



Optimizing Graduate Learning Outcomes Assessment through an Outcome-Based Education Framework in SIAKAD STAIN Majene

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ABSTRACT

This study aims to analyze the optimization of the Graduate Learning Outcomes (CPL) assessment system through the Outcome-Based Education (OBE) Module at SIAKAD STAIN Majene, identify the factors that affect its implementation, and formulate an optimization strategy to support academic quality assurance. A descriptive qualitative approach was used, involving the head of the study program selected by purpose, SIAKAD operator, and lecturers. Data was collected through observation, in-depth interviews, and documentation, and analyzed using the interactive models of Miles, Huberman, and Saldaña, supported by triangulation of sources and methods and member examinations. The findings show that the utilization of the CPL assessment system is quite optimal but has not been implemented comprehensively, as only three out of twelve study programs have implemented an OBE-based curriculum and activated the OBE Module. The optimization is influenced by three interrelated dimensions: structural factors related to incomplete CPL-CPMK mapping, personal factors related to the understanding and competence of lecturers in OBE, and institutional factors involving coordination, quality standards, curriculum assistance, and human resources. Two complementary strategies are proposed: a conceptual strategy through strengthening a consortium of lecturers and an institutional strategy through the establishment of CPL assessment quality standards and strengthening human resources related to the curriculum. This study concludes that the effective optimization of SIAKAD-based CPL assessments requires the integration of technological functionality with curriculum readiness, lecturer competence, and sustainable institutional governance. This study provides an integrated optimization framework for the context of PTKIN by linking the implementation of the OBE Module, structural–personal–institutional determinants, and conceptual–institutional strategies to strengthen internal quality assurance and continuous curriculum improvement.



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INTRODUCTION

The development of higher education systems in various countries has shifted from teacher-centered approach to Outcome-Based Approach (OBE). In the OBE paradigm, the success of the implementation of education is no longer measured by the amount of material delivered by lecturers, but by the level of achievement of postgraduate competencies that have been formulated as Learning Outcomes or Graduate Learning Outcomes (CPL) (Mufanti et al., 2024; Nguyen et al., 2024). Therefore, all components of the curriculum, from learning planning and execution, to evaluation, must be designed in an integrated manner to ensure that CPL can be achieved measurably (Kushari & Septiadi, 2022). This approach has become a standard in the development of higher education quality in various countries because it is able to improve the accountability, transparency, and quality of graduates (Mufanti et al., 2024).

In Indonesia, the implementation of OBE is increasingly receiving attention in line with the policy of improving the quality of higher education which requires each study program to formulate CPL as the main reference for the implementation of education. Regulations regarding quality assurance of higher education require each study program to prepare a CPL that includes aspects of attitudes, knowledge, general skills, and special skills as the basis for the implementation of learning and assessment (Suhenda, 2026). Therefore, the CPL assessment system is a very important

component because it not only serves to determine student scores, but also serves as a basis for evaluating the quality of study programs, accreditation, and curriculum improvement on an ongoing basis (Setiono & Juhandia, 2023; Usri & Salam, 2024).

Despite the increasing adoption of OBEs in higher education, the implementation of CPL-based assessments continues to face several challenges. One of the main issues relates to the imperfections between the CPL, Course Learning Outcomes (CPMK), assessment indicators, and assessment instruments used by lecturers (Abejuela et al., 2022; Kushari & Septiadi, 2022). As a result, CPL achievement data may not be sufficiently representative of postgraduate competencies because assessment practices often remain oriented towards course final grades rather than the achievement of specific learning outcomes (Ali, 2024; Mufanti et al., 2024). This condition limits the capacity of higher education institutions to conduct systematic monitoring and evaluation and to carry out evidence-based curriculum enhancements.

Previous studies have mainly examined the implementation of OBE from the perspective of curriculum development, lecturer perceptions, and Constructive alignment Mufanti et al., (2024) for example, examining the implementation of OBE policies in Indonesian higher education from the perspective of lecturers, Abejuela et al., (2022) while investigating the implementation of OBE based on the principles of *Constructive alignment*. However, studies that specifically discuss the optimization of CPL assessments through the integration of Academic Information Systems (SIKAD) are still limited, especially within the State Islamic Higher Education Institution (PTKIN). These limitations point to a research gap regarding how academic information systems can be used not only as an administrative platform, but as an integrated mechanism to monitor, evaluate, and improve CPL achievement within the framework of OBE. Overcoming this gap is very important in the context of PTKIN, where the implementation of OBE and the digitization of academic quality assurance need to operate in an integrated and sustainable manner.

The effectiveness of OBE implementation is closely related to the principle *Constructive alignment*, which emphasizes consistency between *Intended Learning Outcomes (ILO)*, *Teaching and Learning Activities (TLA)*, and *Assessment Task (AT)* (Hristov et al., 2023; Munikwa, 2024). Ali, (2024) It further emphasizes that a quality assessment system must demonstrate validity and reliability and produce meaningful information for academic decision-making. Recent studies in Indonesia also show that the digitization of academic systems can improve the efficiency of learning data management, including CPL and CPMK mapping and the management of student assessment results, when the system is used effectively (Kushari & Septiadi, 2022). Therefore, integrating the principles of OBE with academic information systems is a strategic approach to strengthen the quality assurance of higher education.

STAIN Majene, as one of the State Islamic Higher Education Institutions (PTKIN), has adopted an OBE-based curriculum as part of its efforts to improve the quality of learning and meet the requirements of higher education quality assurance. To support its implementation, STAIN Majene uses SIKAD Cloud, which incorporates OBE Modules to manage outcome-based learning. This module provides functions to map CPL, CPMK, learning indicators, and assessment components, thus facilitating systematic monitoring of learning outcomes achievement. However, preliminary observations and interviews with academic system managers show that the utilization of OBE Modules at STAIN Majene has not reached its optimal level. The features available for mapping and assessment of learning outcomes have not been fully utilized, so the integration of CPL achievement data in the academic information system is incomplete. As a result, the potential of SIKAD as an instrument to monitor the achievement of CPL and support data-based academic quality assurance has not been fully realized. These institutional conditions provide an empirical basis for examining not only the utilization rate of the CPL assessment mechanism but also the factors influencing its implementation and the strategies required for its optimization.

Therefore, this study answers three research questions: (1) To what extent has the CPL assessment system through SIKAD been optimally used within the framework of OBE in STAIN Majene? (2) What factors affect the optimization of the CPL assessment system through SIKAD at STAIN Majene? and (3) What strategies can be formulated to optimize the use of the CPL assessment system through SIKAD in supporting academic quality assurance at STAIN Majene? In line with this research question, this study aims to analyze the level of optimization of the CPL assessment system through SIKAD within the framework of OBE at STAIN Majene, identify the factors that affect its implementation, and formulate an optimization strategy to strengthen academic quality assurance.

METHODS

This study uses a descriptive qualitative approach to gain an in-depth and contextual understanding of the utilization and optimization of the Graduate Learning Outcomes (CPL) assessment mechanism through the SIKAD Cloud at STAIN Majene. The qualitative design was chosen because this study aims to explore how the system is implemented, identify factors that facilitate or limit its utilization, and formulate strategies to optimize its implementation based on

the experiences, perceptions, and practices of the actors directly involved (Hall & Liebenberg, 2024; Villamin et al., 2025). The study was conducted at STAIN Majene, West Sulawesi, which has been using SIAKAD Cloud as an academic information system since 2021 and is gradually incorporating the Outcome-Based Approach (OBE) framework into its curriculum. Data collection was carried out from July to November 2025

This study used both primary and secondary data. Primary data was obtained through field observation and in-depth interviews with individuals directly involved in curriculum management, academic quality assurance, and the implementation of the OBE Module on SIAKAD Cloud. Informants were selected using a sampling of objectives based on their institutional responsibilities, knowledge of CPL and CPMK management, experience in OBE implementation, and involvement in the utilization or supervision of SIAKAD Cloud (Ahmad & Wilkins, 2025; Denny & Weckesser, 2022). To ensure transparency and ease of interpretation of citations, each informant is assigned an anonymous code. The main informants represent study program management and institutional academic quality management, as summarized below.

Table 1. Informants

Informant Code	Institutional Role	Relevance to Studies
IH	Head of Study Program	Provide information about CPL-CPMK mapping, lecturers' understanding, and implementation limitations
ZS	Head of Study Program	Provide information on CPMK standardization and institutional implementation of CPL assessment
MP	Head of the Master of Islamic Religious Education (PAI) Study Program	Providing information about study programs that have implemented OBE Modules more comprehensively
And	Representative of the Institutional Quality Assurance Unit (P2M)	Provide information on curriculum assistance, lecturer consortium activities, quality standards, and institutional support

Secondary data were obtained from OBE curriculum documents, CPL and CPMK documents, Semester Learning Plans (RPS), academic reports, assessment notes, SIAKAD Cloud records, system implementation documents, and other institutional documents relevant to the study. This documentary source is used to complete the interview and observation data and verify the extent to which the stages of OBE implementation have been completed in various study programs (Morgan, 2022). The manuscript must also include the total number of informants interviewed if other SIAKAD operators or lecturers other than the four coded key informants are involved, as the existing manuscript does not provide sufficient information to reliably establish the number. The original method generally only states that the participants include the head of the study program, the SIAKAD operator, and the lecturer (Vivek et al., 2023).

The researcher plays the role of main instrument (human instrument) in the process of collecting and interpreting data, supported by semi-structured interview guidelines, observation sheets, and documentation review forms. In qualitative investigation, researchers play a central role in interacting with participants, interpreting contextual information, and deriving meaning from data, making researcher reflexivity an important component of methodological rigor (Uliassi, 2022). The researcher directly observed the implementation of the OBE Module in SIAKAD Cloud, including curriculum configuration, graduate profile input, CPL-to-course mapping, CPMK mapping, lesson plan preparation, assessment planning, and recording of student learning outcomes. Semi-structured interviews are used because they provide sufficient flexibility to explore participants' experiences and perceptions in depth while remaining consistent with the study's predetermined focus (Ruslin et al., 2022). Thus, the interviews explored the level of system utilization, implementation barriers, lecturer readiness, institutional support, and strategies needed to optimize CPL assessments. Documentation analysis was then carried out to corroborate the information obtained through observations and interviews and check the actual completeness of OBE-related academic data recorded in the system.

Although the study is primarily qualitative, Simple descriptive quantification used to summarize documentary and system-based evidence regarding the implementation of OBE Modules in various study programs. The use of numerical summaries in qualitative research can be helpful in describing patterns and making the distribution of observed phenomena more explicit, provided that the figures are interpreted in a qualitative context and are not treated as inferential statistical evidence (Maxwell, 2010; Sandelowski, 2001). Therefore, the numerical data in this study are not used for hypothesis testing or statistical generalization, but rather solely to describe the proportion of study programs that complete a particular stage of OBE implementation. The percentage is calculated using the following formula,

$$\frac{n \text{ study programs}}{\Sigma n \text{ study programs}} \times 100$$

These descriptive percentages are interpreted together with interviews, observations, and documentary evidence, rather than as independent quantitative findings. The denominator for each descriptive calculation is determined according to the analytical context. For institutional adoption of OBE, all 12 Study Programs in STAIN Majene is the denominator, while the analysis of the progress of implementation is limited to three study programs that have adopted the OBE curriculum and activated the OBE Module. This difference ensures that the percentages reported accurately represent the relevant units of analysis at each stage. In accordance with the use of numerical information in qualitative investigations, these descriptive summaries are not interpreted independently but are integrated with observational, interview, and documentary evidence to clarify patterns and strengthen the interpretation of qualitative findings (Maxwell, 2010; Sandelowski, 2001)

The data were analyzed using an interactive qualitative data analysis framework of (Miles et al., 2014), which involved three interrelated processes: data condensation, data display, and conclusion visualization/verification. During data condensation, interview transcripts, observational notes, and documentary evidence were selected, coded, categorized, and organized according to three research focuses: the level of utilization of the CPL assessment mechanism, the factors that influence its optimization, and strategies to improve its implementation. The summarized data is then presented through narrative descriptions, matrices, thematic tables, and descriptive summaries of system implementation to facilitate the identification of patterns and relationships between data sources. Conclusions are then developed and continuously verified against the available evidence throughout the analysis process (Miles et al., 2014). The credibility of the findings is strengthened through Source triangulation, by comparing information obtained from various informants, and Triangulation Method, by comparing the interview findings with observations and documentary evidence. In addition, member examination This is done by returning relevant interpretations and findings to the informant for confirmation, clarification, or correction, thereby reducing the potential for misinterpretation and strengthening the credibility of the findings (Erdmann & Potthoff, 2023).

RESULTS

1. Utilization of the CPL Assessment System through SIAKAD

The optimal level of utilization of the CPL system in STAIN Majene SIAKAD can be identified through the progress of data entry from each study program in the OBE Module. This module contains a series of main menus that must be filled in as part of the CPL assessment system, including a description of the learning process, preparation stages, and the form of implementation carried out by the study program administrator and academic administrator. Through this module, each study program is expected to be able to map the relationship between CPL, CPMK, and RPS in an integrated manner as a basis for evaluating the quality of learning. Based on the results of observations and data documentation in the system, the description of the level of utilization of the CPL assessment system by the study program at SIAKAD STAIN Majene is presented as follows:

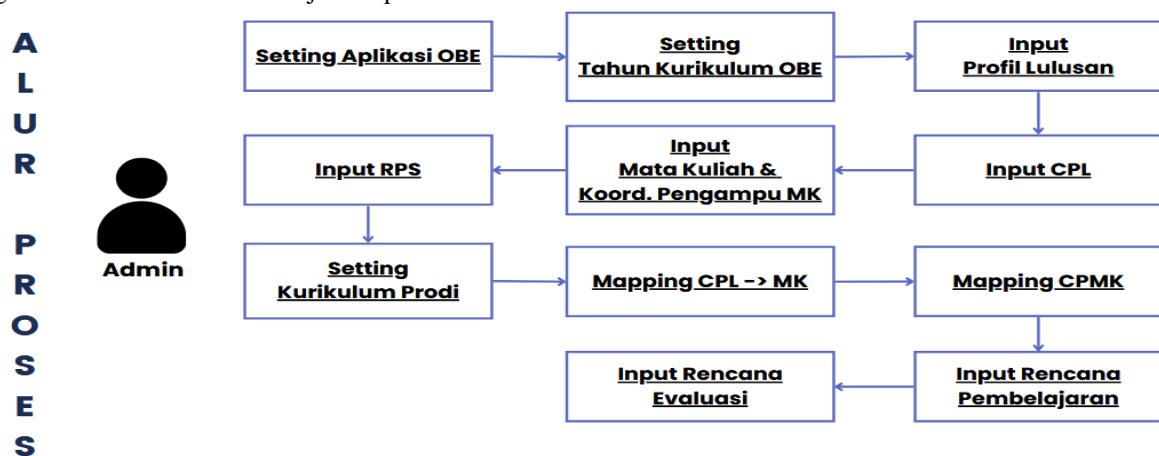


Figure 1. Process flow stages

Figure 1. CPL Assessment Process Workflow in OBE Module. The image illustrates the sequential stages of the implementation of the CPL assessment through the OBE Module in the SIAKAD Cloud. This document shows the integration of curriculum configuration, CPL–CPMK mapping, lesson plans, and assessment processes.

a. Step One: Preparing the OBE Application

Langkah pertama, Admin Akademik melakukan pengaturan aplikasi untuk mengaktifkan manajemen Outcome-Based Education.

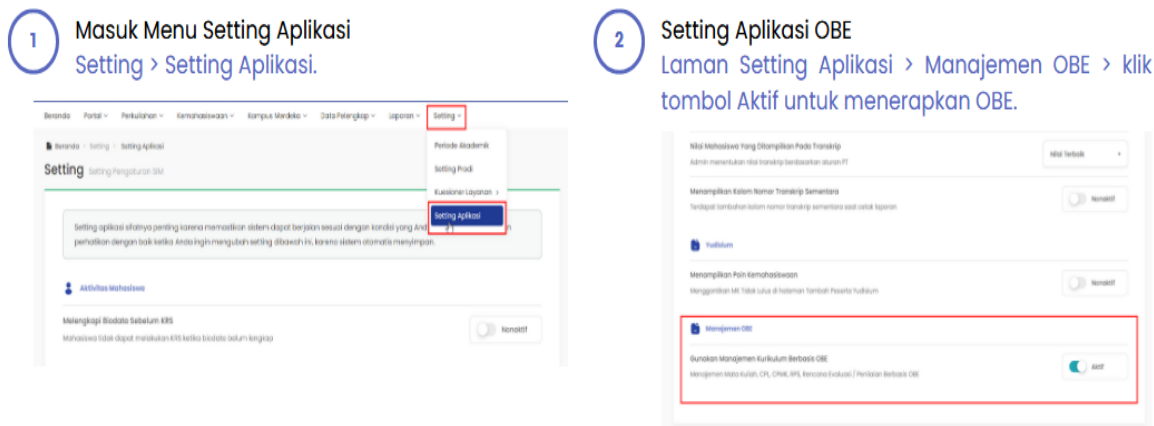


Figure 2. OBE Application Setup

Figure 2. Activation of the OBE Application on SIAKAD Cloud.. The image shows the initial configuration used to enable OBE management in the SIAKAD Cloud. This activation allows study programs with an OBE-based curriculum to access and utilize the OBE Module.

b. Step two: Establish the OBE curriculum year

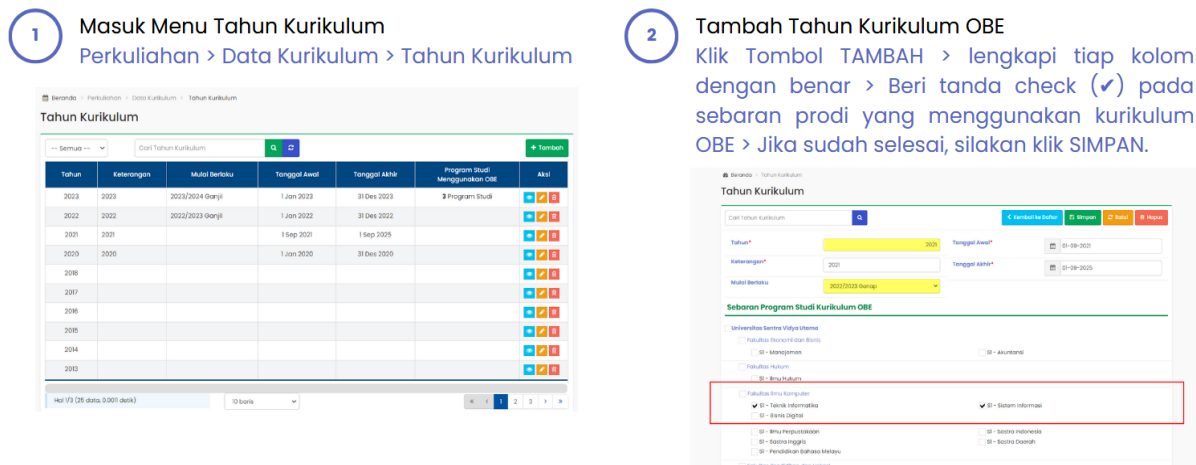


Figure 3. OBE Curriculum Year Arrangements

Figure 3. OBE Curriculum Year Configuration. This image presents the configuration of the OBE curriculum year applicable to each course of study. This stage establishes the curriculum framework used for OBE data management next.

c. Step Three: Enter a Postgraduate Profile

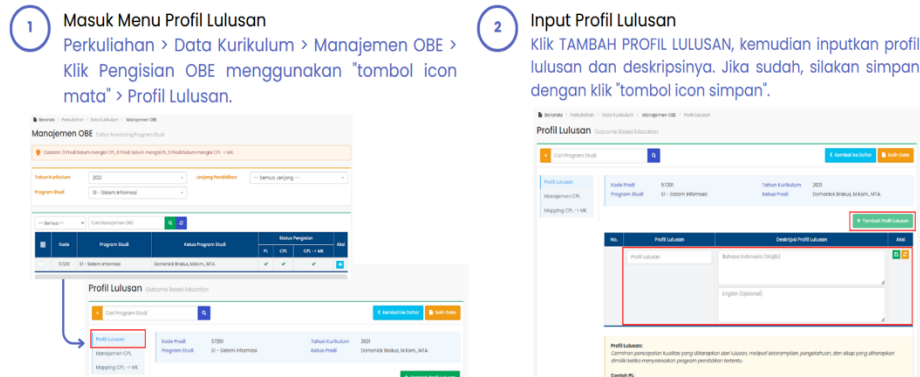


Figure 4. Graduate profile input settings.

Figure 4. Enter the Postgraduate Profile in the OBE Module. This image shows the process of entering a graduate's profile into the OBE Module. These profiles form the basis for formulating and organizing Graduate Learning Outcomes (CPL).

d. Step four: Map the CPL to the Course.

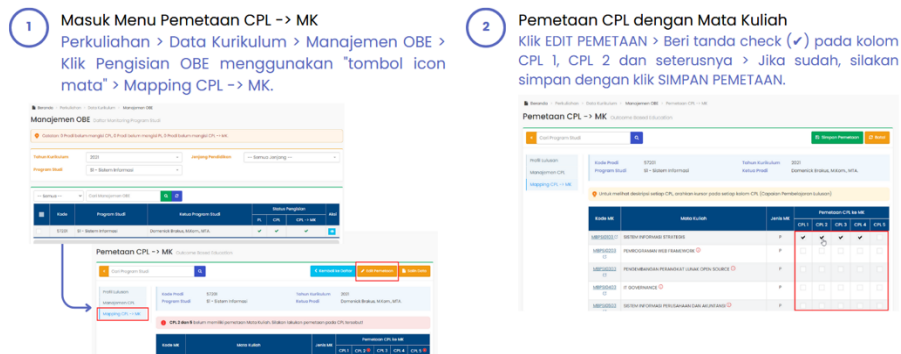


Figure 5. CPL to Field Mapping

Figure 5. Mapping Postgraduate Learning Outcomes (CPL) to Courses. This image illustrates the mapping of CPL to relevant courses in the OBE curriculum. This mapping establishes the relationship between expected graduate outcomes and curriculum structure.

e. Step five: Mapping the Course Learning Outcomes (CPMK)

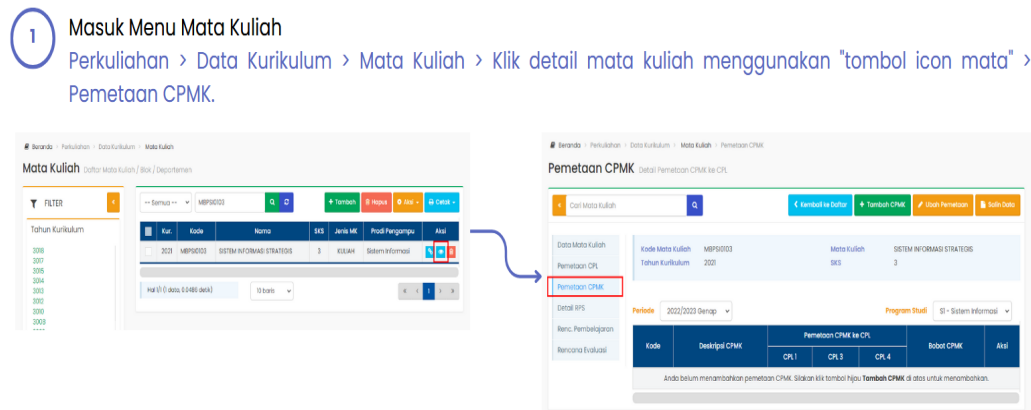


Figure 6. CPMK Mapping

Figure 6. Course Learning Outcome Mapping (CPMK). This image presents the CPMK mapping process as a continuation of CPL-to-path mapping. This stage operationalizes postgraduate learning outcomes into specific learning outcomes for individual courses.

f. Step six: Enter a Learning Plan.

1 Masuk Menu Mata Kuliah
 Perkuliahan > Data Kurikulum > Mata Kuliah > Klik detail mata kuliah menggunakan "tombol icon mata" > Renc. Pembelajaran.

2 Input Rencana Pembelajaran
 Pilih filter Periode > Klik TAMBAH > Lengkapi data detail rencana pembelajaran tiap pertemuan yang tersedia dengan benar.

Figure 7. Input a lesson plan.

Figure 7. Input the Learning Plan in the OBE Module. The picture shows the input of the learning plan and supporting learning documents into the SIKAD Cloud. This stage connects CPL and CPMK with planned learning activities at the course level.

g. Step seven: Input Assessment Plan

No	NIM	Nama	Hadir (%)	TUGAS INDIVIDU (0%)	TEST AWAL (10%)	UTS (40%)	UAS (30%)	TUGAS KELOMPOK (10%)	SEMINAR PROPOSAL (10%)	Nilai	Grade
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Figure 8. The final stage of the CPL assessment feature uses the OBE curriculum.

Figure 8. Input of the Assessment Plan in the OBE Module. This figure shows the configuration of the assessment components used to measure CPMK and CPL achievement. This report relates assessment types and weights to the appropriate learning outcomes.

The utilization rate of the CPL assessment system is checked through observation, documentation, and data verification available in the OBE SIKAD Cloud Module. The analysis includes seven stages of implementation: OBE application activation, OBE curriculum year configuration, graduate profile input, CPL mapping to courses, Course Learning Outcomes (CPMK) mapping, learning plan input, and assessment plan input. Figure 1 presents the overall workflow, while Figure 2–8 documents the interface and the corresponding implementation stages within SIKAD.

The findings show that the implementation of OBE through SIKAD Cloud is not uniform among the 12 study programs at STAIN Majene. At the time of data collection, three study programs, namely Islamic Education Counseling Guidance (BKPI), Madrasah Ibtidaiyah Teacher Education (PGMI), and Master of Islamic Religious

Education (PAI) have adopted an OBE-based curriculum and activated the OBE Module. Thus, the implementation of OBE covers three of the 12 study programs (25%), while the other nine study programs are still preparing or adjusting their curriculum for the implementation of OBE. These findings are consistent with the documentary evidence in the original Results.

Among the three courses that adopted the OBE, different levels of completion were identified throughout the implementation stages. All three programs have activated the OBE curriculum year and entered their postgraduate profiles. However, the implementation becomes less complete in the later stages. The PAI and BKPI Master programs have completed CPL-to-course mapping, while PGMI is still completing this process. At the CPMK mapping stage, only the PAI Master Study Program has completed comprehensive mapping, while BKPI and PGMI are still in the preparation and internal validation stage.

Similar patterns are found in the later stages. Only the PAI Master of Studies Program incorporates the learning plan into the OBE Module and starts using the assessment plan feature during the 2024/2025 academic year. BKPI and PGMI have not reached the same level of implementation because the mapping of the CPMK and their related learning documents has not been fully completed. The status of the implementation is summarized in Table 1.

Table 2. OBE Module Implementation Status in SIAKAD Cloud

Implementation Stage	Master of PAI	BKPI	PGMI
Activation of the OBE curriculum year	Finish	Finish	Finish
Graduate profile input	Finish	Finish	Finish
CPL-to-track mapping	Finish	Finish	In progress
CPMK Mapping	Finish	In progress	In progress
Input a lesson plan	Finish	Not fully implemented yet	Not fully implemented yet
Utilization of assessment plans	Implemented	Not yet implemented	Not yet implemented
OBE transcript creation	Available	Not yet available	Not yet available

Source: SIAKAD Cloud observations, interviews, and documentation, 2025.

This comparison shows a progressive decline in implementation completeness from the initial administrative configuration to the assessment and output stages. The PAI Master Study Program is the only program that has developed through the entire series to the utilization of assessment features and the creation of OBE-based learning outcome data. BKPI and PGMI have completed the initial configuration stage but have not completed all the components required for the integrated CPL assessment.

2. Outputs of the CPL Assessment System

a. Individual OBE Transcripts

The utilization of the OBE Module results in two forms of CPL achievement outputs: individual OBE transcripts and cohort-level OBE transcripts. However, these results are only available in the PAI Master Study Program as it is the only program that has completed the CPL–CPMK mapping components, lesson plans, and assessments required.

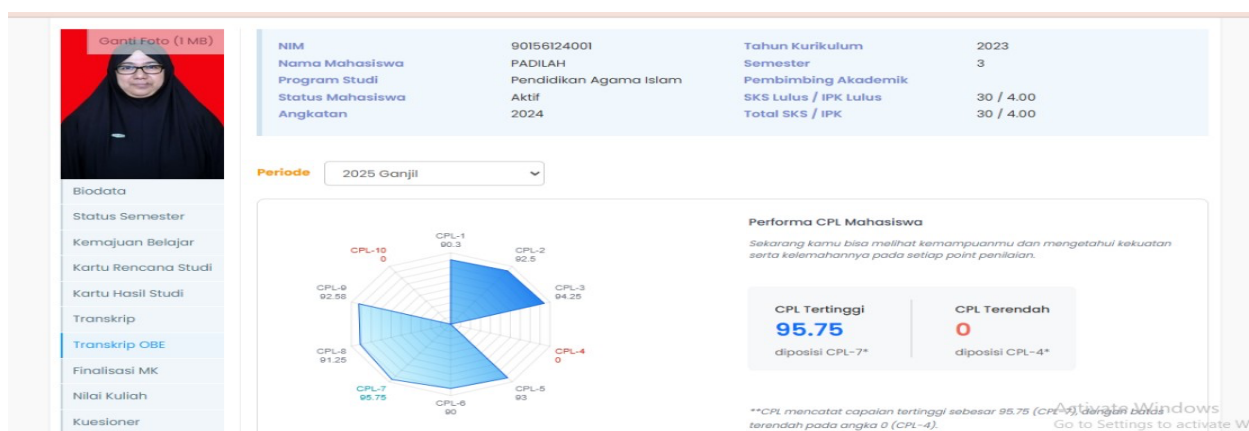


Figure 9. OBE Transcript

Figure 9. Individual OBE Transcripts of CPL Achievements. The image displays the individual CPL achievements generated automatically by the OBE Module. This book provides measurable information about the achievement of learning outcomes based on assessment data entered by lecturers.

At the individual level, OBE transcripts display student achievement for each CPL mapped based on assessment data entered into the system. In the transcripts examined during the study, CPL 7 recorded the highest score of 95.75, while CPL 4 showed a score of 0. Verification of the documents and systems shows that the zero score for CPL 4 is due to the absence of assessment data because the CPL in question is still related to courses programmed for the odd semester of the 2025/2026 academic year, not due to low student achievement records.

b. OBE Transcript per Cohort



Figure 10. CPL Results Statistics Graph by batch

Figure 10. Summary of Quorum Level Statistics on CPL Achievement. The figure presents the aggregate CPL achievement of students in a single cohort. This method allows the study program to identify patterns of achievement and evaluate learning outcomes at the cohort level.

At the cohort level, the system generates a recapitulation of CPL achievement for students in the same cohort. System records from the PAI Master Study Program show that eight of the ten designated CPLs have recorded achievement data, while two CPLs are still related to learning activities scheduled for the following semesters. CPL 7 recorded the highest average achievement among CPLs for which data were available.

Overall, the system's records show substantial differences in the utilization of OBE Modules across different study programs. Of the 12 courses at STAIN Majene, only three have activated the OBE Module, and only the PAI Master's Study Program has reached the stage where individual and cohort OBE transcripts can be generated.

3. Factors Affecting CPL Assessment Optimization through SIAKAD

The interview data identified three categories of interrelated factors that influence the utilization of the CPL assessment system: structural, personal-cultural, and institutional factors. For transparency in citation reporting, the informants cited in this section are identified based on their institutional roles: IH and ZS are the Head of Study Programs involved in the implementation of CPL-CPMK; MP is the Head of the Master of Islamic Religious Education (PAI) Study Program; and Sy represented the Quality Assurance Center (P2M) and was involved in curriculum support and OBE implementation.

a. Structural Factors: Incomplete CPL-CPMK Mapping

The first factor identified from the interview was the incomplete mapping of the CPMK. Although the CPL has been formulated and mapped to courses in some study programs, the CPMK has not been established for all courses. Informant IH, Head of Study Program involved in the implementation of CPL-CPMK, explained this condition:

"Actually, the CPL has been completed and we have mapped it to the track, but the CPMK is not finished. When we log into the system, the OBE module cannot be fully filled because there is no final CPMK."
(IH, Head of Study Program, interview, 2025)

Interview data also revealed variations in the formulation of CPMK among lecturers who teach the same course. Informant ZS, another Head of Study Program, stated:

"Lecturers have their own CPMK, so even though the courses are the same, CPMK in class A can be different from class B. That's because there is no official CPMK that has been agreed in the curriculum."
(ZS, Head of Study Program, interview, 2025)

This record is consistent with the system record that shows incomplete CPMK mapping in BKPI and PGMI. The original data also established incomplete CPMKs and differences between CPMKs produced by lecturers as the main findings.

b. Personal and Cultural Factors: Lecturers' Understanding of OBEs

The interviews also identified differences in lecturers' understanding of the relationship between CPL, CPMK, and OBE-based assessments. IH informant reported:

"Many lecturers do not understand how to translate CPL into CPMK. They also do not fully appreciate the importance of CPL in ensuring the quality of learning."
(IH, Head of Study Program, interview, 2025)

Different conditions are reported in the PAI Master Study Program. The MP informant explained that the CPMK mapping has been completed and the coordination between lecturers is facilitated by the relatively small number of courses and direct assistance received during the OBE curriculum workshop:

"In the Master of Islamic Education (PAI), the CPMK is complete. The courses are not too many, so it is easier to communicate with lecturers. In addition, we are also assisted directly during the OBE curriculum workshop, so the process is fast and uniform."
(MP, Head of the PAI Studies Master's Program, interview, 2025)

The contrast between these notes corresponds to the differences found in the system documentation: the PAI Master Study Program has completed the CPMK mapping and the next stage of implementation, while other programs that have adopted OBE have not completed all the stages.

c. Institutional Factors: Curriculum Assistance and Coordination

Institutional support emerged as another factor that differentiated implementation across various study programs. Interview data shows that curriculum assistance and internal coordination are more intensive in the PAI Master Study Program. At the institutional level, the Center for Quality Assurance (P2M) has carried out OBE-related activities, including training, CPMK assistance, and the formation of lecturer consortiums. However, interview data shows that the consortium does not operate regularly. Informant Sy, representing P2M, stated:

"A consortium of lecturers already exists, and we have officially formed it. However, this campus has not been able to function optimally due to the busy campus schedule and administrative activities." (Sy, P2M representative, interview, 2025)

Table 3. Three categories that emerge from the data

Dimensions	Empirical findings	Evidence
Structural	The CPL-CPMK mapping is incomplete and the CPMK formulation is different between lecturers/classes	Interviews with IH and ZS; SIAKAD Recordings
Personal-culture	The lecturers show different levels of understanding of the implementation of CPL, CPMK, and OBE	Interview with IH and MP
Institutional	Curriculum assistance and coordination differ in each program; The Lecturer Consortium does not operate regularly	Interviews with MP and Sy; Institutional documentation

Source: SIAKAD Cloud observations, interviews, and documentation, 2025.

This version only reports what the data indicates. Sentences such as *"this creates gaps in learning achievement standards and undermines the principle of constructive alignment"* should be moved to Discussion, as the statement interprets the findings theoretically, not simply reports them. In the original results, the interpretation appears immediately after the informant's data.

4. Optimization Strategies Identified from the Findings

Analysis of interview and documentary data identified two key areas for optimizing the CPL assessment system: strengthening academic coordination through lecturer consortiums and strengthening institutional support through quality standards and curriculum-focused human resources.

a. Strengthening the Lecturer Consortium

The interview showed that STAIN Majene had formed a consortium of lecturers under P2M coordination. However, the activities have not been carried out regularly. Informant Sy reported that institutional and administrative workloads limited the time available for consortium activities. Interview data from study program management also shows the need for greater coordination in formulating CPMK. The IH informant stated:

"We already have CPL mapping to courses, but the CPMK has not been completed because lecturers are still confused about how to translate CPL into CPMK. As a result, each lecturer interprets it himself, and the results vary from class to class." (IH, Head of Study Program, interview, 2025)

Based on the needs identified by the informants, strengthening the existing lecturer consortium emerged as one of the proposed optimization strategies, especially to coordinate the mapping of CPL-CPMK and standardization of CPMK formulation among lecturers who teach the same or related courses.

b. Institutional Quality Standards and Human Resources Curriculum

The second strategy identified from the data relates to institutional standardization. Interview data showed that the special institutional standards governing the implementation of CPL assessments through SIAKAD have not been uniformly established throughout the study program. The IH informant stated:

"Until now, there is no special standard from P2M that regulates how the CPL assessment system is applied in each study program. As a result, each study program operates independently." (IH, Head of Study Program, interview, 2025)

ZS informants also emphasized the need for institutional standards:

"If there are clear standards from P2M, study programs will also have the basis and incentives to immediately adjust their systems. So it doesn't just depend on the enthusiasm of the lecturers." (ZS, Head of Study Program, interview, 2025)

The interviews also identified limitations in the human resources responsible for curriculum development and OBE implementation. Informant Sy from P2M stated:

"Ideally, there should be a dedicated area that handles curriculum development and OBE implementation, as this is a job that requires its own focus." (Sy, P2M representative, interview, 2025)

Thus, the strategies that emerge from the empirical data include: (1) strengthening the function of the existing lecturer consortium for CPL-CPMK coordination; (2) establish institutional standards for CPL and CPMK formulation, data input, validation, reporting, and evaluation; and (3) strengthening human resources responsible for curriculum development and OBE implementation. These strategies are derived from implementation constraints and institutional needs identified through interviews, observations, and documentary analysis

DISCUSSION

The findings of this study reveal that the optimization of Graduate Learning Outcomes (CPL) assessment through SIAKAD is not the main issue of technology, but the process of aligning curriculum readiness, academic capacity, technology utilization, and institutional governance. Although SIAKAD Cloud provides the necessary technical infrastructure to map CPLs, CPMKs, lesson plans, assessments, and reports on learning outcomes, the availability of these functions does not automatically result in comprehensive utilization. This distinction is important because it shifts the understanding of digital transformation in OBE from the mere availability of information systems to the institutional capacity to integrate those systems into academic practice. In this regard, the findings extend previous studies on OBE implementation by showing that technological readiness and academic readiness can evolve at different paces.

Curriculum Readiness and Technology Implementation Gap

The uneven utilization of OBE Modules across different study programs indicates a gap in technology implementation: although technology infrastructure is institutionally available, its effective utilization depends on the extent to which each study program has developed the academic architecture and curriculum necessary for the implementation of OBE. These findings provide a deeper understanding of curriculum readiness, suggesting that readiness should not be interpreted simply as formal adoption of the OBE curriculum or completion of the administrative component. In contrast, effective OBE implementation requires operational alignment of learning outcomes, curriculum structure, teaching and learning activities, and assessment practices (Mufanti et al., 2024; Nguyen et al., 2024). In this case, curriculum readiness involves the function of the entire outcome chain, from graduate profiles and CPLs to CPMK, learning activities, assessment instruments, and measurable evidence of achievement of results. This kind of integration is critical because measuring learning outcome achievement requires a systematic mechanism that links curriculum components to assessment and reporting of outcomes (Tjandra et al., 2024).

This interpretation is consistent with Mufanti et al., (2024), which suggests that effective OBE implementation depends not only on institutional commitment but also on the ability of lecturers to formulate appropriate learning outcomes, teaching strategies, learning materials, and assessment tools. The report is also supported by Kushari & Septiadi, (2022), which shows that OBE-based assessment information systems only become operational to monitor learning outcomes after the structural relationships between program learning outcomes, performance indicators, courses, and course learning outcomes have been clearly defined and mapped. However, this study expands on these arguments by showing that curriculum readiness serves as a prerequisite for effective use of digital systems. A study program may have access to the same SIAKAD infrastructure as other programs but still cannot generate meaningful CPL achievement data when the underlying outcome architecture, particularly the alignment between CPL, CPMK, learning activities, and assessment components has not been fully realized. Thus, the availability of technology alone does not mean readiness for implementation; on the contrary, the function of an OBE-based academic information system depends on the completeness and coherence of the curriculum structure that provides measurable outcome data for the system.

This difference also explains why administrative readiness should not be confused with the implementation of a substantial OBE. Building graduate profiles and configuring OBE-based curricula provides an important foundation, but these administrative steps alone do not guarantee that student learning outcomes can be meaningfully assessed. Effective OBE implementation requires that the desired outcomes be operationalized through aligned teaching and learning activities and appropriate assessment methods so that student achievement can be demonstrated and measured (Hristov et al., 2023; Mufanti et al., 2024). A crucial transition occurs when graduate profiles and CPLs are translated into measurable CPMKs and are systematically connected to learning activities, performance indicators, and assessment tasks. This alignment also provides the structured outcome data required by digital systems to monitor and evaluate learning achievement (Kushari & Septiadi, 2022). Therefore, the findings of this study suggest that the digitization of OBE should be understood as a digital transformation that depends on the curriculum, rather than simply the migration of existing academic processes into information systems.

Constructive Alignment as a Critical Academic Obstacle

The second important interpretation relates to the role of CPL–CPMK mapping. Rather than viewing incomplete CPMK as just an administrative shortcoming, the findings suggest that this is a critical academic barrier in the implementation of OBE. CPMK occupies an intermediate position between institutionally defined graduate outcomes and learning practices and assessments applied by individual lecturers. When these intermediate layers are incomplete or inconsistent, the alignment chain is broken, so the assessment data cannot be meaningfully aggregated into the CPL achievement.

These findings reinforce the principle of constructive alignment, which requires deliberate coherence between intended learning outcomes, teaching and learning activities, and assessment methods so that the competencies expected of students can be developed and appropriately measured (Hristov et al., 2023). However, this study expands on this principle by showing its digital and operational dimensions. In the implementation of a conventional curriculum, mismatches between learning outcomes, learning activities, and assessment practices may remain fragmented among separate curriculum documents that are difficult to detect systematically at the institutional level. However, in an integrated OBE-based academic information system, this kind of mismatch can be a functional constraint, as the system relies on a clear structural relationship between program learning outcomes, performance indicators, courses, and course learning outcomes before the achievement of outcomes can be effectively monitored (Kushari & Septiadi, 2022). Thus, SIAKAD does not only function as a repository for the existing curriculum structure;

Its operation also makes the gap in the internal coherence of the curriculum more visible. From this perspective, the implementation of digital OBE transforms constructive alignment from curriculum design principles to operational requirements for the functioning of results-based academic information systems.

This perspective also helps explain the variation in CPMK formulation among lecturers who teach similar courses. Variations like this should not only be caused by the lack of competence of each lecturer. Although lecturers' understanding and ability to formulate measurable learning outcomes is an important challenge in the implementation of OBE (Mufanti et al., 2024), current findings suggest that inconsistencies in the formulation of CPMK also reflect broader governance issues, particularly the absence of collectively agreed academic standards to translate CPL into course-level learning outcomes. Effective OBE implementation requires that learning outcomes be systematically aligned with teaching and learning activities and assessment methods (Hristov et al., 2023). Therefore, this study expands on the previous discussion by stating that the difficulties in the formulation of the CPMK are not only a matter of technical curriculum design but also a matter of academic coordination and standardization. Strengthening constructive alignment therefore requires the development of collaborative curriculum, shared academic standards, and institutional coordination rather than simply requiring individual lecturers to complete additional fields in SIAKAD.

Beyond Technology Acceptance: Academic Capabilities and Institutional Support

The findings regarding the lecturer's understanding provide another layer of interpretation. The limitations of using the OBE Module cannot be adequately explained by the availability of the system alone. From the perspective of the *Technology Acceptance Model* (TAM), technology adoption is influenced by users' perceptions of the usability and ease of use of a system, which then shapes their intention to use it (Wahyuningsih et al., 2024; Wandira et al., 2024). However, the findings of this study suggest that, in the context of OBE-based academic information systems, the acceptance of technology is necessary but inadequate. Lecturers may perceive SIAKAD as accessible and useful and willing to use it, but they may still not be able to make effective use of OBE-NA's functions if they do not have the academic ability to formulate CPMK, align assessment components with learning outcomes, or translate curriculum structure into system-ready data. Thus, the effective use of OBE-based academic information systems depends not only on users' acceptance of the technology but also on their domain-specific curriculum competencies and assessments.

Therefore, this study expands the application of TAM by highlighting the importance of domain-specific academic capabilities in the utilization of OBE-based academic information systems. The issue is not simply whether lecturers accept the technology, find it useful, or easy to use, but whether they have the pedagogical knowledge and curriculum necessary to produce valid academic input for the system. This interpretation is consistent with Mufanti et al., (2024), which finds that lecturers' understanding of OBE is not always comprehensive and there are still difficulties in developing measurable learning outcomes, teaching strategies, learning materials, and assessment tools. In the context of this study, the competence of lecturers serves as a bridge between the conceptual requirements of OBE and the technical functions of SIAKAD. It expands the perspective of conventional technology acceptance by suggesting that the effective utilization of specialized academic information systems requires not only the acceptance of technology, but also the domain-specific competencies required to produce valid and structurally aligned data.

The contrast between the experience of implementing the study program increasingly shows that the competence of lecturers is mediated institutionally, not solely individually. More intensive curriculum assistance, OBE workshops, and coordination were associated with more complete implementation, suggesting that successful adoption is better understood as a product of an institutional support ecosystem rather than the responsibility of individual lecturers alone. Previous studies have also shown that effective OBE implementation requires organizational readiness, curriculum coordination, ongoing capacity building, and institutional mechanisms that support the translation of results-based principles into teaching, assessment, and curriculum practices (Chameera et al., 2023; Girik Allo, 2024). The study expands on those findings by showing how such institutional support operates specifically at the intersection between curriculum design and digital academic systems. In this context, workshops, curriculum assistance, lecturer coordination, and quality assurance mechanisms not only improve individual competence; they create the necessary organizational conditions for lecturers to translate the OBE concept into valid CPL-CPMK mapping and system-ready assessment data.

This interpretation has implications for the role of lecturer consortiums. This consortium should not simply serve as an administrative forum to disseminate OBE policies. This method can serve as an academic standardization mechanism where lecturers collaboratively formulate and validate CPMK, assessment indicators, and align them with CPL. This kind of collective academic work can reduce variation between classes while maintaining appropriate

lecturer autonomy in teaching practice. Therefore, revitalizing lecturer consortiums is not only a capacity building strategy but also a mechanism to institutionalize constructive alignment.

From Academic Information Systems to Evidence-Based Quality Assurance

Another important contribution of this study relates to the role of SIAKAD in academic quality assurance. The OBE Module's ability to generate individual and cohort-level CPL information demonstrates the potential for the transition of academic information systems from an administrative database to an evidence-producing quality assurance infrastructure. This distinction is very important. Conventional academic information systems primarily record courses, grades, and administrative transactions, while OBE's integrated systems could potentially track how evidence of assessment contributes to specific postgraduate outcomes.

These findings are consistent with [Kushari & Septiadi, \(2022\)](#), which suggests that an OBE-based assessment information system can only support the monitoring and evaluation of learning outcomes when the structural relationships between program learning outcomes, performance indicators, courses, and course learning outcomes have been clearly defined and mapped. Similarly, [Ali, \(2024\)](#) it emphasizes that technology-based assessments in OBEs should be designed to generate meaningful evidence of the achievement of students' desired learning outcomes, rather than simply automating conventional assessment procedures. Nevertheless, the study expands on those arguments by showing that automated output should not automatically be equated with valid academic evidence. The quality of CPL information produced by SIAKAD depends directly on the completeness and coherence of curriculum mapping as well as the quality of assessment data entered into the system. Digital automation can improve the efficiency of data processing and reporting, but it cannot independently guarantee the academic validity of the CPL information generated. If the CPL–CPMK relationship is incomplete, the formulation of the CPMK varies significantly between lecturers, or the assessment assignment is not sufficiently aligned with the desired outcome, the resulting CPL report may be technically generated but remain incomplete academically or potentially misleading.

These observations provide an important qualification for optimistic assumptions about digital transformation in higher education. Digitalization can only strengthen evidence-based academic quality assurance when the underlying academic data is conceptually valid, systematically organized, and institutionally standardized. This interpretation is consistent with recent studies that conceptualize digital transformation in higher education as an organizational transformation, not just the adoption of digital technologies, which require changes in institutional strategies, processes, organizational structures, and culture ([Antonopoulou et al., 2023](#); [Fernández et al., 2023](#)). The importance of reliable data is also supported by [Stojanov & Daniel, \(2024\)](#), which identifies data-driven decision-making as the primary reason for the use of data and analytics in higher education. However, this study expands that perspective by defining the mechanisms by which curriculum, human resources, technology, and quality assurance interact: curriculum standards determine what should be measured; lecturers operationalize these standards through teaching and assessment; SIAKAD processes and aggregates the resulting data; and the quality assurance unit interprets these results for evaluation and improvement of the ongoing curriculum. From this point of view, digital transformation becomes meaningful for academic quality assurance only when technology is integrated in a coherent curriculum–assessment–data–quality assurance cycle.

The implication is that CPL assessments should be incorporated into the institutional quality assurance cycle rather than treated as an additional feature of SIAKAD. CPL achievement data has the potential to be used to identify consistently under-achieving learning outcomes, review course contributions to postgraduate competencies, evaluate assessment practices, and provide evidence for curriculum revision. This will transform CPL reporting from compliance-oriented activities to a continuous quality improvement mechanism.

Implications for Academic Governance

Overall, these findings suggest that optimizing CPL assessments requires a shift from technology-centric implementation to governance-centric implementation. Providing access to OBE Modules or holding occasional technical training will most likely not be enough. Optimization requires an institutional architecture that sets common standards for the formulation of CPL and CPMK, coordinates curriculum alignment, develops lecturer competencies, monitors the completeness and quality of academic data, and uses CPL reports as evidence in curriculum evaluation.

The proposed strategy to strengthen faculty consortiums, set institutional quality standards, strengthen curriculum-related human resources within the Quality Assurance Center, and provide ongoing mentoring should be understood as interconnected interventions, not independent interventions. Standardization without lecturer capacity can result in formal compliance without meaningful implementation; training without institutional standards can reproduce variations among lecturers; and technological infrastructure without any of these components may remain

underutilized. The contribution of this study is the identification of an integrated optimization logic in which structural, personal, and institutional dimensions must operate simultaneously.

This interpretation is particularly relevant in the context of PTKIN because it shows that the integration of OBE with academic information systems involves more than just technological modernization. This requires the institutionalization of results-oriented academic governance. As a result, SIADIK-based CPL assessment optimization can be conceptualized as a process in which curriculum architecture, lecturer capabilities, digital infrastructure, and internal quality assurance are integrated into a sustainable academic quality cycle. This perspective expands existing discussions about OBE implementation beyond curriculum design and technology adoption to broader issues of sustainable institutional governance.

Study Limitations

The study has several limitations to consider when interpreting its findings. First, the research was conducted in a single institutional context, namely STAIN Majene, and focused on the implementation of the OBE Module in a specific organizational, curriculum, and technological environment. Therefore, these findings are context-dependent and are not intended for statistical generalization to all State Islamic Higher Education Institutions (PTKIN). Nevertheless, these findings can provide analytical insights for institutions with comparable OBE characteristics and implementation stages.

Second, the study used a descriptive qualitative design and relied primarily on interviews, observations, and institutional documentation. Although triangulation and member checks were used to strengthen credibility, this study did not quantitatively examine the relationship between lecturer competence, technology acceptance, institutional support, and the effectiveness of CPL assessments. Therefore, the relationships identified among these factors should be understood as qualitative patterns, rather than statistically tested causal relationships. The methods in the current manuscript do rely on observation, interviews, documentation, triangulation, and examination of members.

Third, the implementation of OBE in various study programs is uneven at the time of data collection. Only a limited number of courses have developed enough to take advantage of the advanced assessment and reporting functions of the OBE Module. As a result, the study was unable to comprehensively compare the results of CPL assessments across the study program or examine their development over multiple implementation cycles. The manuscript itself shows that the implementation is still concentrated only in some of these institutions.

Finally, the study primarily focused on the implementation and governance of the CPL scoring mechanism, rather than evaluating whether the CPL scores generated by the system accurately predict graduates' actual competencies or subsequent performance. Future studies may use longitudinal or mixed method designs to examine the validity and reliability of system-generated CPL data, compare implementations across multiple PTKIN institutions, investigate lecturers' technology acceptance quantitatively, and assess whether the use of CPL data results in measurable improvements in curriculum quality and student learning outcomes.

CONCLUSION

This study concludes that the utilization of the Graduate Learning Outcomes (CPL) assessment system through the OBE Module at SIAKAD STAIN Majene is quite optimal, although its implementation has not been comprehensive in all study programs. Of the 12 study programs, only BKPI, PGMI, and Master of PAI implemented an OBE-based curriculum and activated the OBE Module, with the Master of PAI showing the most complete implementation ranging from curriculum configuration and CPL–CPMK mapping to assessment planning and creation of individual and cohort-level OBE transcripts. These findings show that SIAKAD Cloud is technically able to support systematic, measurable, and data-based CPL assessments, but its effective utilization still depends on the academic readiness and curriculum of each study program.

The optimization of the CPL assessment system is influenced by three interrelated dimensions: structural, personal, and institutional factors. Structural factors involve incomplete CPMK mapping and inadequate integration between CPL, CPMK, RPS, and assessment instruments; personal factors related to differences in the understanding and ability of lecturers in applying OBE; and institutional factors related to curriculum assistance, coordination, quality standards, and human resources. To overcome these constraints, this study proposes two complementary strategies: a conceptual strategy through strengthening and revitalizing lecturer consortiums, and an institutional strategy through standard quality guidelines and human resources related to the curriculum that are strengthened under the Quality Assurance Center (P2M). The novelty of this study lies in the integration of the implementation of the OBE Module, structural-personal-institutional factors, and conceptual-institutional optimization strategies into a framework that links curriculum readiness, the use of digital systems, and internal quality assurance in the context of PTKIN.

Nevertheless, the study was limited by a single institutional context, descriptive qualitative design, and uneven levels of OBE implementation across the various study programs, which limited a broader generalization and comprehensive comparison of CPL assessment results. In addition, the study focused on system implementation and governance rather than empirically validating whether the CPL scores generated by SIAKAD accurately represent the actual competencies of graduates. Therefore, future research should involve multiple PTKIN institutions, using longitudinal or mixed method designs, assess the validity and reliability of system-generated CPL data, as well as investigate how CPL-based evidence contributes to improving curriculum quality, academic governance

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CONFESSION

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STATEMENT OF CONTRIBUTION BY THE AUTHOR

D, SB, AS contributes to the drafting of the concept and design of the research. D is responsible for data collection, data analysis, interpretation of research results, and preparation of the initial draft of the manuscript. SB contributes to the improvement of research methodology, analysis of results, discussion, and supervision of research implementation. The US plays a role in data validation, critical review of the content of the manuscript, editing, and refining the final manuscript. All authors have read, approved, and are responsible for the content of the published manuscript

AI DISCLOSURE STATEMENT

The authors state that artificial intelligence (AI) tools are used in a limited capacity to aid in language editing and improve script clarity. All ideas, analyses, and conclusions presented in this study are the original work of the authors, and they are solely responsible for the content of this manuscript..

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