OBE in Teaching and Learning: Implementation Level Study at Sultan Mizan Zainal Abidin Polytechnic

Wan Mohd Rizairie Wan Mohd Noor[1]*, Siti Safuan Kamaruddin[1], Norazmira Wati Awang[1]

[1]Department of Mechanical Engineering, Politeknik Sultan Mizan Zainal Abidin, Km 8, Jalan Paka, 23000 Dungun, Terengganu, Malaysia

*Corresponding author: rizairie@psmza.edu.my
Please provide an **official organisation email** of the corresponding author

Abstract

Polytechnic Malaysia was first introduced to Outcome-Based Education (OBE) since 2010 to meet the requirements of the Malaysian Qualifications Framework (MQF). The concept of OBE was introduced to replace traditional education. One of the principles of OBE is "curriculum design down" which requires alignment between each level of implementation. Sultan Mizan Zainal Abidin Polytechnic (PSMZA) is one of the polytechnics that strives to cultivate the OBE ecosystem among staff and students. However, PSMZA faces several problems in implementing OBE, such as the lack of clarity regarding the level of the OBE ecosystem that has been implemented in PSMZA, difficulties in identifying lecturers according to departments who need OBE-related workshop courses, and difficulties in setting the focus of the OBE course content for the short term. The purpose of this study was to examine the implementation level of the OBE ecosystem such as planning, delivery and assessment in teaching and learning at PSMZA. This study was conducted as a survey and the research data was analyzed using the statistical software package The Statistical Package for Social Science (SPSS) version 18.0. to obtain the mean and standard deviation as well as significant relationships and differences. The results of the analysis show a high level between the practice of planning, implementation, and assessment of learning at PSMZA, while the correlation analysis shows that there is a significant relationship between the three and there is no difference in the level of implementation of OBE among departments except JTMK in terms of evaluation. In conclusion, the OBE ecosystem has become a culture at PSMZA, but efforts are still needed to overcome some of the problems encountered in its implementation.

Keywords: - OBE, planning, delivery, assessment

1. Introduction

OBE (Outcome-Based Education) is an education system that emphasizes the results that students want to achieve, not the learning process itself. In this system, the focus is on what students should achieve because of their learning, not on the traditional teaching-learning process. OBE focuses on the achievement of results that can be observed and measured, such as the ability to solve problems, think critically, and work together with someone else. This is different from the traditional education system that emphasizes transcription, tests, and assignments. By emphasizing the result, OBE is expected to provide students with an education that is more meaningful and relevant to the real world. This system is also expected to improve students' ability to adapt to a changing environment and overcome challenges in the future.

Sultan Mizan Zainal Abidin Polytechnic Action Transformation Plan 2021-2025 stipulates that at least 6 courses or workshops related to OBE need to be planned and implemented throughout the year for lecturers to improve their understanding and improve the practice of delivering the ecosystem-based curriculum of OBE in daily teaching and learning (PSMZA, 2020). The KPI of

these 6 courses or workshops is set since there are 6 study departments here, namely the Department of Civil Engineering (JKA), the Department of Electrical Engineering (JKE), the Department of Mechanical Engineering (JKM), the Department of Information and Communication Technology (JTMK), the Department of Mathematics, Science and Computer (JMSK) and General Studies Department (JPA). Accordingly, PSMZA sets a KPI for all its lecturers to attend at least 1 course or workshop related to OBE.

However, in the process of inculcating OBE, the management of PSMZA faces a vague situation in deciding to set at least 6 courses or workshops related to OBE that need to be planned and implemented throughout the year for the lecturers to be maintained or abolished due to no concrete statement that the OBE ecosystem has become a culture in the curriculum presenter at PSMZA.

Whereas if this KPI continues then there will be difficulties in identifying the target group of lecturers according to the department who need a course or workshop related to OBE and making the OBE course more focused.

The OBE (Outcome-Based Education) ecosystem includes various elements that are interrelated and need to be observed holistically in implementing OBE. Among them include the Learning Outcome itself which is the main aspect in OBE. Learning outcomes must be clearly defined for each course or program. This includes the knowledge, skills, values, and attitudes that students want to achieve. Learning outcomes at Malaysian polytechnics including PSMZA have been clearly defined in the curriculum. The polytechnic curriculum has been redesigned to meet the goals and learning outcomes that have been set since the 2014 version. This curriculum development process has considered the needs of the job market and current technological developments (Rahmat, 2020).

The evaluation element in OBE needs to be focused on the learning outcomes that have been set. Students are evaluated based on their ability to achieve the learning outcomes. Meanwhile, the teaching concept needs to be implemented effectively by using appropriate teaching methods and strategies to achieve the set learning outcomes. Resources and technology need to be provided to facilitate students and lecturers in the teaching and learning process. This includes reading materials, teaching aids, teaching and learning software, as well as online learning platforms.

In terms of competence, lecturers need to be trained and provided with sufficient skills and knowledge in implementing OBE. They also need to understand the concepts of OBE and can facilitate students in achieving learning outcomes. While the students need to be trained to be more proactive in their learning process. They need to understand the concepts of OBE and be able to carry out learning activities independently.

Apart from that, the maintenance of OBE needs to be observed holistically, including monitoring, and improving

the program, as well as improving the quality of teaching and learning.

This study focuses on the OBE ecosystem in terms of the relationship between planning, delivery, and evaluation at PSMZA. Instructional planning means planning appropriate learning activities to achieve the desired learning outcomes. In OBE, teaching planning needs to be done based on the learning outcomes that have been set. Therefore, when evaluating the level of implementation of teaching planning, assessment is done to ensure that the planned teaching activities are related to the learning outcomes set (García-Ramos & Díaz, 2021).

Teaching delivery means carrying out planned learning activities. In OBE, teaching delivery needs to focus on students as the center of learning. Therefore, when evaluating the level of implementation of teaching delivery, assessment is done to ensure that the way the teaching is delivered gives students the opportunity to achieve the set learning outcomes. Among the delivery methods practiced by most PSMZA lecturers, whether they are aware of it or not, is the "Flipped Classroom" concept (Abeysekera, 2015).

Teaching assessment means measuring the achievement of learning outcomes that have been set. In OBE, assessment needs to be carried out based on the learning outcomes that have been set. Therefore, when assessing the level of implementation of teaching assessment, the assessment is done to ensure that the way the assessment is done gives an accurate picture of the level of achievement of the learning outcomes that have been set (Lim, 2020).

Overall, evaluating the implementation level of teaching planning, teaching delivery, and teaching assessment based on the OBE approach means seeing the extent to which the teacher or lecturer has followed the basic principles of the OBE approach in implementing learning activities. This will help ensure that the desired learning outcomes have been achieved by students through effective teaching planning, delivery, and assessment.

Therefore, the objective of this study is to evaluate the level of implementation of teaching planning, teaching delivery and teaching assessment based on the OBE approach and to identify the level of relationship and significant differences in the OBE ecosystem implemented at PSMZA by lecturers based on placement in the department.

2. Methodology

This study was conducted at PSMZA by using research instruments that were distributed to 185 lecturers who had attended the Outcome-Based Education (OBE) curriculum interpretation workshop until August 2022. Of these, a total of 111 (60%) lecturers responded to the questionnaire given.

The questionnaire of this study consists of two main parts. The first part contains questions related to the demographics of the respondents, such as age, gender, teaching experience, education level, and placement in the

department. Meanwhile, the second part contains questions about certain habits or behaviors that want to be studied, namely the level of planning implementation (7 questions), delivery (10 questions) and assessment (10 questions). The results of the pilot test showed a Cronbach Alpha reliability value of 0.870, which means it has good and acceptable reliability.

This study is important because it can provide an overview of lecturers' habits in implementing the OBE curriculum, especially in the aspects of planning, delivery, and assessment of teaching. Findings from this questionnaire can help the management of the institution to make improvements in teaching and learning, as well as strengthen the OBE curriculum to be more effective and provide the best benefits to students. In addition, this study also provides information on the demographics of lecturers which is expected to help the management of the institution in making decisions related to the management of OBE-related training and provision among lecturers.

This study is a qualitative descriptive study where it involves the analysis of mean and standard deviation to assess the level of implementation of planning, delivery and assessment of teaching based on the OBE approach. While the significance analysis to identify the level of relationship and significant differences of the OBE ecosystem implemented at PSMZA by lecturers based on placement in the department. The overview of this study is illustrated in the framework of the study as in Fig. 1.
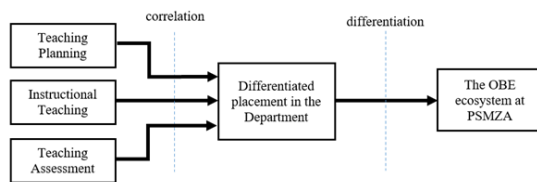

Fig. 1. Framework of the study

Correlation analysis uses the null hypothesis and alternative hypothesis approach. The initial hypothesis statement in this study is as follows:

Null Hypothesis 1 (HO1):

HO1: There is no significant difference in the level of the OBE ecosystem implemented at PSMZA by lecturers based on placement in the department.

Alternative Hypothesis 1 (HA1)

HA1: There is a significant difference in the level of the OBE ecosystem implemented at PSMZA by lecturers based on placement in the department.

The appropriate analysis method to find differences in OBE practices between the departments is inferential statistical analysis, such as the ANOVA (Analysis of Variance) test. The next step is to do further analysis to find out the difference, a post-hoc test is done to find out where the difference lies. In this test post-hoc Tukey model is used.

3. Result and Discussion

3.1 OBE Ecosystem Implementation Level at PSMZA

Based on the findings of the study analyzed descriptively, it can be concluded that the level of lecturers' teaching planning, delivery methods and assessment based on the OBE curriculum in the programs offered at PSMZA is at a high level where the OBE ecosystem can be said to have been implemented comprehensively and in parallel between all three, with each planning with a mean score of 4.19, delivery with a mean score of 4.19 and assessment with a mean score of 4.20. While the standard deviation is 1.02. All the finding as show in Table 1.

Table 1. Min score and standard deviation

Element teaching	Min	S.D	Interpret
planning	4.19	1.02	High
delivery	4.19	1.02	High
assessment	4.20	1.02	High
average	4.19	1.02	High

S.D=Standard Deviation

Based on the data provided, there are several conclusions that can be drawn regarding the respondents' views on aspects of learning and teaching in the context of teaching alignment. In general, respondents have a positive view of teaching alignment with an average value above 4 on all aspects evaluated.

Thus, the conclusion can be made that overall, the lecturer has used effective and appropriate teaching methods in the class. Research conducted by Osman (2014) in Malaysia found that the use of different teaching techniques, such as lectures, group discussions, group assignments, and presentations, had a positive influence on learning outcomes.

Similarly, research by Halai (2018) in Pakistan shows that the use of varied teaching techniques, such as group discussions, assignments, and presentations, can increase learning motivation and student academic performance.

3.2 The Relationship Between the Implementation of The OBE Ecosystem Between the Departments At PSMZA

Table 2 shows the Pearson correlation value and significance (p-value) for three variables: "Mean score for planning", "Mean Delivery Score", and "Mean Assessment score". Each factor is evaluated based on the mean score obtained by each tested factor. In this context, Pearson's correlation measures how strong the linear relationship is between two variables.

Table 2. Relationship of OBE implementation

	Min skor planning	Min Skor delivery	Min skor assessment
Pearson Correlation	0.048	0.088	0.068
Sig. (2-tailed)	0.550	0.423	0.369

Pearson correlation values range from -1 to 1, where a value of -1 indicates a perfect negative relationship, a value of 0 indicates no relationship, and a value of 1 indicates a perfect positive relationship. In the table, all the Pearson correlation values are quite low, i.e., below 0.1, which shows that the relationship between the variables is quite weak.

Table 2 shows the level of implementation of the OBE ecosystem in the department because of the Pearson correlation test between the three variables namely planning, delivery, and assessment. The Pearson Correlation value shown for each pair of variables indicates the strength of the linear relationship between the two variables. The Pearson Correlation value varies between 0 and 1, where a value of 1 indicates a perfect positive relationship between two variables, a value of 0 indicates no linear relationship between the two variables, and a value of -1 indicates a perfect negative relationship between the two variables.

In addition, Sig. (2-tailed) is the p value for the hypothesis test conducted to determine if there is a significant relationship between the two variables. A p value of less than 0.05 indicates that there is a significant relationship between the two variables, while a p value of more than 0.05 indicates that there is no significant relationship between the two variables.

In this case, the Pearson Correlation value between planning and delivery is 0.048 with a p value of 0.550. This shows that there is a weak and insignificant relationship between planning and delivery. The Pearson Correlation value between planning and assessment is 0.068 with a p value of 0.369. This also shows that there is a weak and insignificant relationship between planning and assessment. Furthermore, the Pearson Correlation value between delivery and assessment is 0.088 with a p value of 0.423. This also shows that there is a weak and insignificant relationship between delivery and assessment. Therefore, the conclusion is that there is no significant relationship between planning, delivery, and assessment in this study.

Therefore, the conclusion that can be drawn is that there is no significant relationship between the three variables, HO1 is rejected and HA1 is accepted, that is, there is a significant relationship in the level of the OBE ecosystem implemented at PSMZA by lecturers based on placement in the department.

Several factors can cause a significant relationship between planning, delivery and assessment of teaching based on principles (OBE) at PSMZA, there has been a relationship that can be considered consistent between planning, delivery and assessment leading to optimal learning outcomes. Planning must be well integrated with delivery and assessment so that learning objectives can be achieved effectively (Farooq, 2018).

It can be said that the lecturers have used appropriate instructions during the learning process which affects the teaching methods used must be in accordance with the objectives and expected results. The use of appropriate teaching will help build students' skills and knowledge in meeting the learning outcomes that have been set.

OBE emphasizes the achievement of desired learning outcomes. Therefore, planning, delivery and assessment must be based on desired outcomes, which must then be measured and evaluated equivalently as established in the curriculum. A significant relationship between planning, delivery and assessment can also occur when students understand and respond well to the material taught (Thomas L. Good, 2008). Appropriate teaching and learning methods can help students understand and respond to the material.

In conclusion, the OBE ecosystem has been successfully cultured among the lecturers at PSMZA when the planning, delivery and assessment that have been implemented are able to create a constructive alignment between the three.

3.3 Differences in The OBE Ecosystem Between Departments

The appropriate analysis method to find differences in OBE practices between the departments is inferential statistical analysis, such as the ANOVA (Analysis of Variance) test. ANOVA analysis is best used in social science research to find differences between more than two groups of data. In this study, we compared differences in OBE practices among six different departments. Therefore, ANOVA analysis is suitable to answer this hypothesis because it allows us to test whether there is a significant difference between the data groups.

F-ratio is the ratio between the variability between data groups and the variability within data groups. Larger F-ratio values indicate greater differences between data groups. If the F-ratio value is greater than the critical value associated with the chosen significance level, then there is a significant difference between the data groups.

Table 3 shows the results of ANOVA analysis for three different factors, namely planning, delivery, and assessment in the context of measuring OBE practices among 6 departments at PSMZA. Here is a description of each column in the table:

In the context of the table above, we can see that only the assessment factor has a low statistical significance value (p-value = 0.015). Therefore, we can conclude that there is a significant difference in the practice of OBE in the context of assessment among the 6 departments at PSMZA. However, planning and delivery factors did not show significant differences.

Table 3. Differentiation result of anova analysis

		Sum of Squares	df	Mean Square	F	Sig.
planning	Between Groups	5.475	6	.913	1.133	.344
	Within Groups	205.391	105	.805		
	Total	210.866	111			
delivery	Between Groups	10.984	6	1.831	2.118	.052
	Within Groups	220.409	105	.864		
	Total	231.393	111			
assessment	Between Groups	15.499	6	2.583	2.692	.015
	Within Groups	244.674	105	.960		
	Total	260.173	111			

To determine the part of the department that has a significant difference in assessment, the Post-Hoc-Test model of Turkey is used. Fig. 2 shows a comparison of the significant difference scores between departments in the assessment factor. The description indicates that in a post-hoc test using Tukey's test, there is a significant difference between the JTMK department and all other departments in the context of OBE practice that is evaluated through factors that have been determined. The low significance value (between 0.019 and 0.13) shows that the difference has a high level of significance and can be trusted. However, there is no significant difference between JTMK and JMSK departments (0.651).
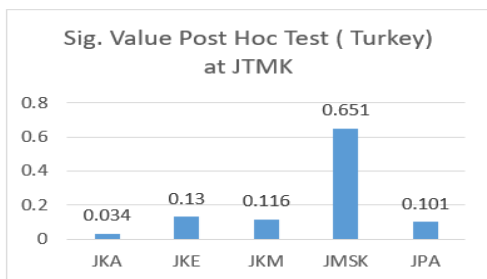

Fig. 2. Significant value throw post-hoc-test (Turkey) at JTMK

So, it can be concluded that the JTMK department has a significant difference in practice for OBE when compared to other departments. This can be caused by factors such as differences in the planning, delivery, or assessment of OBE carried out by the JTMK department compared to other departments.

Therefore, from the anova analysis there is a significant difference for the assessment factor and from the post-hoc-test it is found that this significant value difference is contributed by the JTMK department. This is likely that the assessment process at JTMK, PSMZA is based on the requirements of the Malaysia Board of Technology (MBOT) because it offers programs related to technology while for other departments, the assessment process is based on the requirements of the Engineering Technology Accreditation Council (ETAC) because other departments offer programs related to engineering.

The field of engineering and the field of technology are two different but closely related fields (Smith J., 2021). The main difference between the two fields is to begin with the objective. The main objective in engineering is to design, develop, and produce products or systems using the principles of science and mathematics. While the main objective in the field of technology is to use technology to improve processes, productivity and safety in various sectors including business, services, and industry.

In terms of focus, engineering is the design, development, and production of physical objects such as bridges, buildings, vehicles, and machinery. Meanwhile, the focus in the field of technology is on the use of technology in services and industries such as software, computer networks, information technology, and e-commerce systems (Lee, 2022).

Next, the emphasis in engineering is on mathematics, science, and modeling to design and develop products or systems. This is in line with the findings in Fig. 2 showing that there is no significant relationship between JTMK and JMSK (0.651). This is because some courses from JTMK, especially mathematics, are taught by the same lecturers at JMSK. Mathematics, science, and modeling are used in every phase of design and development, including identification of needs, concept development, analysis, and testing (Smith J., 2021). But the emphasis in the field of technology is on the use of technology to speed up processes and reduce costs in business or services. While in terms of approach, in the field of engineering it is to develop the best product or system by using a systemic and holistic approach and the approach in the field of technology is to use technology to solve problems or meet needs in a more specific aspect.

4. Conclusion

From the findings of the analysis above, it can be concluded that the OBE ecosystem works well at PSMZA if viewed in terms of planning, delivery, and assessment of teaching. This shows that respondents or lecturers consider it important to plan learning alignment that is suitable with CLO and use appropriate educational resources in achieving CLO.

This good OBE ecosystem is expected to have a significant positive impact on PSMZA. Here are some of the possible impacts:
1. Improving the quality of teaching and learning:
   By implementing the principles of OBE well, teaching and learning can be improved with more emphasis on the achievement of learning objectives and efficiency in the delivery and assessment of learning outcomes.
2. Increasing student satisfaction:
   Students who follow teaching and learning based on OBE may feel more satisfied because it emphasizes on the achievement of learning objectives and a deep understanding of the topics studied.
3. Attract more students: educational institutions known for good implementation of OBE may attract more students to enroll because it is considered a modern and effective approach to teaching and learning.
4. Improve the image of the institution:
   With the reputation of the educational institution as a place that implements the principle of OBE well, it can improve the image and reputation of the institution in the community and industry.
5. Increasing the competitiveness of institutions:
   Institutions of learning that have a good reputation in implementing OBE well may have a higher

competitiveness in exhibiting excellence in teaching and learning. This can open opportunities to collaborate with industry and have a positive impact on student career achievement.

6. Improving student performance:
   Implementing OBE well may have a positive impact on student achievement. Therefore, educational institutions may be able to improve students' performance in tests and examinations and increase their success in their careers.

In conclusion, implementing OBE well can provide various benefits to educational institutions. Therefore, it is important for educational institutions to ensure that the principles of OBE are applied effectively and efficiently in teaching and learning.

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