has a vital role in achieving student learning outcomes, which are explained as follows.

#### **a. The Role of Dean and Deputy of Dean, and Quality Assurance Body of Engineering Faculty**

Based on the Strategic Plans (vision and mission) of the Engineering Faculty, the Dean establishes policies related to achieving student learning outcomes, internationalization of study programs, supporting activities for the Tri Dharma of Higher Education, and lean organization. This policy is followed up with performance-based program planning and budgeting by the vice dean. In addition, the quality assurance body carries out planning, setting standards, monitoring, and evaluation. The Dean is very concerned about achieving student learning outcomes by establishing various supporting programs. These programs include capacity building for Heads of Departments, Heads of Study Programs, Quality Control Group (QCG) in each Department, and lecturers and granting OBE Grants for each Department to support CLO & PLO assessment through one lecturer one assistant program. The capacity building program has been carried out by holding OBE training by PII in 2020; also, in collaboration with UTM Malaysia in 2021, a series of OBE training, design, teaching-learning program, and assessment was held. On the other side, the Faculty of Engineering also developed of OBE assessment information system; capacity building week for lecturers, students, and educational staff, which is held regularly; and assistance in designing the OBE curriculum, teaching & learning program, and assessment. The Dean also stipulates the policy of internationalization of the Study Program through international accreditation and an international undergraduate program opening. Programs that support the internationalization of study programs include smart classrooms, FT Digital, English courses, and other supporting facilities. The Quality Assurance Body conducts regular audits of the conformity between academic quality standards and OBE in the University and Faculty Internal Quality Assurance System concerning their implementation in the

field. Dean, Vice Dean, are directly involved in the implementation of audit, monitoring, and evaluation. In addition, the Dean proactively follows up on audit findings by establishing programs according to organizational development needs.

b. The Role of Head of Study Program

Based on the Dean of the Engineering Faculty policy, the Head of the Department and the Head of the Study Program prepare a Work Program to support the achievement of these policies. Head of Department and Head of Study Program share roles in supporting the policy. The Head of the Department provides support in terms of facilities and Human Resources. At the same time, the Head of the Study Program focuses on developing Outcome Based Education in design, teaching and learning process, and assessment. The programs carried out include following up on OBE training activities carried out by the Faculty of Engineering by conducting knowledge sharing by QCG and representatives of participants from each Department to the lecturers in the Department. In addition, to strengthen the understanding of the lecturers, the Head of the Study Program held a workshop to discuss the design and assessment of OBE in more detail by inviting speakers who were in the same field as their respective Study Programs. The Head of Study Program, assisted by GPM is responsible for designing the curriculum and OBE assessment and conducting PLO and PEO assessments. Each Study Program, under the coordination of QCG, also conducts internal surveys to students in each subject and exit surveys to graduates to determine the achievement of PLO.

c. The Role of Faculty Members (Lecturer and Education Staff)

Each lecturer is responsible for conducting course learning outcome assessments in the subjects being taught. Lecturers are required to make a course portfolio containing RPS, CLO assessment results, mid-semester and end-semester exam questions, sample assignments, assessment rubrics, analysis of CLO, and improvement plans. The Head of the Study Program will evaluate the lecturer portfolio, and periodically, the sample portfolio in each Study Program will be audited by the Quality Assurance Team of the Engineering Faculty. Education staff supports the administration of all activities in the teaching and learning process. In addition, education personnel are also responsible for the readiness and convenience of learning facilities.

d. The Role of Students

Students are stakeholders who play an essential role in designing the OBE curriculum. Student input through academic dialogue is considered in preparing the TLA, assessment plan, and the number of credits. Students are also involved in evaluating the achievement of their learning outcomes through filling out questionnaires for assessing lecturers' performance in the teaching and learning process (Eva-TLA questionnaire). The questionnaire is confidential so that it will have no impact on student performance. All OBE evaluations and teaching and learning process surveys are confidential, so students feel comfortable and safe when filling out these surveys. The results of the Eva-TLA survey are used by university and faculty leaders to evaluate lecturers' performance.

e. The Role of Alumni Users

Apart from students, alumni and alumni users are also involved in evaluating student learning outcomes. Under their duties, alumni and users will provide input regarding the curriculum structure and course materials needed to evaluate curriculum development in the previous curriculum cycle. Meanwhile, alumni users (direct supervisors of alumni) will provide input regarding the quality and performance of graduates. In more detail, alumni users play a role in evaluating the achievement of graduate competencies as stated in the PEO carried out four years after alumni work, become speakers in building curriculum, and provide internships in the MBKM program. The Head of Study Program and alumni users should discuss the material for the internship program so that the program can support the achievement of PLO and CLO.

#### **5.4. Engineering Faculty Plans related to OBE**

As a commitment to society in producing globally competitive graduates, the Engineering Faculty – Diponegoro University continues to strive to improve TLA through implementing the OBE curriculum. These programs are expanding the scope of collaboration with UTM and UNS in lecturer capacity building and research collaboration on Engineering Education and initiating the establishment of the Center of Engineering Education at each University and CEE Indonesia Chapter; building capacity building models for Engineering Faculty lecturers; continuous improvement in OBE implementation; book reviews guidelines for preparing and implementing OBE; reviewing and upgrading quality standards for OBE implementation; making SOPs; surveys on OBE implementation; book chapters on OBE implementation experiences; sharing sessions on how to implement OBE in the Faculty of Engineering regularly at the beginning of every month; benchmarking of governance and quality assurance systems both design, assessment and implementation of OBE; benchmarking of TLA & CQI to world-class universities; as well as ISO 21001:2018 Education Management System certification.

## 5. Conclusion

Working with the tagline of developing a system which is OBE as a culture inside the organization, the Engineering Faculty in its Strategic Plan establishes several programs in accelerating the understanding and implementation of OBE and the internationalization of the Study Program. OBE is a student-centered teaching and learning style in which course delivery and evaluation are organized to meet stated aims and results. It focuses on assessing student achievement or results at various levels. Outcome-based education rejects the traditional focus on what the school delivers to pupils in favor of requiring students to demonstrate that they "know and can accomplish" whatever the needed outputs are. The basic notion behind Spady's description is that OBE is a method of planning, delivering, and assessing instruction that compels administrators, instructors, and students to focus their attention and efforts on the desired educational outcomes—results represented in terms of individual student learning. In response to this, the Engineering Faculty of Diponegoro University has compiled various programs, including socialization, capacity building, mentoring, inviting expert resource persons, providing OBE grants as a form of responsibility to the community to continue to improve the quality of the learning process and produce graduates who are competent and globally competitive. Furthermore, Dean together with QAB continue to conduct research and develop various engineering education development programs to achieve these goals.

## References

- Afuah, A. (1998). *Innovation Management*. Oxford univ: press.
- Akhmadeva, L., Hindy, M., & Sparrey, C. J. (2013). Overcoming Obstacles to Implementing An Outcome-Based Education Model: Traditional Versus Transformational OBE. *Canadian Engineering Education Association (CEEA)*, 1–29.
- Alley-Johnson, E. (1993). *Teachers' Perceptions of the Effects of Implementation of Outcome-Based Education- A Qualitative Analysis*. 245.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295–336.
- Cuban, L. (2000). *A fundamental puzzle of school reform. Schools as Collaborative Cultures: Creating the Future Now*, 71–77.
- Gall, M., Gall, J., & Borg, R. (2007). *Educational research: An introduction* (8th ed.). New York, NY: Pearson Education.
- Ghozali, I. (2014). *Structural Equation Modeling, Metode Alternatif dengan Partial Least Square (PLS)* (4th ed.). Semarang: Badan Penerbit Universitas Diponegoro.
- Harden, R. M. (1999). AMEE Guide No. 14: Outcome-based education: Part 1-An introduction to outcome-based education. *Medical Teacher*, 21(1), 7–14.
- Harden, R. M. (2007). Outcome-based education: the future is today. *Medical Teacher*, 29(7), 625–629.
- Hoffman, T. G. (1996). *An examination of outcome-based education practices, standards, and factors that enhance implementation of OBE*.
- Killen, R. (2003). Validity in outcomes-based assessment. *Perspectives in Education*, 21(1), 1–14.
- Maree, J. G., & Fraser, W. J. (2004). *Outcomes-based assessment*. Sandown: Heinemann.
- Polit DF, Beck CT. Nursing research: generating and assessing evidence for nursing practice. 9. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2012.
- Schools, N. of O.-B. (1993). *Standards of Outcome Based Education*.
- Spady, W. G. (1994). *Outcome-Based Education: Critical Issues and Answers*. ERIC.
- Vinzi, V., Chin, W. W., Henseler, J., & Wang, H. (2010). *Handbook of Partial Least Squares: Concepts, Methods, and Applications*. Berlin: Springer Handbooks of Computational Statistics.
- Yusof, R., Othman, N., Norwani, N. M., Ahmad, N. L. B., & Jalil, N. B. A. (2017). Implementation Of Outcome-Based Education (OBE) In Accounting Programme In Higher Education. *International Journal of Academic Research in Business and Social Sciences*, 7(6), 1186–1200. <https://doi.org/10.6007/ijarbs/v7-i6/3352>

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