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Implementation of Outcome-Based Education from the Perception of Lecturers and Students

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ABSTRAK

Pendidikan berbasis hasil (OBE) berarti memfokuskan dan mengatur dengan jelas segala sesuatu dalam sistem pendidikan di sekitar apa yang penting bagi semua siswa untuk dapat melakukannya dengan sukses di akhir pengalaman belajar mereka. Ini berarti memulai dengan gambaran yang jelas tentang apa yang penting bagi siswa untuk dapat dilakukan, kemudian mengatur kurikulum, instruksi, dan penilaian untuk memastikan pembelajaran ini pada akhirnya terjadi. Oleh karena itu, penelitian ini bertujuan untuk menganalisis persepsi dosen dan mahasiswa mengenai implementasi OBE di Fakultas Teknik. Ada enam variabel yang digunakan dalam penelitian ini, yaitu, pernyataan prestasi mahasiswa, relevansi prestasi mahasiswa, persiapan mata kuliah, proses belajar mengajar, fasilitas pendukung, dan evaluasi. Indikator-indikator tersebut dihasilkan menurut tinjauan pustaka dan wawancara dengan para ahli, menghasilkan 51 indikator. Ada 103 mahasiswa dan 79 dosen yang akan dipilih sebagai responden. Responden ditanyai tentang pendapat mereka mengenai implementasi OBE menurut indikator-indikator tersebut. Hasil penelitian menunjukkan bahwa dari sudut pandang dosen, OBE terlaksana dengan sangat baik pada variabel pernyataan prestasi mahasiswa, relevansi prestasi mahasiswa, dan proses belajar mengajar; sedangkan variabel lainnya terlaksana dengan baik. Namun, dari sudut pandang mahasiswa, OBE terlaksana dengan cukup baik pada variabel sarana pendukung; sedangkan variabel lainnya terlaksana dengan baik.

ABSTRACT

Outcome-based education (OBE) 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. This means starting with a clear picture of what is important for students to be able to do, then organizing curriculum, instruction, and assessment to make sure this learning ultimately happens. Therefore, this study aims to analyze the perceptions of lecturers and students regarding the implementation of OBE in the Faculty of Engineering. There are six variables used in this study, i.e., statement of student's achievement, relevance of student's achievements, subject's preparation, teaching and learning process, supporting facilities, and evaluation. The indicators are generated according to the literature review and interview with experts, resulting 51 indicators. There are 103 students and 79 lecturers to be selected as the respondents. The respondents are asked about their opinions regarding the OBE implementation according to those indicators. Results show that from the perspective of lecturers, OBE is very well implemented regarding the variables of statement of student's achievement, relevance of student's achievements, and teaching and learning process; while the others are well implemented. However, from the perspective of students, OBE is fairly implemented regarding the variable of supporting facilities; while the others are well implemented.

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1. INTRODUCTION

Outcome-based education (OBE) is a model of education reform based on the philosophy of student-centered learning and focuses on results or outcomes rather than inputs. In this model, students are trained to be active, creative, and innovative (Aminuddin et al., 2021; Arlinwibowo et al., 2022). OBE is widely adopted because teachers have to explain the importance of respecting the diversity of individual variations in the learning process and believe that a good education is measured by encouraging the student to have achievement at a different level than other students or allowing students to learn at their own pace (Liu et al., 2023; Lukum, 2015). The focus on learning should enable students to be able to solve real-life problems as a result of the knowledge gained during learning. This learning model not only helps students to develop technical and intellectual abilities, but also practical skills (Haryanto & Arty, 2019; Smieskova, 2017). Because OBE holds the philosophy of student-centered learning, in OBE, the teacher only acts as a facilitator who guides students to achieve the results or outcomes (Mulawarman et al., 2020; Su et al., 2021).

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The implementation of OBE in Higher Education requires restructuring of relevant systems (such as curriculum, resources, facilities, and other supporting activities) and procedures that constructively facilitate the achievement of desired outcomes in learning as an initial step that needs to be done. This includes a critical restructuring of assessment methods and procedures used by teachers and educational institutions in evaluating students that serves as evidence of achievement (Ivanović et al., 2013; Park et al., 2011). Currently, universities in Indonesia have begun to shift from traditional education to OBE as an innovation in education. Especially since 2021, the Merdeka Belajar Kampus Merdeka (MBKM) program was started as an effort by the government to provide learning experiences for students and bring students closer to the industry. The higher education curriculum that has been developed based on the SN-DIKTI has actually used the OBE approach (Miles et al., 1994). The implementation of OBE is indispensable as an assessment standard for external quality assurance systems such as the need for national and international accreditation.

Faculty of Engineering at Diponegoro University, Indonesia, as one of the education institutions must be able to improve the quality and provide a more impactful and relevant educational experience in accordance with its vision and mission. Improvements in quality are sought to meet students' needs so that in the end it will affect the competitiveness of universities and students in the future. In addition, the concept of OBE is being a requirement for an accreditation from the Indonesian Accreditation Board for Engineering Education (IABEE) and the Accreditation Board for Engineering and Technology (ABET) (Hasanah & Supriansyah, 2022; Supeni et al., 2019). The latest innovation made by the OBE team as the supervisor of OBE activities is the launching the Outcome-Based Education Information System (SI OBE) which has a function to integrate learning modules to measuring learning outcomes. In order to run effectively, a learning system that adopts OBE must have some knowledge about OBE. There is a significant relationship between knowledge and implementation of OBE, i.e., the greater the level of knowledge of the faculty members, the higher the probability of achieving OBE goals. Based on the preliminary study that has been done, 75% of students do not know that the lectures use the OBE learning system. In addition, teachers also have different interpretations of the implementation of OBE (Aminuddin et al., 2021; Wibowo & Veronica, 2022). Therefore, this study aims to find out how the perceptions of lecturers and students regarding the implementation of OBE in the Faculty of Engineering at Diponegoro University, Indonesia. Outcome-based education (OBE) 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. This means starting with a clear picture of what is important for students to be able to do, then organizing curriculum, instruction, and assessment to make sure this learning ultimately happens (Elmahdi et al., 2018; Kennedy et al, 2012). The keys to having an outcome-based system are: (i) developing a cleat set of learning outcomes around which all of the system's components can he focused; and (ii) establishing the conditions and opportunities within the system that enable and encourage all students to achieve those essential outcomes. The characteristics describe how traditional education systems differ from outcome -based systems. Outcome-based systems build everything on a clearly defined framework of exit outcomes. Curriculum, instructional strategies, assessments, and performance standards are developed and implemented to facilitate key outcomes (Wei et al., 2021; Yazar Soyadı, 2015). In OBE, curriculum, instruction, and assessment should be viewed as flexible and alterable means for accomplishing clearly defined learning "ends". In contrast, traditional systems already have a largely predefined curriculum structure with an assessment and credentialing system in place. They usually are not structured around clearly defined outcomes expected of all students. By and large, curriculum and assessment systems are treated as ends in themselves.

Outcome-based systems focus on increasing students' learning and ultimate performance abilities to the highest possible levels before they leave school. In other words, OBE schools take a "macro" view of student learning and achievement. Mistakes are treated as inevitable steps along the way to having students develop, internalize, and demonstrate high level performance capabilities. Working to continuously improve student learning before graduation, outcome-based systems define student achievement as the highest level of performance a student has been able to reach at any given point in time (Hoang & Arch-Int, 2013; Mee Mee et al., 2020). Ultimate school achievement is directly reflected in what students can do successfully at or after their formal instructional experiences have ended. The current system takes quite the opposite approach, testing and permanently grading students every step of the way on all segments of the curriculum. All mistakes become part of a permanent record, which accumulates and constantly reminds students of past errors (Goyal et al., 2022; Weller et al., 2020). The system emphasizes and rewards students for how well they do assigned work at the time it is initially covered in class. Those who are fast and consistent performers emerge with the best grades and records. Those who are slower never get the opportunity to truly catch up because their record of earlier mistakes cannot be erased. The aim of this study is to analyze the perceptions of lecturers and students regarding the implementation of OBE in the Faculty of Engineering. The novelty of this study offers a new perspective by comparing the perceptions of two groups that play a key role in the implementation of Outcome-Based Education (OBE), namely lecturers and students. The differences and similarities in their views on the application of OBE have not been widely explored in previous studies, making this research capable of filling that gap.

2. METHOD

This study adopts a descriptive quantitative approach to examine the perceptions of lecturers and students regarding the implementation of Outcome-Based Education (OBE). This approach was chosen because it allows the researcher to systematically and objectively measure perceptions, providing data that can be analyzed to describe the reality in the field (Seixas et al., 2018). The research population includes lecturers and students from higher education institutions that have implemented OBE. The sample is selected using purposive sampling based on participants' direct experience with OBE-based teaching and learning processes. Data were collected through questionnaires distributed to lecturers and students. The questionnaire was designed based on key indicators of OBE implementation, such as understanding the concept, its application in lectures, and its impact on learning outcomes. Additionally, semi-structured interviews were conducted with selected lecturers and students to enrich the data. The interviews aimed to delve deeper into the challenges and supporting factors of OBE implementation from the participants' perspectives. The questionnaire and interview guide were tested for validity and reliability prior to their use in the study. The data obtained from the questionnaires were analyzed using descriptive statistics to determine frequency distributions and general trends in the perceptions of lecturers and students. To compare perceptions between the two groups, an independent t-test was conducted to assess whether there were significant differences between lecturers' and students' perceptions of OBE implementation. Interview data were analyze using thematic analysis, where responses were identified and categorized into key themes such as challenges in implementation and factors contributing to the success of OBE. The findings from these analyses were then used to provide recommendations for further curriculum development in OBE. Initial indicators for each variable is show in Table 1.

Table 1. Initial Indicators for Each Variable

Variables		Indicators	References
Statement of student's achievement	S1	Students have knowledge that is relevant to the subject	(Custodio et al., 2019)
	S2	Students have technical skills related to the subject	
	S3	Learning improves communication skills	
	S4	Learning improves collaboration skills	
	S5	Learning improves critical thinking and problem-solving skills	
	S6	Learning improves leadership skills	
	S7	Learning improves information management skills	
	S8	Learning improves long life learning skills	
	S9	Learning to improve entrepreneurial skills	
	S10	Learning improves moral and professional ethics	
Relevance of student's achievements	R1	Study program's educational Objectives, graduate learning outcomes, and learning outcomes are discussed with students	(Carlos & Dacoco, 2021)
	R2	Study program's educational objectives, graduate learning outcomes, and learning outcomes are clear and explicit	
	R3	Study program's educational objectives, graduate learning outcomes, and learning outcomes are relevant	
	R4	Study program's educational objectives, graduate learning outcomes, and learning outcomes can be achieved	
	R5	Study program's educational objectives, graduate learning outcomes, and learning outcomes are developed based on the requirements of the Ministry of Education and Culture	
	R6	Study program's educational objectives, graduate learning outcomes, and learning outcomes are developed based on what is expected of the industry	
	R7	Study program's educational objectives, graduate learning outcomes, and learning outcomes are developed based on what is expected of students and parents	
Subject's preparation	P1	The subjects in the curriculum are set sequentially and logically and the required courses are clearly identified	(Carlos & Dacoco, 2021)
	P2	No repetition or overlapping of content in subjects	
	P3	No repetition or overlapping of content between subjects	
Teaching and learning process	T1	Teaching and learning activities according to the subject	(Carlos & Dacoco, 2021)
	T2	The learning process is student centered	
	T3	The learning process across subjects is sequenced appropriately	
	T4	Collaborative learning opportunities are provided to students	

Variables		Indicators	References
	T5	There are instructions to students in the form of assignments in the form of case studies	(Carlos & Dacoco, 2021)
	T6	Capstone design is a form of learning	
	T7	Provisions for self-study are incorporated into the instructional process	(Custodio et al., 2019)
	T8	Opportunities to apply practical work skills are sufficient (e.g., internships, practicum, service)	
Supporting facilities	F1	The OBE facilities in the classroom are sufficient and satisfying	(Custodio et al., 2019)
	F2	Learning resources in the library are adequate	
	F3	Laboratory facilities are sufficient to serve the needs of students	
	F4	There is academic related counseling if needed	
Assessment	A1	The assessment method is explained to students in the beginning and clearly understood by students	(Carlos & Dacoco, 2021)
	A2	Assessment covers the main content in learning	(Custodio et al., 2019)
	A3	Teachers provide feedback on student performance in a timely manner	
	A4	The type of assessment used is in accordance with the subject	
	A5	Frequency and distribution of assessments for one semester is relevant	
	A6	The assessment involves an objective (written test) and performance based	
	A7	The assessment measures the demonstration of the results obtained by students adequately (knowledge, skills, attitudes)	
	A8	Students update their portfolio regularly	
	A9	Learners reflect on the knowledge, skills, and attitudes expected at the end of the lesson	
	A10	Teachers understand the preparation of the assessment rubric	(Carlos & Dacoco, 2021)

3. RESULT AND DISCUSSION

Result

OBE Implementation in the Faculty of Engineering at Diponegoro University

The process of implementing OBE starts from the mission and vision of the university which is passed down to the mission and vision of the faculty, study program educational goals (TPP) in each department, graduate learning outcomes (CPL) for each department, and course learning outcomes (CPMK) for each subject. All elements have their respective duties and responsibilities. In the assessment of each process, it is necessary to prepare supporting documents and forms such as syllabus in accordance with OBE implementation standards. Lecturers also need to understand a good OBE method to achieve the planned outcomes. Therefore, there is a need to held a socialization and workshop in accordance with the competencies of each subject. In addition to the assessment, OBE evaluation also uses a continuous quality improvement (CQI) approach through supervision through reports on the achievement of quality goals, internal audits under the quality assurance center to assess the achievement of quality goals or standards, periodic satisfaction surveys related to the teaching and learning process and user needs, reviews management led by the unit leader on a regular basis to identify potential problems found in internal audits and satisfaction surveys, as well as monitoring using an information system so that it is more systematic.

The Faculty of Engineering at Diponegoro University also applies OBE in its curriculum. The whole process in implementing OBE is described by SIPOC (Supplier – Input – Process – Output – Customers) diagram. At the Faculty, there are suppliers or suppliers, including high schools that supply undergraduate students and other universities that supply master's or doctoral level students as well as teaching staff, the business/industry world that supplies curriculum needs, the community, parents, and the government. To carry out the process, input is needed. In the application of OBE, the students are the main focus, teaching staff, management staff, administrative staff, laboratory staff, finance, curriculum, supervisors, facilities and infrastructure, as well as alumni who have roles and responsibilities. each. The process carried out by the Faculty is in accordance with Tri Dharma of Higher Education with a strategic plan regarding the education system, research system, community service system, human resource management, curriculum reorientation, infrastructure, industry 4.0-oriented organizational culture, collaboration and synergy with stakeholders, and a quality assurance system.

Implementation of OBE into the education system is starting with the admission of new students. Development of implementation and curriculum based on OBE is starting with the mission and vision of UNDIP to CPMK for each subject in each department, each element of which can be analyzed using assessment and CQI, development of teaching materials, implementation of learning, and assessment and evaluation of learning. In the quality assurance system process that focuses on evaluation, an assessment of organizations/institutions, learning activities/programs, and assessment of courses is also carried out as an improvement material for the OBE-based curriculum. Likewise in the curriculum reorientation process as well as collaboration and synergy with stakeholders. Furthermore, the learning process at the Faculty produces outputs in the form of information related to the number of graduates, grade point average (GPA) and length of study, graduates who are competitive and oriented towards industry 4.0, publications, intellectual property rights and patents, as well as the commercialization of research and development. This output is useful for customers or customers of the Faculty, namely the government, multinational companies, state-owned enterprises, private companies, service companies, non-governmental organizations (NGOs), micro, small and medium enterprises (MSMEs), and the community, who can use the outputs generated from the Faculty learning process, especially in the application of the OBE-based curriculum.

Indicators Validation

From the 42 proposed indicators then validate these indicators. There are 12 experts who are appointed to validate these indicators. From those 12 experts, only one expert holding master's degree; others hold doctorate's degree. List of the experts is available upon request. The validity is measured using a questionnaire of Likert scale of 4 (Rubio et al., 2012): 1 = the indicator is not representative and cannot be used; 2 = not representative; 3 = representative enough but still needs improvement; 4 = representative and can be used.

The relevance and importance of each indicator is measured by two criteria. The first is by using the Item Content Validity Index (I-CVI) to assess the validity of each indicator. Polit and Beck (2006) mentioned that as the experts are more than 9, the minimum value of I-CVI is 0.78. The second is by using the Scale Content Validity Index (S-CVI) to measure the validity for the whole indictors. The minimum threshold to assure the validity is 0.80. According to our calculation, the value mean of I-CVI is 0.990 and S-CVI is 0.905. It means that the indicators to be used are valid. However, some experts suggest adding some indicators to enhance the quality of the research. Therefore, we then add one indicator into statement of student's achievement, one indicator into the assessment, and one new variable, namely monitoring and evaluation which contains seven new indicators, as show in Table 2.

Table 2. New Indicators Added

Variables		Indicators	References
Statement of student's achievement	E11	Learning improves creativity skills	(Trilling & Fadel, 2009)
Assessment	A11	The teacher is able and has prepared an assessment rubric	(Kilgour et al., 2020)
Monitoring and evaluation	M1	There are guidelines for evaluating the implementation of OBE that can be accessed by lecturers and students	(Aminuddin et al., 2021)
	M2	Scheduled and frequency monitoring are carried out	(Afandi et al., 2023)
	M3	There is a questionnaire related to the evaluation of the learning process and the curriculum which is distributed to alumni	(Heri Suryaman et al., 2020)
	M4	There is a questionnaire related to process evaluation learning and curriculum at the end of the semester that can be filled by lecturers and students	
	M5	Lecturer keeps student portfolios for OBE implementation assessment	(Carlos & Dacoco, 2021)
	M6	Structured feedback from lecturers and students is used for curriculum improvement	(Yamazaki, 2018)
	M7	Implemented socialization and public test of the curriculum that was developed	

Since the Faculty of Engineering has 12 departments, the respondents for this research are proportionally selected. There are 103 students and 79 lecturers to be selected as the respondents, see Table 3. The respondents are asked about their opinions regarding the OBE implementation in the Faculty of Engineering according to the

(42+9) indicators previously mentioned. We use Likert scale of 5: 1 = very disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = very agree with the item statements reflecting the aforementioned indicators. The respondent of this study is show in Table 3.

Table 3. Respondents Of This Study

	Departments	Students (%)	Lecturers (%)
D1	Civil engineering	5.31	13.92
D2	Architecture	4.35	7.59
D3	Chemical engineering	4.83	6.33
D4	Urban and regional planning	4.35	11.39
D5	Mechanical engineering	4.35	11.39
D6	Electrical engineering	4.35	10.13
D7	Industrial engineering	4.83	7.59
D8	Environmental engineering	3.86	6.33
D9	Naval architecture	3.38	5.06
D10	Geological engineering	2.90	8.86
D11	Geodetic engineering	3.38	5.06
D12	Computer engineering	3.86	6.33

The weighted mean score (WMS) is used to calculate the average weight of each indicator and determine the criteria or level of the implementation of these indicators. WMS processing produces information on the level of implementation of each indicator, ranking of indicators for each variable, and departmental ranking for each variable. The weights for corresponding indicators are based on the Likert scale values: the weight of 1 is appointed if the respondent gives value 1 for the indicators; the weight of 2 for scale Likert scale of 2; and so on. The criteria for the WMS are depicted in Table 4.

Table 4. Criteria For WMS

Range	Criteria
4.20 – 5.00	Very high (VH)
3.40 – 4.19	High (H)
2.60 – 3.39	Fair or good enough (F)
1.80 – 2.59	Low (L)
1.00 – 1.79	Very low (VL)

The implementation of OBE in regard to the variable of the statements' student achievement from the perception of the lecturers has been implemented very well, this is shown by the total weighted average value of 4.29 which can be seen in Table 5**.**

Table 5. Lecturer's Perception for Each Assessed Indicator

Indi-cators	Departments												Mean	Criteria	Rank
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12			
Statement of student's achievement															
S1	4.82	4.33	4.60	4.50	4.63	4.75	4.67	4.60	4.50	4.71	4.50	4.60	4.63	VH	1
S2	4.45	4.17	4.20	4.25	3.88	4.38	4.17	4.40	4.50	4.57	4.00	4.60	4.31	VH	7
S3	4.64	3.67	4.60	4.25	4.00	4.50	4.17	4.40	4.25	4.43	4.00	4.40	4.31	VH	7
S4	4.55	4.00	4.40	4.38	4.00	4.75	4.00	4.40	4.50	4.43	4.25	4.40	4.36	VH	4
S5	4.82	4.33	4.80	4.38	4.50	4.75	4.67	4.40	4.50	4.71	4.50	4.80	4.60	VH	2
S6	4.64	3.50	4.60	3.88	4.25	4.50	4.33	4.00	4.50	4.43	4.50	4.60	4.33	VH	5
S7	4.36	4.17	4.60	4.13	3.88	4.88	4.00	4.40	4.00	4.29	3.00	4.80	4.44	VH	3
S8	4.55	3.67	4.20	4.13	3.88	4.25	3.83	4.20	4.50	4.29	3.75	4.40	4.12	H	10
S9	4.45	3.83	4.40	4.13	4.13	4.13	4.67	4.00	4.75	4.29	4.00	4.40	4.18	H	9
S10	4.36	4.17	4.40	4.13	3.50	4.63	3.67	4.20	4.25	4.00	3.50	4.40	4.32	VH	6
S11	4.73	3.50	4.40	3.63	4.25	4.38	4.50	4.00	3.50	4.43	4.2	3.80	3.91	H	11
Mean	**4.58**	**3.94**	**4.47**	**4.16**	**4.08**	**4.53**	**4.24**	**4.27**	**4.34**	**4.42**	**4.02**	**4.47**	**4.29**	**VH**	
Rank	**1**	**12**	**3**	**9**	**10**	**2**	**8**	**7**	**6**	**5**	**11**	**4**			
Relevance of student's achievements															
R1	4.73	4.67	4.60	4.50	4.50	5.00	4.67	4.60	5.00	4.57	4.75	5.00	4.71	VH	1
R2	4.64	4.67	4.60	4.25	4.50	5.00	4.67	4.60	4.75	4.43	4.50	4.60	4.59	VH	3
R3	4.73	4.50	4.60	4.25	4.50	4.63	4.50	4.60	5.00	4.57	4.75	4.80	4.60	VH	2
R4	4.55	4.50	4.40	4.50	4.50	4.50	4.67	4.40	3.75	4.57	4.50	4.80	4.50	VH	5

Indi-cators	Departments												Mean	Criteria	Rank
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12			
R5	4.00	4.00	4.20	4.00	3.88	4.25	4.33	4.60	4.50	3.86	3.75	4.40	4.13	H	6
R6	4.55	4.50	4.40	4.50	4.00	4.50	4.83	4.60	5.00	4.43	4.75	4.60	4.51	VH	4
R7	4.00	4.00	4.20	3.88	3.75	4.00	3.83	4.40	4.50	4.00	3.75	3.60	3.94	H	7
Mean	**4.45**	**4.40**	**4.43**	**4.27**	**4.23**	**4.55**	**4.50**	**4.54**	**4.50**	**4.35**	**4.39**	**4.54**	**4.43**	**VH**	
Rank	**6**	**8**	**7**	**11**	**12**	**1**	**5**	**3**	**4**	**10**	**9**	**2**			
Subject's preparation															
P1	4.55	3.67	4.20	4.25	4.38	4.75	4.50	4.20	4.75	4.71	4.50	4.40	4.42	VH	1
P2	4.36	4.17	4.00	4.00	4.00	4.13	4.00	4.20	4.50	4.14	3.75	4.20	4.13	H	2
P3	4.18	3.67	3.80	3.75	4.13	3.50	3.67	4.00	4.25	3.71	4.00	4.00	3.88	H	3
Mean	**4.36**	**3.83**	**4.00**	**4.00**	**4.17**	**4.13**	**4.06**	**4.13**	**4.50**	**4.19**	**4.08**	**4.20**	**4.15**	**H**	
Rank	**2**	**12**	**10**	**10**	**5**	**7**	**9**	**6**	**1**	**4**	**8**	**3**			
Teaching and learning process															
T1	4.18	4.00	4.20	4.50	4.25	4.38	4.17	4.20	4.50	4.14	4.50	4.40	4.26	VH	6
T2	3.91	3.83	4.60	4.25	4.13	3.88	4.33	4.20	4.50	3.86	4.25	4.20	4.09	H	8
T3	4.18	3.67	4.20	4.38	4.00	4.38	4.33	4.00	4.25	4.29	4.00	3.80	4.12	H	7
T4	4.45	4.17	4.40	4.38	4.25	4.75	4.50	4.80	4.25	4.57	4.50	4.20	4.41	VH	2
T5	4.45	4.17	4.20	4.38	4.50	4.75	4.33	4.60	4.75	4.43	4.50	4.20	4.42	VH	1
T6	4.27	4.17	4.00	4.38	4.50	4.75	4.67	4.40	4.00	4.29	4.50	4.40	4.36	VH	3
T7	4.00	4.17	4.60	4.25	4.25	4.75	4.33	4.40	4.25	4.29	4.50	4.00	4.28	VH	4
T8	4.36	3.83	4.20	4.00	4.00	4.88	4.33	4.40	4.75	4.43	4.50	3.80	4.27	VH	5
Mean	**4.23**	**4.00**	**4.30**	**4.31**	**4.23**	**4.56**	**4.38**	**4.38**	**4.41**	**4.29**	**4.41**	**4.13**	**4.30**	**VH**	
Rank	**10**	**12**	**7**	**6**	**9**	**1**	**4**	**5**	**2**	**8**	**2**	**11**			
Supporting facilities															
F1	3.64	3.33	3.80	4.13	3.38	4.50	4.17	3.80	3.50	4.00	2.50	3.60	3.76	H	2
F2	3.64	3.33	3.80	4.25	3.50	4.13	4.33	3.80	3.50	3.43	2.50	3.40	3.69	H	3
F3	3.73	317	3.20	3.75	2.88	3.50	3.67	3.60	3.75	3.14	2.25	3.60	3.38	F	4
F4	3.91	3.83	3.80	3.88	4.13	4.38	4.00	4.00	4.25	4.57	4.00	4.40	4.09	H	1
Mean	**3.73**	**3.42**	**3.65**	**4.00**	**3.47**	**4.13**	**4.04**	**3.80**	**3.75**	**3.79**	**2.81**	**3.75**	**3.69**	**H**	
Rank	**8**	**11**	**9**	**3**	**10**	**1**	**2**	**4**	**6**	**5**	**12**	**6**			
Assessment															
A1	4.55	4.00	4.60	4.38	4.50	5.00	4.00	4.60	5.00	4.14	4.75	4.40	4.46	VH	1
A2	4.45	3.83	4.20	4.25	4.25	4.63	4.67	4.60	5.00	4.29	4.25	4.40	4.37	VH	2
A3	4.00	3.50	4.00	4.25	4.25	4.50	3.83	4.20	4.50	4.00	4.50	4.00	4.12	H	8
A4	4.36	4.17	4.00	4.38	4.50	4.63	4.50	4.40	4.50	4.29	4.25	4.00	4.35	VH	3
A5	4.09	3.83	4.00	4.25	4.25	4.50	4.33	4.20	4.75	4.00	4.00	4.00	4.18	H	6
A6	4.09	3.67	4.20	4.38	4.13	4.75	4.33	4.60	5.00	4.29	4.75	4.20	4.32	VH	4
A7	4.18	3.67	4.20	4.25	4.00	4.63	4.33	4.20	4.00	4.00	4.25	4.00	4.15	H	7
A8	4.09	4.00	4.00	3.75	3.75	4.38	3.67	3.80	4.00	3.86	4.00	3.80	3.94	H	10
A9	4.27	4.17	4.00	4.25	4.13	4.75	3.83	4.20	4.25	3.86	4.50	4.20	4.21	VH	5
A10	4.18	3.67	4.00	4.38	4.25	4.50	4.33	3.60	4.00	3.86	4.75	3.40	4.10	H	9
A11	4.18	3.67	3.80	3.38	4.38	3.75	4.33	3.40	2.75	3.57	4.50	3.20	3.81	H	11
Mean	**4.22**	**3.83**	**4.09**	**4.17**	**4.22**	**4.55**	**4.20**	**4.16**	**4.34**	**4.01**	**4.41**	**3.96**	**4.18**	**H**	
Rank	**4**	**12**	**9**	**7**	**5**	**1**	**6**	**8**	**3**	**10**	**2**	**11**			
Monitoring and evaluation															
E1	3.82	3.17	3.40	4.00	4.13	4.13	4.50	3.00	4.75	3.71	4.25	2.80	3.82	H	6
E2	3.73	3.50	3.60	4.00	4.13	4.50	4.33	3.40	4.75	4.14	4.25	3.20	3.97	H	3
E3	3.27	4.17	3.80	3.88	3.63	4.00	4.33	4.00	4.00	4.29	4.00	3.60	3.88	H	5
E4	4.09	3.50	3.60	3.88	4.00	4.38	4.17	3.60	4.25	3.57	4.75	4.40	4.01	H	2
E5	3.00	3.17	3.80	3.88	3.25	4.13	3.83	3.60	4.25	4.14	4.25	2.60	3.62	H	7
E6	3.82	4.00	4.00	4.13	4.13	3.75	4.00	3.80	3.75	4.00	4.00	3.40	3.91	H	4
E7	3.73	3.67	4.00	4.38	4.13	4.25	4.50	4.00	4.25	4.14	4.00	4.00	4.08	H	1
Mean	**3.64**	**3.60**	**3.74**	**4.02**	**3.91**	**4.16**	**4.24**	**3.63**	**4.29**	**4.00**	**4.21**	**3.43**	**3.90**	**H**	
Rank	**9**	**11**	**8**	**5**	**7**	**4**	**2**	**10**	**1**	**6**	**3**	**12**			

Base on Table 5, there are 8 indicators that have been implemented very well or have very high criteria (VH), namely indicators S1, S2, S3, S4, S5, S6, S7, and S10; and 3 indicators that are implemented well because (high criteria or H), namely S8, S9 and S10. The indicator that has the highest score or is ranked 1 is S1 with a value of 4.63; while the indicator that has the lowest score is S11 with a value of 3.91. Creativity can be increased by accommodating a variety of learning activities that adopt OBE, such as brainstorming, actual demonstrations, debates, and role playing. The department with the best implementation level regarding this variable is Civil Engineering with the average of 4.58, while the department that is at the bottom is Architecture. From the student's perception, the total weighted average score is 3.64 and is high category (H) which means that the implementation

of variable of the statements' student achievement has been implemented well. Individually, there are 9 indicators that have been implemented well, namely indicators S1, S2, S3, S4, S5, S7, S8, S10, S11. While the indicator S6 and S9 only fit into fairly implemented (F). The indicator that has the highest score is S10. De Guzman et al. (2017) stated that students who have moral and professional ethics after participating in the learning process are caused by the smooth learning process due to the good relationship that develops between lecturers and students. The indicator that has the lowest score is E9. This implementation is a challenge for the faculty in designing a curriculum that is able to inspire students to turn their business ideas into productive business activities. The department that is ranked 1 is Urban and Regional Planning, while the department that is at the bottom is Computer Engineering. Student's perception for each assessed indicator is show in Table 6.

Table 6. Student's Perception For Each Assessed Indicator

Indi-cators	Departments												Mean	Criteria	Rank
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12			
Statement of student's achievement															
S1	3.82	3.33	4.00	4.22	3.89	4.00	4.10	4.13	3.14	3.83	4.00	3.38	3.84	H	4
S2	3.00	3.56	3.50	4.00	3.67	3.44	3.50	3.50	2.71	3.00	3.71	3.50	3.42	H	9
S3	3.36	3.67	3.67	4.22	3.78	3.33	4.00	3.38	3.57	3.83	3.86	3.50	3.65	H	6
S4	3.82	3.78	4.00	4.44	3.89	3.67	4.20	4.00	3.71	3.50	4.29	3.13	3.90	H	3
S5	3.73	3.89	4.33	4.44	4.22	4.11	4.10	4.38	3.86	4.17	4.29	3.75	4.05	H	2
S6	3.27	3.56	3.67	3.89	3.67	3.00	3.70	3.88	3.57	3.17	2.71	2.63	3.39	F	10
S7	3.55	3.56	3.83	3.89	3.78	3.78	3.90	3.88	3.71	3.17	4.29	3.50	3.73	H	5
S8	3.09	3.67	4.00	3.67	3.89	3.89	3.80	2.88	3.29	3.50	3.57	3.00	3.52	H	8
S9	2.36	3.22	2.50	3.22	3.00	2.89	3.00	2.25	2.43	3.00	3.29	2.63	2.83	F	11
S10	3.73	3.89	3.83	4.44	4.22	4.11	4.30	4.50	4.14	4.33	4.29	3.50	4.09	H	1
S11	3.18	3.89	3.33	3.89	3.89	3.89	4.00	3.63	3.14	3.33	3.57	3.63	3.59	H	7
Mean	**3.36**	**3.64**	**3.70**	**4.03**	**3.81**	**3.65**	**3.87**	**3.67**	**3.39**	**3.53**	**3.81**	**3.28**	**3.64**	**H**	
Rank	**11**	**8**	**5**	**1**	**3**	**7**	**2**	**6**	**10**	**9**	**4**	**12**			
Relevance of student's achievements															
R1	3.64	3.67	3.67	4.56	3.67	3.78	3.80	4.50	2.86	4.00	4.29	4.13	3.89	H	1
R2	3.36	3.11	3.50	4.33	3.67	3.67	3.40	4.25	2.86	3.17	3.29	3.63	3.55	H	6
R3	3.55	3.44	3.67	4.22	3.67	3.78	3.90	4.25	3.29	3.17	3.57	3.88	3.74	H	3
R4	3.27	3.44	3.67	4.11	3.56	3.67	4.10	3.88	3.14	3.83	4.14	3.75	3.69	H	4
R5	3.45	3.11	3.83	4.11	3.67	3.78	3.90	3.88	3.57	2.83	3.29	3.50	3.61	H	5
R6	3.64	3.11	3.33	3.89	3.56	4.00	3.90	4.00	4.00	3.17	4.57	3.75	3.75	H	2
R7	3.09	2.78	3.00	3.67	3.22	3.33	3.70	3.63	3.29	2.33	3.43	2.88	3.18	F	7
Mean	**3.43**	**3.24**	**3.52**	**4.13**	**3.57**	**3.71**	**3.81**	**4.05**	**3.29**	**3.21**	**3.80**	**3.64**	**3.62**	**H**	
Rank	**9**	**11**	**8**	**1**	**7**	**5**	**3**	**2**	**10**	**12**	**4**	**6**			
Subject's preparation															
P1	4.00	3.67	3.83	4.44	4.00	3.33	3.70	4.38	3.29	3.00	3.86	4.00	3.82	H	1
P2	3.64	3.44	3.17	4.33	3.56	3.56	3.80	3.88	3.71	3.50	3.71	3.63	3.67	H	2
P3	3.64	3.44	3.00	3.89	3.67	3.78	3.00	3.75	3.29	2.83	3.29	3.25	3.44	H	3
Mean	**3.76**	**3.52**	**3.33**	**4.22**	**3.74**	**3.56**	**3.50**	**4.00**	**3.43**	**3.11**	**3.62**	**3.63**	**3.62**	**H**	
Rank	**3**	**8**	**11**	**1**	**4**	**7**	**9**	**2**	**10**	**12**	**6**	**5**			
Teaching and learning process															
T1	3.64	3.67	3.83	4.11	3.56	3.67	3.50	3.88	3.57	2.83	3.71	3.38	3.60	H	4
T2	2.82	3.33	3.83	3.67	3.67	3.56	4.00	3.88	3.29	3.17	3.86	3.75	3.50	H	6
T3	3.36	3.22	3.50	3.67	3.22	3.44	3.50	3.13	3.14	3.33	2.57	3.13	3.28	F	8
T4	3.73	3.78	3.67	4.22	3.22	3.67	3.50	3.75	3.29	3.67	3.57	3.88	3.67	H	3
T5	4.00	4.00	4.00	4.67	3.78	3.67	3.70	4.63	3.86	3.50	4.43	3.75	3.99	H	2
T6	4.09	3.89	4.17	4.11	3.89	3.89	4.10	4.38	3.57	4.33	4.43	4.00	4.08	H	1
T7	3.91	3.67	3.67	4.33	3.67	2.78	2.90	4.00	3.86	3.33	4.43	2.75	3.56	H	5
T8	3.55	3.44	3.33	3.67	3.56	3.33	3.70	4.13	3.00	2.83	4.00	3.13	3.47	H	7
Mean	**3.64**	**3.63**	**3.75**	**4.06**	**3.57**	**3.50**	**3.61**	**3.97**	**3.45**	**3.38**	**3.88**	**3.47**	**3.66**	**H**	
Rank	**5**	**6**	**4**	**1**	**8**	**9**	**7**	**2**	**11**	**12**	**3**	**10**			
Supporting facilities															
F1	2.91	3.00	3.00	3.89	3.22	3.22	3.30	1.63	2.86	3.33	2.29	2.63	3.03	F	3
F2	2.64	2.89	3.17	3.67	2.78	3.44	3.20	3.50	2.86	2.33	1.71	2.75	2.94	F	4
F3	3.82	3.11	2.83	3.44	3.11	2.56	3.40	3.75	3.00	2.33	3.14	2.50	3.15	F	1
F4	2.73	3.44	3.17	3.67	3.56	3.11	2.70	2.88	2.29	3.00	2.71	3.50	3.06	F	2
Mean	**3.02**	**3.11**	**3.04**	**3.67**	**3.17**	**3.08**	**3.15**	**3.19**	**2.75**	**2.75**	**2.46**	**2.84**	**3.02**	**F**	
Rank	**8**	**5**	**7**	**1**	**3**	**6**	**4**	**2**	**10**	**10**	**12**	**9**			
Assessment															
A1	3.82	3.22	3.50	4.44	3.89	3.78	4.00	4.13	3.71	4.00	2.86	3.75	3.81	H	2
A2	3.91	3.67	4.00	4.56	4.00	3.67	4.20	4.13	3.86	3.50	3.43	4.13	3.95	H	1

Indi-cators	Departments												Mean	Criteria	Rank
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12			
A3	3.09	3.33	3.33	3.89	3.33	3.44	3.20	3.63	3.14	3.00	3.00	3.50	3.32	F	9
A4	3.55	3.67	3.67	4.11	3.56	3.78	3.90	3.88	3.00	3.00	3.29	3.75	3.61	H	4
A5	2.91	3.67	3.00	4.11	3.56	3.44	3.70	3.88	3.29	3.33	3.14	3.63	3.49	H	8
A6	3.27	3.22	3.50	4.22	3.67	3.78	4.00	3.88	2.86	3.50	3.14	3.13	3.53	H	6
A7	3.18	3.33	3.50	4.33	3.56	3.67	3.90	3.63	3.57	3.67	3.43	3.13	3.56	H	5
A8	2.73	3.22	3.33	3.33	3.22	3.44	3.40	2.88	2.57	2.17	2.29	2.88	2.97	F	11
A9	3.18	3.56	3.33	3.67	3.56	3.44	3.70	3.13	3.43	2.67	3.00	2.88	3.30	F	10
A10	3.73	3.67	3.50	4.56	3.89	3.33	3.80	3.75	3.14	3.17	3.29	3.75	3.67	H	3
A11	3.55	3.44	3.00	4.22	3.33	3.11	3.90	3.50	3.00	3.83	3.57	3.63	3.52	H	7
Mean	**3.36**	**3.45**	**3.42**	**4.13**	**3.60**	**3.54**	**3.79**	**3.67**	**3.23**	**3.26**	**3.13**	**3.47**	**3.50**	**H**	
Rank	**9**	**7**	**8**	**1**	**4**	**5**	**2**	**3**	**11**	**10**	**12**	**6**			
Monitoring and evaluation															
E1	3.82	3.67	4.00	3.89	3.78	4.00	4.40	4.00	4.29	4.00	4.57	4.25	4.06	H	2
E2	4.27	3.89	4.50	3.67	4.11	3.89	4.60	3.88	4.14	3.83	4.57	4.13	4.13	H	1
E3	3.27	3.56	3.67	3.89	3.22	4.00	3.90	3.50	3.57	3.17	2.86	3.38	3.49	H	7
E4	3.36	3.89	3.83	3.67	3.67	3.89	4.10	4.00	3.71	4.00	4.00	4.00	3.83	H	6
E5	3.64	3.89	4.00	3.56	4.11	3.78	4.00	3.88	4.14	4.17	4.43	3.88	3.95	H	5
E6	3.91	4.11	3.83	4.33	4.11	4.11	4.30	4.25	4.00	4.00	3.14	4.00	4.04	H	3
E7	3.91	3.89	3.33	4.00	4.11	4.11	4.00	4.00	4.29	4.00	4.57	4.13	4.02	H	4
Mean	**3.74**	**3.84**	**3.88**	**3.86**	**3.87**	**3.97**	**4.19**	**3.93**	**4.02**	**3.88**	**4.02**	**3.96**	**3.93**	**H**	
Rank	**12**	**11**	**8**	**10**	**9**	**4**	**1**	**6**	**3**	**7**	**2**	**5**			

Base on Table 6, the implementation of OBE in regard to the variable of relevance of student's achievement from the perception of lecturer is very good. This is indicated by the total weighted average value of 4.43. Individually, there are 5 indicators that are categorized as very high (VH) or very well implemented, namely indicators R1, R2, R3, R4, and R6. The indicator with the highest score is R1. The indicator that has the lowest score is R7. A curriculum that adopts OBE is better at integrating what is needed by the industry so that after graduating students have the capabilities and abilities that match the needs of the market. The department that is ranked 1 with is Electrical Engineering; while the department that is ranked 12th is Mechanical Engineering. From student's perception, the weighted average is 3.62. There are 6 indicators that individually fall into the high category (H), namely R1, R2, R3, R4, R5, and R6. R7 is included in fairly implemented (F) with a WMS value of 3.18. The indicators that have the highest and lowest scores are R1 and R7, respectively. The department with the best level of implementation in this variable is Urban and Regional Planning with a value of 4.13, while Geological Engineering is at the bottom list.

The implementation of OBE regarding the variable of subject's preparation from the perception of lecturer obtains a total weighted average value of 4.15 and it is included in the high category (H). Of the 3 indicators assessed, P1 is the only indicator that is in the very high category (VH) or very well implemented, while P2 and P3 are in the high category (H) or well implemented. The indicator with the highest score is P1. The subjects have been set sequentially, logically, and clearly identified and have been implemented well at the Faculty of Engineering. The indicator with the lowest score is P3. The department that has the highest score or the best level of implementation is Naval Architecture, while the one with the lowest score is Architecture. From the perception of students, the total weighted average score was 3.62 which means that the implementation of OBE of this variable is good. Three indicators P1, P2, and P3 are in the high category (H). The indicators with the highest and lowest rankings are the same as from the lecturers' perceptions. The department with the highest ranking is Urban and Regional Planning, while Geological Engineering is at the bottom list.

Discussion

The implementation of OBE regarding the variable of teaching and learning process from the lecturer's perception obtains a total weighted average score of 4.30 and it is included in the very high category (VH). There are 6 indicators with very high criteria (VH), namely indicators T1, T4, T5, T6, T7, and T8. Meanwhile, the other 2 indicators are categorized as high (H) or well implemented, namely T2 and T3. The indicator that is ranked 1 is T5 with a score of 4.42. The learning process with case studies is an excellent way for students to apply the theory they have learned to practical concepts in various cases, increase curiosity, cultivate decision-making skills, problem solving, and involve discussion (Dam et al., 2019; Irhandayaningsih, 2020). Case studies are not fixed on one correct answer so that they are able to give students the opportunity to be creative in finding different alternative solutions. In addition, learning in the form of case studies provides students with a better understanding and can become long-term memory (Liando et al., 2021; Musso et al., 2019).

The indicator that is at the bottom list is T2 with a value of 4.09. This can be overcome by developing various learning activities that provide opportunities for students to be more active both inside and outside the classroom. The student-centered OBE learning process motivates students to become more independent in learning

and creates clear directions in learning and emphasizes collaboration over competition (Custodio et al., 2019; Wibowo & Veronica, 2022). The department that is ranked 1 is Electrical Engineering, while Computer Engineering is at the bottom list. From the student's perception, this variable obtains a total weighted average value of 3.66 meaning that this variable has been implemented properly. There are 7 indicators that individually have been implemented well and are included in the high category (H) while the other 1, namely indicator T3 is included in the fair criterion (N). The indicator that is ranked 1 is T6. Independent learning or self-study is one component of learning that can improve communication skills, think critically, and apply modern learning tools. This is also applied in the Chemical Engineering department of BMS College, India, where several independent learning activities that can be carried out are reading literature assignments to be applied in experiments in the laboratory, reading individual research progress, demonstrating concepts taught in class through experiments, and using tools. modern technology to solve problems (Crawley et al., 2019; Goeltz & Cuevas, 2021). While the last rank is T3. The sequence of learning for this course can be overcome by doing a breakdown or detailing the content of the applicable curriculum. The department that are ranked 1 is Urban and Regional Planning, while Geological Engineering is at the bottom list.

The implementation of OBE in the supporting facilities variable from the perception of the lecturers obtains a total weighted average score of 3.69 and it is in the high category (H). There are 3 indicators that fall into the high category (H) or well implemented, namely F1, F2, and F4 and 1 other indicator is in the fair category (F). The indicator with the highest WMS score is F4 with a value of 4.09. Ganesha University of Education applies academic guidance to provide assistance and advice to students in programming courses and continuous supervision for smooth study. Likewise, the Philippine University where lecturers agree that the faculty has provided services in the form of academic counseling (Custodio et al., 2019). While the indicator with the lowest WMS value is F3. If this indicator is perceived by the lecturer as a teacher, it is possible if the objectives and plans of the learning process provide less than optimal results for students. The department with the highest score or the best level of implementation is Electrical Engineering, while the lowest is Geodetic Engineering. From the student's perception, the total weighted average is 3.02 and it is in the fair category (F). All indicators are categorized as fairly implemented. The indicator with the highest score is F3. Even though the student's perception of this indicator is in the highest rank, the WMS value is 3.15 which is lower than the WMS value of the lecturer's perception of the lowest rank (3.15 < 3.38). So, it can be said that both students and lecturers feel that laboratory facilities need to be improved. While the indicator with the lowest score is F2. Libraries should provide extensive learning resources, this facility is related to the benefits of OBE to motivate students to become independent learners in exploring their scientific fields (Robinson, 2009; Saadah et al., 2022). The department with the highest score is Urban and Regional Planning, while Geodetic Engineering is at the bottom list.

The implementation of OBE in the assessment variable from the lecturer's perception obtains a total weighted average value of 4.18 and it is included in the high category (H). There are 5 indicators that fall into the very high category (VH) or have been implemented very well, namely A1, A2, A4, A6, and A9. Meanwhile, indicators A3, A5, A7, A8, A10, and A11 are in the high category (H) or well implemented. The indicator with the highest score is A1 with the value of 4.46. While the indicator with the lowest score is A11 with 3.81. This is also experienced by Kandahar University where around 70% of lecturers have not been able to compile a personal assessment rubric (Damyanov & Tsankov, 2018; Fatimah & Santiana, 2017). The department with the highest score is Electrical Engineering and the lowest is Computer Engineering. From the students' perception, this variable obtains a total weighted average score of 3.50 and included in the high category (H). There are 8 indicators that have been implemented well, namely A1, A2, A4, A5, A6, A7, A10, A11. Meanwhile, the other 3 indicators, namely A3, A8, and A9, are included in the fair category (F). The indicator with the highest score is A2. While the indicator that is ranked 11 is A8. There is a need for improvement in this implementation because it can help students achieve better learning outcomes from portfolio analysis which is updated regularly (Abdullah et al., 2016; Dewi et al., 2022). The department with the highest score is Urban and Regional Planning, while Geodetic Engineering is at the bottom list.

The implementation of OBE in the monitoring and evaluation variable from the perception of the lecturers has been well proven by the total weighted average score of 3.90. All indicators are categorized as high (H) or well implemented. The indicator with the highest score is E7 with value of 4.08. This is in accordance with the stages of designing an ideal curriculum based on KNNI and SN-DIKTI where the public examination needs to involve lecturers, alumni, stakeholders, faculty and university leaders, and other relevant entities. Furthermore, socialization was carried out to lecturers, education staff, faculty leaders, and universities. While the indicator with the lowest score is E5 with the value of 3.62. The portfolio is one of the ingredients in the implementation of PDCA-CI in the OBE curriculum (Aminuddin et al., 2021; Hasanah & Supriansyah, 2022). The department with the highest score is Naval Architecture, while the lowest is Computer Engineering. From the perception of students, the total weighted average score is 3.93 and it is in the high category, which means that the implementation of OBE is good according to the students. All indicators fall into the high category. The indicator with the highest score is E2. Until now, there has been an assessment carried out through SIAP regarding the performance of lecturers and the entire previous semester's learning process which is carried out routinely before the start of the

new semester, the assessment must be filled out by all active students. This implementation is included in the monitoring and has been carried out well. The indicator with the lowest score is E3. The survey questionnaire distributed to alumni is one form of indirect assessment of the continuity of the learning process and curriculum that adopts OBE and is useful for continuous improvement (Aminuddin et al., 2021). The department with the highest score is Industrial Engineering and the department with the lowest score is Civil Engineering.

We then attempt to test whether the difference exists between lecturer's and student's perception. We use the non-parametric Mann-Whitney test to investigate this difference. Regarding the variable of the statements' student achievement, the difference between lecturer's and student's perception is statistically significant at the level of 5%. The other variables which are statistically significant are relevance of student's achievement, teaching and learning process, supporting facilities, and assessment. While subject's preparation is statistically significant at the level of 10%; and monitoring and evaluation is not statistically significant.

Results show that from the perspective of lecturers, OBE is very well implemented regarding the variables of statement of student's achievement, relevance of student's achievements, and teaching and learning process; while the others are well implemented. However, from the perspective of students, OBE is fairly implemented regarding the variable of supporting facilities; while the others are well implemented. We also test whether the difference exists between lecturer's and student's perception using the non-parametric Mann-Whitney test. The variables which are statistically significant at the level of 5% are statements' student achievement, relevance of student's achievement, teaching and learning process, supporting facilities, and assessment. While subject's preparation is statistically significant at the level of 10%; and monitoring and evaluation is not statistically significant.

4. CONCLUSION

This study aims to find out how the perceptions of lecturers and students regarding the implementation of OBE in the Faculty of Engineering at Diponegoro University, Indonesia. To assess the perception, 42+9 indicators are used. The 42 indicators are derived from the literature review while the 9 indicators are suggested from the experts in the interview section. Notice that all indicators have been tested for validity using I-CVI and S-CVI resulting that the indicators to be used are valid. Since the Faculty of Engineering has 12 departments, the respondents for this research are proportionally selected. There are 103 students and 79 lecturers to be selected as the respondents. They are asked about their opinions regarding the OBE implementation in the Faculty of Engineering according to the (42+9) indicators previously mentioned. We use Likert scale of 5 ranging from 1 = very disagree to 5 = very agree.

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