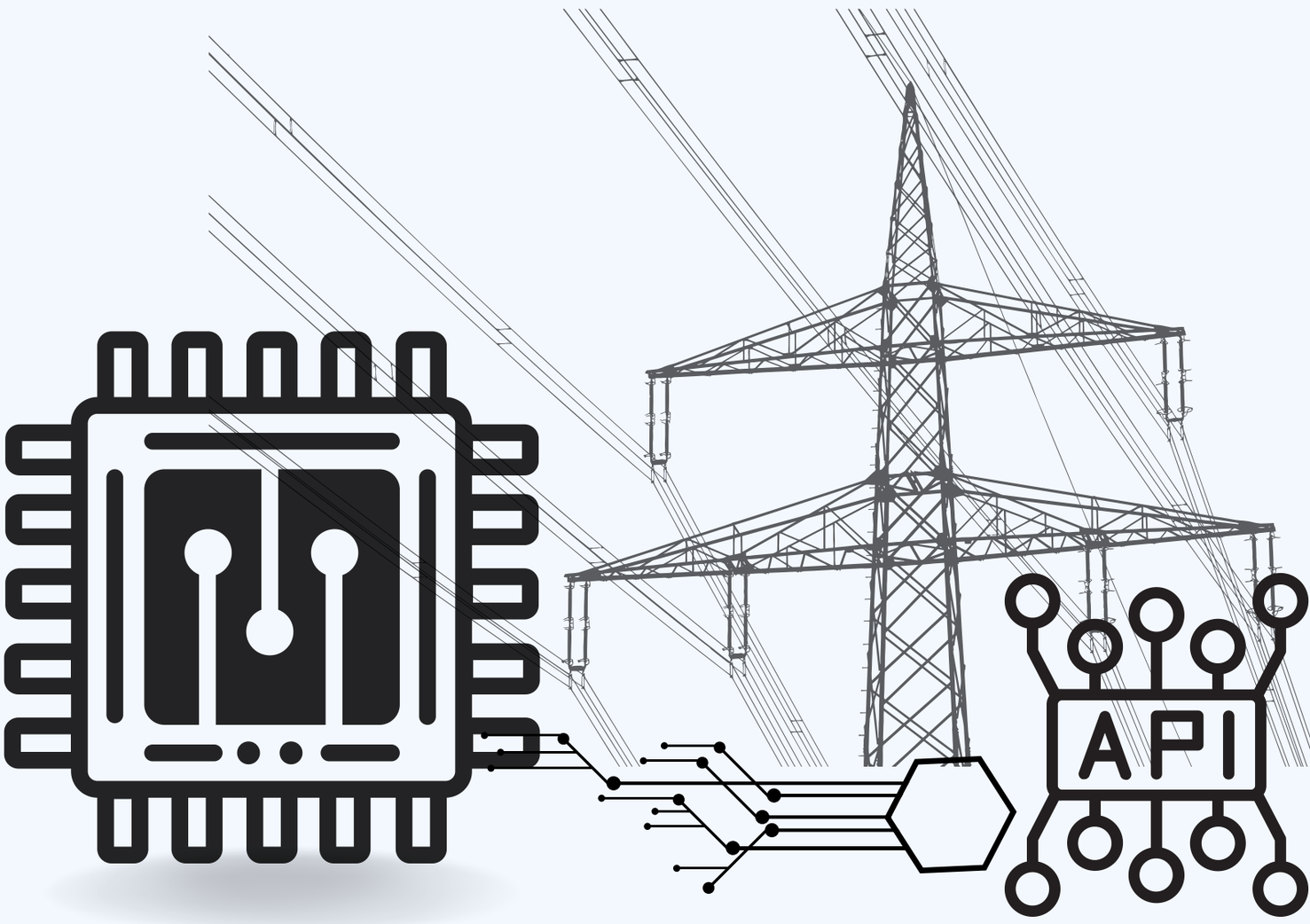
ICITACEE 2023

THE 10TH INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY, COMPUTER, AND ELECTRICAL ENGINEERING

# PROCEEDINGS

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# Proceedings
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## Parallel Session I Schedule

## (Online/Zoom)

| | |
|---|---|
| Parallel Class | Online |
| Room | Breakout Room F |
| Time | 13.15 – 15.15 |
| Chair | Charisma Tubagus Setyobudhi |

| No | Paper ID | Title | Time | Presenter |
|---|---|---|---|---|
| 1 | 1570924833 | Analysis the Use of Pay-Later System on E-Commerce Towards the Consumptive Behavior of Higher Education Students | 13.15 – 13.27 | Herlin |
| 2 | 1570924945 | Integral State Feedback Control Design for 2-DOF Dynamixel AX-12 Manipulator Robot | 13.27 – 13.39 | Andi Muhammad ramdhan Tanralili |
| 3 | 1570925033 | Double Layer Machine Learning for Network Intrusion Detection System on Web Server | 13.39 – 13.51 | Muhammad Hafiz Amrullah |
| 4 | 1570925077 | Gamma Monitoring System Based on BG-51 Pin Photodiode Detector | 13.51 – 14.03 | Gina Kusuma |
| 5 | 1570925102 | Implementation of Forward Dynamic Programming in Solving Thermal Generation Scheduling | 14.03 – 14.15 | Raka Dhijan Ananda |
| 6 | 1570925106 | Design and Implementation Energy Harvesting Using a Thermoelectric Generator (TEG) SP 1848-2715 SA with Solar Energy as a Source of Heat Energy | 14.15 – 14.27 | Rizky Ramdhani Musthofa |
| 7 | 1570925161 | Machine Learning Diabetes Diagnosis Literature Review | 14.27 – 14.39 | Muhammad Rafian Wijoseno |
| 8 | 1570898194 | Feasibility Study of Outcome-Based Education Information System in Indonesia: A Survey-Based Approach | 14.39 – 14.51 | Yulia Kendengis |
| 9 | 1570924847 | The e-Learning Models Adopts Metacognitive Strategies to Support and Influence Independent Learning: Literature Review | 14.51 – 15.03 | Nur Eka Fitrianingtyas |
| 10 | 1570925418 | A Blockchain-Based Electronic Mental Health Records Model | 15.03 – 15.15 | Nehal Ettaloui |

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| | |
|---|---|
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| Time | 15.30 – 17.54 |
| Chair | Ike Pertiwi Windasari |

| No | Paper ID | Title | Time | Presenter |
|---|---|---|---|---|
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| 2 | 1570919171 | The Adaptive Difficulty Level in a Hyper-Casual Game Through Facial Expression | 15.42 – 15.54 | Abas Setiawan |
| 3 | 1570919745 | Adaptive Virtual Synchronous Generator Control Strategy with Inertia Supporting Ability Assessment | 15.54 – 16.06 | Song Ke |
| 4 | 1570923915 | Investigating Convolution-Attention Model for Bone Scan Image Segmentation | 16.06 – 16.18 | Alfinata Yusuf Sitaba |
| 5 | 1570924207 | SCADA System for Realtime Hanger Management Experiment in Painting Process | 16.18 – 16.30 | Prabowo Larasakti |
| 6 | 1570924510 | Comparison of Machine Learning Algorithms for Flood Prediction | 16.30 – 16.42 | Rineka Brylian Akbar Satriani |
| 7 | 1570924402 | IoT-Based Integrated Parking System Prototype Using RFID and HC-SR04 | 16.42 – 16.54 | Dania Eridani |
| 8 | 1570900545 | Smart City in Supporting Sustainable Cities | 16.54 – 17.06 | Sri Sarjana |
| 9 | 1570909604 | Research Challenges in Cervical Cancer Segmentation and Classification Using Colposcopy Images | 17.06 – 17.18 | Zendi Zakaria Raga Permana |
| 10 | 1570924516 | Application of WebSocket with Painlessmesh Topology to Monitor and Control Soil Moisture in Agricultural Land | 17.18 – 17.30 | Alvi Nur Amalia |
| 11 | 1570924528 | Implementation of MQTT Protocol for Hydroponic Parameter Monitoring and Visual Hydroponic Greenhouse Based on Edge and Cloud Computing | 17.30 – 17.42 | Silvia Naada Kamilia |
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| | |
|---|---|
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| Chair | Risma Septiana |

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| 2 | 1570924993 | Investigating Self-Attention in Swin-Unet Model for Disc and Cup Segmentation | 15.54 – 16.06 | Jehua Kusuma Dewa |
| 3 | 1570924994 | Glaucoma Detection Based on Joint Optic Disc and Cup Segmentation Using Dense Prediction Transformer | 16.06 – 16.18 | Dindin Inas Candra Wiguna |
| 4 | 1570925140 | A Comparison of Text Classification Methods: Naïve Bayes and Support Vector Machine for E-Commerce Item Classification | 16.18 – 16.30 | Ghinaa Zain Nabiilah |
| 5 | 1570925170 | Whole-Body Bone Scan Segmentation Using SegFormer | 16.30 – 16.42 | Rafif Fausta Kusuma Syam |
| 6 | 1570925290 | Fuzzy Logic-Based Automatic Water Quality Control System in Smart Aquaponics | 16.42 – 16.54 | Faisal Najib |
| 7 | 1570925460 | Spam Detection in SMS Messages Using Naive Bayes, SVM, LSTM, and CNN | 16.54 – 17.06 | Ghinaa Zain Nabiilah |
| 8 | 1570927424 | Water Quality Prediction Based on Machine Learning Using Multi-Dimension Input LSTM | 17.06 – 17.18 | Ika Arva Arshella |
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# Feasibility Study of Outcome-Based Education Information System in Indonesia: A Survey-based Approach

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*Abstract*— **Outcome-based education (OBE) has become an integral approach to education, focusing on student learning outcomes. To ensure the successful implementation of OBE, universities need a reliable and efficient information system that can capture, and store data related to student learning outcomes. This study examines the descriptive statistics of the need for OBE information systems among university faculty members. The questionnaire-based survey was conducted to understand the current state of teaching and learning practices in higher education and to identify areas where OBE information systems could be implemented to improve the quality of education. The study found that most respondents believed an OBE information system would be beneficial to support the implementation of OBE in the university. The results show a significant positive relationship between the need for an OBE information system and perceptions of OBE effectiveness.**

***Keywords—Outcome-based Education, OBE, information system***

## I. INTRODUCTION

The traditional education system primarily focuses on delivering content to students without considering whether they have acquired the necessary knowledge, skills, and abilities. This approach has been challenged by the adoption of outcome-based education (OBE) to ensure that students acquire specific knowledge, skills, and abilities, which can be demonstrated through measurable learning outcomes. OBE focuses on learning outcomes rather than the education system's inputs, processes, and outputs.

In an OBE curriculum, the learning outcomes are defined first, and the curriculum is then designed to achieve these outcomes. Assessment is aligned with the learning outcomes, and feedback is provided to help students achieve these outcomes.

OBE has gained significant attention globally, and many universities have adopted it to improve the quality of education. While OBE has become increasingly popular, implementing OBE effectively can be challenging, particularly regarding assessment, feedback, and monitoring of learning outcomes.

Many universities implementing OBE needed help with the manual assessment and feedback process. The paper argues that there is a need for an OBE information system to support the effective implementation of OBE in the university.

However, to ensure the successful implementation of OBE, universities need a reliable and efficient information system that can capture and store data related to student learning outcomes. An OBE information system can help universities assess and evaluate their educational programs' effectiveness in implementing an OBE curriculum by automating the entire process of assessment, feedback, and monitoring of student learning outcomes.

This study aims to identify the need for an OBE information system by conducting a survey-based study of faculty members in many universities in Indonesia. The study investigates the opinions of faculty members regarding the need for an OBE information system and the benefits it can bring to the education system.

Researchers have observed four big IT vendors focusing on education in Indonesia; all academic information systems from the four vendors still do not have OBE modules. The main goal of this research is to determine how significant the interest of universities is if an OBE module is added to an academic information system.

## II. THEORY

### A. OBE: Theory and Principles

William Spady introduced the OBE paradigm to the USA about 20 years ago. According to Spady, OBE focuses and organizes everything in the education system around what is essential for all students to do successfully at the end of their learning experience. This means that education starts with a clear picture of what is essential for students to be able to do and then builds curriculum, teaching, and assessment to ensure this learning eventually happens [1].

Outcome-based education (OBE) is a learner-centered approach that focuses on defining measurable learning outcomes rather than traditional inputs such as time spent in class or completing specific assignments. OBE is gaining popularity in higher education, as it can improve the quality of education by providing a clear framework for assessing student learning outcomes.

OBE is currently of much potential in the global educational landscape, particularly in response to the growing demand for evidence of student learning outcomes [2]. OBE emphasizes measuring learning outcomes and using this information to improve teaching and learning practices.

According to Pradhan, OBE is an educational approach considered in planning, enforcing, and assessing the curriculum in preference to the occurring events. It promises an excessive level of acquiring knowledge for all students

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based entirely on achieving clearly defined effects considering the suitability of each student's level of development and ensuring experiential and energetic learning [3].

Information systems (IS) play a critical role in higher education, supporting various functions such as student registration, course scheduling, and student records management. Integrating OBE into information systems can improve the quality of education by providing a more holistic view of student learning outcomes.

An OBE information system is a framework for collecting and managing data related to student learning outcomes. The information system provides a mechanism for capturing and storing data related to student performance, which can be used for assessing and evaluating the effectiveness of educational programs. An OBE information system can help faculty members make informed decisions about the design and delivery of educational programs.

### *B. Research Related to OBE*

Several studies have examined the implementation of OBE in higher education [4, 5, 6, 7, 8, 9]. For example, Eng et al. (2012) conducted a study on implementing OBE in higher education in Malaysia. They found no significant correlation between the OBE scores and the gap in the mean of the incoming and outgoing surveys. There is also no significant correlation between OBE class scores and the average OBE-student-centered learning score. No significant correlation was also reported between OBE class scores and students' online assessments. However, OBE class scores and class size had a significant negative correlation. It implies that the smaller the class size, the higher the expected OBE score.

Mohayidin (2008) said that OBE was developed and has been practiced since the 1950s in Malaysia and is now being implemented at all levels of education, especially at higher learning institutions [8].

Chen (2021) research on school-enterprise OBE management mode based on computer modeling for readers' reference. The application of OBE management mode in the process of school education management can effectively improve students' innovation ability and help students better adapt to the development of enterprises [10].

The integration of OBE into information systems has also been studied by several researchers [11, 12, 13]. Hongsuwan et al. (2022) proposed an Outcome-Based Education (OBED) Web Application that supports administrators and faculty staff for program and course management. Once the course administrator or committee has designed the program's learning outcomes to meet referenced educational standards (e.g., TQF and TABEE), the web application supports PLO's alignment with the course. OBE integration into information systems can help improve the quality of education by providing a more comprehensive view of student learning outcomes. However, they also note that implementing an OBE information system requires significant resources and support from the administration.

Davis et al. l (2007) presents four case studies of outcome-based education from medical schools in different parts of the world; Scotland; the USA; Pakistan; and Singapore. Each school has variations in implementing results-based education and has critical points for successful OBE implementation [9].

### *C. OBE Implementation: The Indonesian Experience*

In Indonesia, the implementation of OBE is required by the government as stated in the Ministerial Regulation No. 49 of 2014 on the National Standards of Higher Education [13] and Presidential Regulation No. 8 of 2012 concerning the Indonesian National Qualifications Framework [14].

The need for OBE in Indonesia is based on several reasons. Firstly, OBE aligns with the country's vision to improve the quality of education and produce competent graduates who can compete globally. With OBE, the focus is not only on knowledge acquisition but also on developing skills, attitudes, and values essential for graduates to succeed in the 21st-century workplace.

Secondly, OBE is a response to the changing demands of the workforce. The global job market is becoming more competitive, and employers are looking for graduates with the skills and knowledge to meet the job demands. OBE prepares graduates for this challenge by ensuring they possess the necessary competencies.

Thirdly, OBE is a way to ensure that education is relevant to the needs of society. By focusing on learning outcomes, OBE ensures that the curriculum is designed to meet the needs of the learners and the community. This is important because education is not just about producing graduates but also about creating responsible citizens who can contribute to the nation's development.

Fourthly, OBE is a vital assessment point in the accreditation of BAN-PT and Independent Accreditation Institutions, namely on standards related to 1) education and outcomes and 2) the three mandates of higher education achievements. Study programs need to implement OBE to get superior or excellent accreditation scores.

Overall, implementing OBE in Indonesia is necessary to produce competent graduates who can compete globally, meet the demands of the workforce, and contribute to the nation's development.

## III. METHODOLOGY

The participants in this study were faculty members from various universities in Indonesia. Six hundred eighty-six faculty members were invited to participate in the study, and they all completed the questionnaire.

### *A. Instrument*

A questionnaire was designed to collect data on various aspects of teaching and learning practices, including the need for outcome-based education information systems. The questionnaire consisted of both closed-ended and open-ended questions. The closed-ended questions included multiple-choice and Likert-scale questions, while the open-ended questions allowed participants to provide more detailed responses.

### *B. Procedure*

The survey was administered online using a secure survey platform. Faculty members from various universities were invited to participate in the survey via a Google form. The invitation included a brief explanation of the purpose of the study and instructions on how to complete the survey.

### C. Data Analysis

Descriptive statistics were used to analyze the survey data. The survey responses were entered into a spreadsheet, and frequency distributions, means, and standard deviations were calculated for the closed-ended questions. The open-ended questions were analysed using thematic analysis to identify common themes and response patterns.

### D. Ethical Considerations

Participants were informed of the purpose of the study and provided with a consent form to review and sign before participating in the survey. Participants were also informed that their participation was voluntary and their responses would be kept confidential.

### E. Limitations

One limitation of this study is the potential for response bias, as participants may have provided socially desirable responses. Additionally, the survey only collected data from faculty members and did not include students or other stakeholders in the education process.

## IV. Data Analysis

The following are some groups of questions asked to the respondents.

1. Demographic Data
2. What is the respondent's problem (related to the OBE system)?
3. What the respondent needs/desire?
4. Is the OBE system a good solution for the problem?
5. What are the consequences if the institution does not use the OBE system? Is the problem unresolved, or can it be resolved, but the process is complicated/long?
6. What benefits do respondents expect from the OBE system?
7. Does the institution want to use it if the OBE system is developed? Why or why not?
8. What do respondents expect from the OBE system?

### A. Demographics

The participants in this study were predominantly from Java Island (46%) (Fig. 1), and ages were spread evenly from ages 25-55. Most participants were full-time faculty members (68.2%) and held a master's degree (78.6%). On average, the study program from the respondents has a good accreditation (B) score (66.2%).

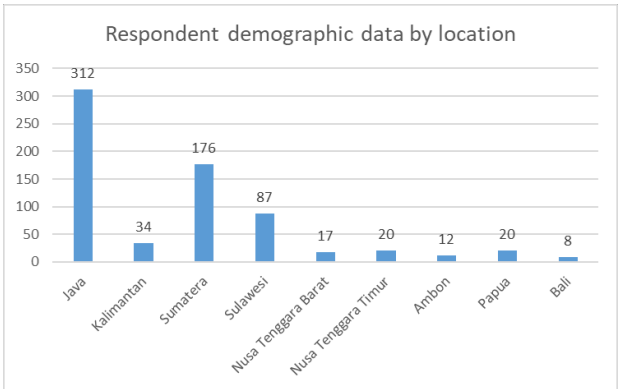


Fig. 1. Respondent's demographic data.

### B. OBE Knowledge

Most participants (45.48%) reported that they have heard about OBE but do not understand yet, and 25.36% said they already know about it (Fig. 2).

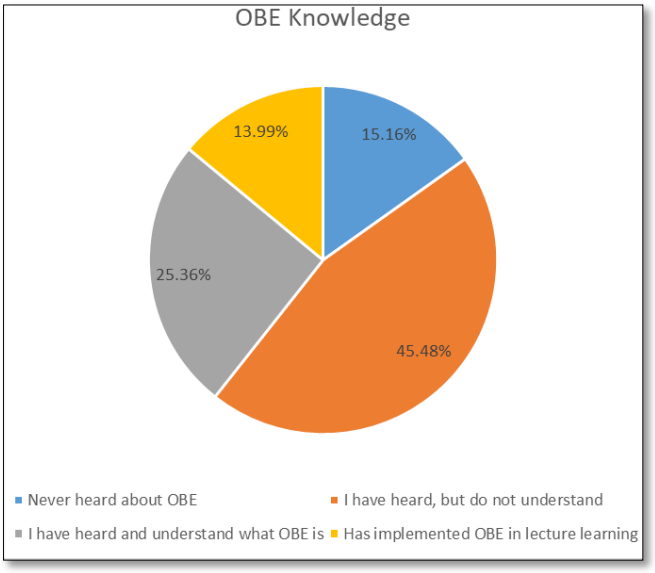


Fig. 2. OBE knowledge.

### C. The Importance of OBE

The majority of participants (67.6%) gave 5 (out of 5), and 26.8% of respondents gave 4 (out of 5) about the importance of OBE (Fig. 3), which means that they believed an outcome-based education information system would be beneficial to their teaching and learning practices.

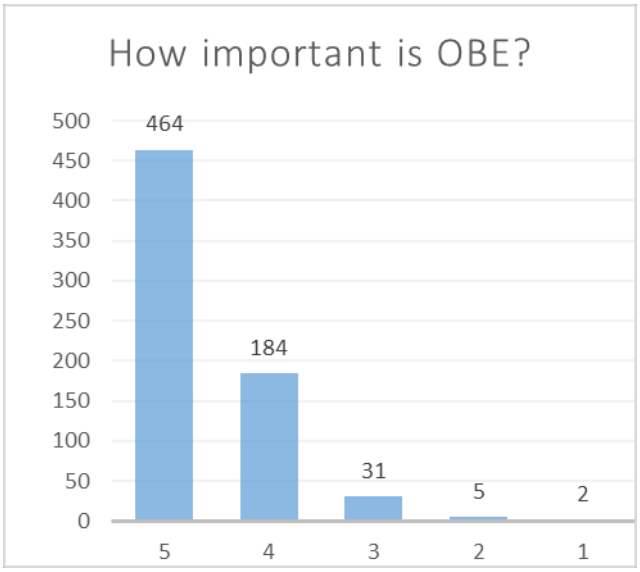


Fig. 3. The importance of OBE.

Most participants (96.6%) reported that there would be negative impacts if they did not implement OBE (Fig. 4):

- The quality of education at the university is not good.
- Cannot get international accreditation.
- Cannot get accreditation excellent.

Only 3.4% of participants reported that they believed there was no impact if they did not implement outcome-based education.

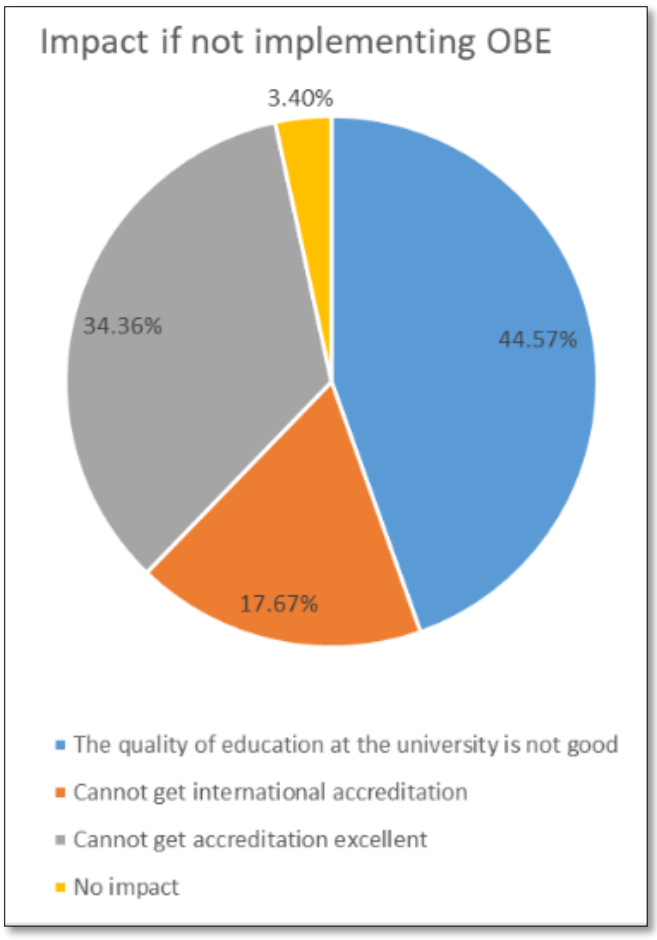


Fig. 4. The impact of not implementing OBE.

Even though most participants stated that OBE was essential, of the 686 participants, only 33.82 had implemented the OBE curriculum, while the majority (66.18%) had not. However, of those who had yet to implement this, 76.43% stated they had plans to implement OBE.

### *D. Difficulties in OBE implementation*

Meanwhile, of the participants who have implemented OBE, not all of them have implemented it thoroughly:

- 50% have just developed an OBE-based curriculum, but in its implementation, it is still not OBE-based
- 34.48% have implemented OBE in each college class and have been able to measure the learning achievements of each student's course
- 15.52% have been able to measure the CPL value of each student

Participants who have implemented OBE stated that there were several obstacles experienced in the OBE implementation process:

- 45.69% stated that they experienced problems because their understanding of the OBE system was unclear
- 45.26% stated problems in recording OBE activity and measuring CPL and CPMK because there was no information system support
- 31.9% stated that problems occurred because the OBE system was very complicated and complex (too much administration needed to be done).

### *E. The Need for OBE Information System*

Of the participants who had implemented the OBE, 98.71% stated that they needed information system support to help implement it. They reported that they believed an OBE information system would benefit their teaching and learning practices. Only 1.29% of participants reported that they did not believe an outcome-based education information system would be beneficial.

When asked about the specific benefits of an outcome-based education information system, the most common responses were:

- Better assessment of student learning outcomes (89%)
- Improved tracking of student progress and feedback (85%)
- Increased accountability and transparency (72%)
- Improved curriculum design and alignment (68%)

### *F. Concerns about Outcome-Based Education Information Systems*

Despite the perceived benefits, participants also expressed concerns about implementing an outcome-based education information system. The most common concern was the potential cost and resource implications, with 70% of participants expressing this concern.

Other concerns included:

- The potential for the system to be too rigid and inflexible (53%)
- Lack of faculty buy-in and support (47%)
- Lack of student engagement and motivation (41%)

Overall, this study's results suggest a strong need for outcome-based education information systems in higher education. While there are some concerns about the potential costs and resource implications, the perceived benefits of such systems are significant and may outweigh these concerns. Further research is needed to explore the implementation and effectiveness of outcome-based education information systems in higher education.

## V. Discussion & Result

This study's results indicate a strong need for outcome-based education information systems among faculty members in various universities in Indonesia. Most participants (98.71%) believed an outcome-based education information system would benefit their teaching and learning practices.

One of the key benefits of an outcome-based education information system is the ability to assess student learning outcomes more effectively. This was reflected in the survey responses, as 89% of participants reported that they believed an outcome-based education information system would help them to assess student learning outcomes better.

Another benefit of an outcome-based education information system is tracking student progress and providing feedback. This was also reflected in the survey responses, as 85% of participants reported that they believed an outcome-based education information system would help them to track student progress more effectively.

However, some concerns were raised by participants regarding implementing an outcome-based education information system. The most common concern was the potential cost and resource implications, with 70% of participants expressing this concern.

Additionally, some participants expressed concern about the potential for an outcome-based education information system to be too rigid and inflexible, not allowing individual differences in student learning. This concern highlights the need for any outcome-based education information system to be adaptable and customizable to meet the unique needs of each institution and program.

Overall, this study's results suggest a strong need for outcome-based education information systems in higher education. However, implementing such systems should be carefully planned and customized to meet each institution's unique needs and resources. Future research could explore the implementation of outcome-based education information systems in more detail, including the potential benefits and challenges associated with implementation.

## VI. CONCLUSION

OBE is becoming increasingly popular in higher education, as it can improve the quality of education by providing a clear framework for assessing student learning outcomes. The integration of OBE into information systems has also been studied by several researchers, who have found that it can help to improve the quality of education. The study results show that developing an OBE information system is feasible. The following are the main points that support this recommendation:

Needs and Benefits: this study identified a strong need for an information system to support implementing and evaluating Outcome-Based Education. In an era of outcome-oriented education, the OBE information system will provide benefits in increasing administrative efficiency, monitoring student achievement outcomes, data analysis, and data-supported decision-making.

Market Potential: there is a need to adopt an Outcome-Based Education approach due to the obligations and guidelines provided by DIKTI through curriculum guidelines and accreditation demands, providing significant market opportunities for OBE information systems. With the increasing demand for solutions supporting student outcomes monitoring and evaluation, OBE information systems can be a relevant and value-added solution.

Technical Feasibility: this study shows the technology required to develop OBE information systems can be implemented. An information platform or system accessed online is responsive and can be integrated with existing systems to meet the required technical requirements.

Organization Eligibility: in an organizational context, this study recognizes the importance of involving multiple teams in developing an OBE information system. Effective communication between teams and the existence of a competent project team will be the key to success in implementing an OBE information system.

Based on these findings, it is recommended that universities invest in providing faculty members with the necessary resources and support to implement outcome-based education information systems effectively. This will help to improve the quality of education and prepare students for the demands of the modern workforce. By involving relevant stakeholders, considering technical, marketing, organizational, and financial aspects, and adopting solutions that suit market needs, the OBE information system can provide significant benefits in supporting Outcome-Based Education in education.


## ACKNOWLEDGMENT

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