Jurnal Pendidikan Progresif
e-ISSN: 2550-1313 | p-ISSN: 2087-9849
URL: https://jpp.fkip.unila.ac.id/index.php/jpp
Jounal's DOI: http://doi.org/10.23960/jpp

Vol. 16, No. 4, 2026
Article ID: 1975
Pages: 2100-2115

Development of an Outcome-Based Authentic Learning Model for Enhancing Students' Professional Competence in Higher Education

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Received: 29 August 2026 *Accepted: 14 October 2026* *Published: 29 October 2026*

Abstract: This study aimed to develop and examine the validity, practicality, and preliminary effectiveness of the Outcome-Based Authentic Learning Model (OBALM) for strengthening the professional competence of prospective vocational educators. This Research and Development (R&D) study employed the ADDIE model and involved 54 third-semester students of the Vocational Makeup Education Study Program at the Indonesian Institute of the Arts Padangpanjang. Data were collected through expert validation, implementation observations, student responses, and a professional performance rubric, and were analyzed using Aiken's V, percentage scores, N-gain, and inferential statistics. OBALM comprises six stages: Authentic Problem Orientation, Problem Analysis, Strategy Design, Implementation, Feedback, and Reflection. Expert validation yielded an Aiken's V of 0.89, indicating high content validity, while the overall practicality score was 85.0%. Students' mean professional competence score increased from 62.18 to 82.94, with an N-gain of 0.55. The pretest–posttest difference was statistically significant, $t(53) = 13.44$, $p < .001$, with a very large effect size (Cohen's $dz = 1.83$). Improvements were observed across the seven targeted professional competence dimensions. These findings provide initial empirical support for OBALM as a structured learning approach that integrates outcome-based learning, authentic problems, practical performance, feedback, and reflection in vocational higher education.

Keywords: outcome-based education, authentic learning, professional competence, vocational education, instructional model.

Article's DOI: https://doi.org/10.23960/jpp.v16i4.pp2100-2115

INTRODUCTION

Higher education is increasingly expected to prepare students not only with knowledge but also with competencies relevant to academic and professional demands. This shift is reflected in the implementation of Outcome-Based Education (OBE), which places learning outcomes at the center of curriculum design, instruction, and assessment (Nguyen et al., 2024). In OBE, learning is considered successful when students can demonstrate the competencies specified in the intended learning outcomes. Therefore, alignment among learning outcomes, learning activities, and assessment is essential (Iqbal et al., 2020).

However, implementing OBE at the curriculum level does not necessarily ensure outcome-oriented learning in the classroom. Implementation challenges include changes in instructional orientation, institutional readiness, and alignment between learning activities and assessment, which may affect students' opportunities to demonstrate their competencies (Katawazai, 2021; Ali, 2024; Mahrishi et al., 2025). Thus, OBE requires not only clearly defined outcomes but also learning experiences that support the development and demonstration of student competencies.

This challenge is especially relevant to vocational higher education and teacher

education, where professional competence cannot develop through knowledge alone. Students need opportunities to apply knowledge, solve problems, make decisions, and perform tasks that reflect professional practice (Rintala & Nokelainen, 2020; Antera, 2021). Accordingly, learning should connect academic content with authentic workplace situations so that students can apply their knowledge and skills in practice (Hiim, 2023). Practical experiences, work-related assessment, and reflection can further support the development and improvement of students' professional performance (Dahlback et al., 2020; Cattaneo & Motta, 2021).

One approach that connects learning with professional practice is authentic learning, which gives students opportunities to learn through problems and situations relevant to real life and the workplace (Lee, 2020). This approach encourages students to apply knowledge to meaningful problems rather than merely recall information. However, a synthesis of 50 empirical studies shows that authentic learning's effectiveness depends on the learning environment's design and characteristics (Nachtigall et al., 2022). Therefore, authentic learning experiences need to be systematically designed and aligned with the competencies students are expected to develop.

Authentic learning experiences also need assessment that captures students' abilities in contexts relevant to professional practice. Authentic assessment uses meaningful tasks that require students to solve problems and demonstrate skills needed in real-world contexts (Sokhanvar et al., 2021; Schultz et al., 2022). A systematic review of 94 articles by Vlachopoulos & Makri (2024) further indicates that authentic assessment can support various 21st-century skills, including critical thinking, problem-solving, collaboration, creativity, and communication. Thus, assessment should provide evidence not only of what students know but also of their ability to apply that knowledge in practice (Villarroel et al., 2018; McArthur, 2023).

Beyond assessment, students need opportunities to practice before evaluating their competencies. Simulation and practice-based learning enable students to apply knowledge, make decisions, solve problems, and receive feedback in situations that approximate professional practice (Chernikova et al., 2020). In teacher education, simulation can also support professional skill development through experiences that resemble classroom situations (Theelen et al., 2019). Thus, practice and simulation can bridge knowledge and professional competence.

Problem-based approaches encourage students to actively apply knowledge by understanding problems, seeking information, and developing solutions. Problem-Based Learning can enhance students' higher-order thinking skills through engagement with problem-based learning activities (Al-Farisi et al., 2023). Integrating Problem-Based Learning and Project-Based Learning can also foster critical and creative thinking (Mantra et al., 2022). However, these approaches have not been specifically designed to integrate learning outcomes, authentic problems, professional practice, assessment, feedback, and reflection within a single learning sequence. This condition highlights the need for a model that systematically integrates these components.

The issue, therefore, is not a lack of instructional approaches but their limited integration into a coherent learning process. OBE focuses on learning outcomes, authentic learning on real-world situations, while problem-based learning, practice, and authentic assessment support problem-solving and the demonstration of competence (Mai Anh Tho et al., 2021). However, these components are not always systematically connected from learning outcomes

through practice, feedback, and reflection. Therefore, a learning model is needed to integrate these components into a single cycle oriented toward learning outcomes and professional competence.

This need is particularly relevant for students in Vocational Makeup Education, who need to integrate makeup and pedagogical knowledge in authentic learning and professional practice contexts. In vocational education, professional competence closely relates to applying knowledge and skills in professional and workplace contexts (Zhang et al., 2022). In vocational education in the arts and cultural fields, professional competence is also associated with mastery of specialized competencies and the ability to perform professional tasks (Susatya et al., 2022). Therefore, students need learning experiences that enable them to solve problems, make decisions, engage in practice, and demonstrate assessable performance.

To address this need, this study develops the Outcome-Based Authentic Learning Model (OBALM). The model grounds learning outcomes and organizes learning into six stages: Authentic Problem Orientation, Problem Analysis, Strategy Design, Implementation, Feedback, and Reflection. These stages guide students from identifying authentic problems to analyzing and designing solutions, implementing them through practice, and then receiving feedback and reflecting. Thus, OBALM provides a systematic learning sequence that connects problems, actions, improvement, and reflection toward competency attainment.

OBALM's novelty lies not in using OBE, authentic learning, problem-based learning, authentic assessment, simulation, or reflection separately, but in integrating their functions into a single learning cycle oriented toward learning outcomes and professional competence. OBE focuses on learning outcomes and their attainment through assessment (Amirtharaj et al., 2022), while Authentic learning environments facilitate experiential learning and strengthen the connection between theoretical knowledge and practical experience (Radoviæ et al., 2021). OBALM systematically integrates these components, learning outcomes, authentic problems, and analysis through practice, feedback, reflection, and assessment, to provide evidence of competence.

This integration is expected to strengthen the connection between learning outcomes and student performance in professional contexts. Through OBALM, students identify problems, develop solutions, engage in practice, receive feedback, and reflect on their performance before assessment. Reflection helps students examine their actions, learn from their experiences, and identify areas for improvement, supporting their professional development (Hommel et al., 2023). In vocational education, learning environments can also support the development of workplace-related competencies, such as problem-solving, cooperation, and professional attitudes (Löfgren et al., 2023).

Based on this rationale, this study aims to develop and examine the validity, practicality, and initial effectiveness of the Outcome-Based Authentic Learning Model (OBALM) in enhancing the professional competence of vocational higher education students. Theoretically, OBALM integrates OBE, authentic learning, problem-solving, practice, feedback, reflection, and assessment into a coherent learning sequence. Practically, the model is expected to help vocational educators translate learning outcomes into meaningful experiences that support students in practicing, improving, and demonstrating professional competence. Accordingly, this study addresses three questions: (1) How valid is OBALM? (2) How practical is OBALM in the Instructional Strategies course?

Furthermore, (3) To what extent is OBALM accompanied by improvements in students' professional competence?

METHOD

Participants

This study was conducted at Institut Seni Indonesia Padangpanjang and involved students in the Vocational Makeup Education Study Program enrolled in the Instructional Strategies course. The participants comprised 54 third-semester students. Because the study included all third-semester students, it used total sampling. The study also involved expert validators with expertise in instructional design, Outcome-Based Education (OBE), and educational assessment to evaluate the feasibility of the developed model.

Ethical Considerations

Participation was voluntary, and all 54 students provided informed consent before data collection. Participants were informed about the purpose and procedures of the study. The study was conducted with permission from Institut Seni Indonesia Padangpanjang, and the collected data were used solely for research purposes.

Research Design

This study used a Research and Development (R&D) approach based on the ADDIE model, comprising Analysis, Design, Development, Implementation, and Evaluation. The model provided a systematic framework for identifying needs, developing the instructional product, implementing it, and evaluating outcomes (Patel et al., 2018). The resulting product, the Outcome-Based Authentic Learning Model (OBALM), aligns learning outcomes, authentic instructional problems, learning activities, performance, and assessment with students' professional competence.

OBALM comprises six interconnected stages: (1) Authentic Problem Orientation, (2) Problem Analysis, (3) Strategy Design, (4) Implementation, (5) Feedback, and (6) Reflection. The sequence moves from identifying an authentic instructional problem to designing and implementing an instructional strategy, receiving feedback, and reflecting on performance for subsequent improvement. The relationship among the stages is presented in Figure 1.

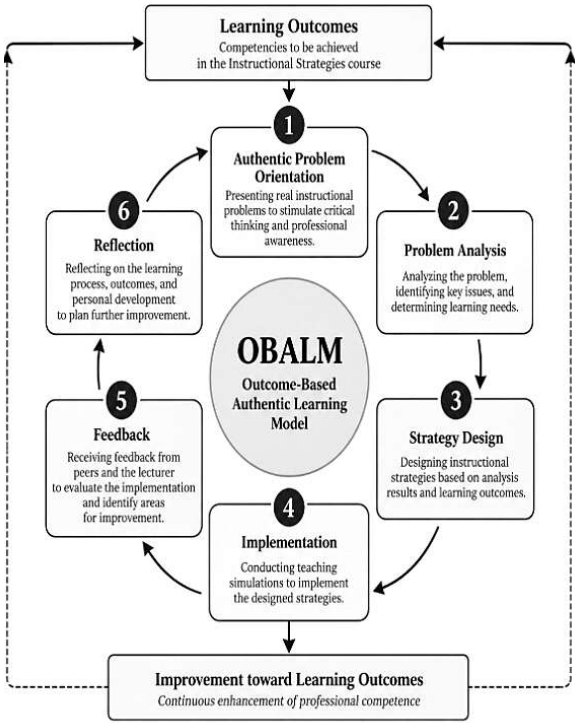

Figure 1. The Six-Stage syntax and learning flow of OBALM

Research Procedure

The development of OBALM followed the five stages of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation. Following expert validation and subsequent revision, the model was implemented with 54 third-semester students. A one-group pretest–posttest design was employed to assess changes in students' professional competence. Given the absence of a comparison group, potential maturation and testing effects were considered. To maintain consistency across the intervention, the study used common learning objectives, instructional context, assessment procedures,

performance tasks, and a standardized professional performance rubric. Accordingly, the observed changes should be interpreted as preliminary evidence of the model's effectiveness rather than definitive causal effects.

During the Analysis stage, the model identified learning needs, student characteristics, and instructional problems. The Design stage established the learning objectives, authentic cases, learning activities, media, assessment procedures, and OBALM syntax. In the Development stage, the model and its supporting materials underwent expert validation and revision. The revised model was subsequently implemented through authentic cases, teaching simulations, feedback, and reflection activities. The Evaluation stage assessed the implementation and changes in students' professional competence.

Instruments

Four instruments were used in this study: an expert validation sheet, a student response questionnaire, a learning implementation observation sheet, and a professional performance rubric. All instruments employed a four-point rating scale ranging from 4 (very good) to 1 (very poor). Content validity was established through expert judgment using Aiken's V coefficient to assess the relevance and appropriateness of the model components (Ahmad et al., 2024). Student responses and classroom observations were used to evaluate the practicality and implementation of OBALM.

The professional performance rubric was employed to assess students' professional competence through authentic tasks and teaching simulations across seven competency dimensions: instructional problem analysis, strategy design, strategy implementation, problem solving, communication, decision-making, and reflection. The teaching simulations were independently evaluated by two lecturers with expertise in instructional design and instructional strategies. Both raters used the same standardized professional performance rubric to independently assess students' teaching performance. Inter-rater reliability was examined using Cohen's kappa coefficient to determine the degree of agreement between the two raters beyond chance.

Practicality Assessment

Following expert validation and revision, the practicality of OBALM was assessed for clarity, ease of implementation, and feasibility in the Instructional Strategies course. The assessment involved 54 third-semester students and two lecturer-observers and covered three aspects: model implementation, lecturer response, and student response. Model implementation was evaluated by two lecturer-observers through observation of the six OBALM stages, while lecturer and student responses were collected using structured questionnaires. A four-point rating scale was employed, and the practicality percentage was calculated using the following formula:

$$P = \frac{\text{Obtained Score}}{\text{Maximum Possible Score}} \times 100\%$$

The resulting percentage was interpreted according to predetermined practicality criteria. Scores of 81–100% were categorized as very practical, 61–80% as practical, 41–60% as moderately practical, 21–40% as less practical, and 0–20% as not practical.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Content validity was assessed using Aiken's V, while model implementation and lecturer and student responses were analyzed using percentage scores. Inter-rater reliability of the professional performance assessment was assessed using Cohen's kappa coefficient based on independent ratings from two expert lecturers

using the same standardized rubric. Students' improvement was measured using normalized gain (N-gain). The Shapiro–Wilk test was used to assess normality. A paired-samples *t*-test was applied to normally distributed paired data, while the Wilcoxon signed-rank test was used otherwise. Paired-samples *t*-tests were also conducted separately for the seven professional competence dimensions. Mean scores, mean differences, N-gain, and *p*-values were reported for each dimension. Cohen's *dz* was calculated to estimate the magnitude of the overall pretest–posttest change, with $\alpha = .05$. Individual changes in overall profesional competence were visualized using a scatter plot with a 45° reference line.

■ RESULT AND DISCUSSION

Analysis Stage

The analysis identified a gap between students' understanding of instructional concepts and their application in authentic professional contexts. Students had limited opportunities to analyze instructional problems, make instructional decisions, practice teaching, receive feedback, and reflect on their performance. The existing learning process also needed stronger alignment among learning outcomes, learning activities, and performance-based assessment to support the development of professional competence. These findings established the need for a learning model that integrates authentic instructional problems, professional practice, and performance-based assessment. Accordingly, the analysis provided the foundation for developing OBALM to support the progressive development of students' professional competencies as prospective vocational educators.

Design Stage

The design stage translated the identified learning needs into the initial OBALM framework. The design aligned intended learning outcomes with authentic learning activities and performance-based assessment in the Instructional Strategies course. The model comprised six interconnected stages: Authentic Problem Orientation, Problem Analysis, Strategy Design, Implementation, Feedback, and Reflection. Each stage was designed to progressively engage students in analyzing authentic instructional problems, developing and applying instructional strategies, receiving feedback, and reflecting on their performance. The resulting framework provided the initial structure for developing students' professional competence as prospective vocational educators.

Table 1. OBALM Six-Stage learning syntax

OBALM Stage	Main Activity	Targeted Competence
Authentic Problem Orientation	Examining a realistic instructional case	Problem identification
Problem Analysis	Analyzing students, learning needs, and instructional problems	Analytical thinking
Strategy Design	Designing appropriate instructional strategies	Instructional planning
Implementation	Conducting a teaching simulation	Professional performance
Feedback	Receiving and providing feedback	Communication and problem solving
Reflection	Evaluating performance and planning improvement	Decision-making and reflection

Development Stage

The initial OBALM framework was developed into a prototype comprising a learning module, implementation guidelines, observation sheet, student response questionnaire, and performance-based competence rubric. Content

validity was evaluated by three experts in instructional design, Outcome-Based Education (OBE), and educational assessment using a four-point rating scale and Aiken's V coefficient (Aiken, 1985). The expert validation was conducted in two rounds. Components that did not meet the applicable critical-value criterion in the first round were revised based on expert feedback and subsequently resubmitted to the same experts for second-round validation.

Table 2. OBALM development before and after expert review

Validation Stage	Assessed Component	Expert 1	Expert 2	Expert 3	Aiken's V	Decision
Before Revision	Model objectives and theoretical foundation	4	4	4	1.00	Accepted
	OBALM syntax	4	4	3	0.89	Accepted
	Authentic learning activities	4	4	2	0.78	Revised
	Performance-based assessment	4	4	3	0.89	Accepted
	Professional competence	4	4	4	1.00	Accepted
	Implementation clarity	4	4	2	0.78	Revised
	Overall	—	—	—	0.89	Revised
After Revision	Authentic learning activities	4	4	3	0.89	Accepted
	Implementation clarity	4	4	3	0.89	Accepted
	Overall revised components	—	—	—	0.89	Accepted

First-round expert validation showed that most OBALM components achieved acceptable content validity, with Aiken's V values ranging from 0.89 to 1.00. However, authentic learning activities and implementation clarity each obtained a value of 0.78 and were therefore revised. The revisions focused on strengthening the authenticity of learning contexts and tasks and clarifying the procedures and guidance for implementing the OBALM stages.

Following revision, the two components were resubmitted to the same three experts for a second round of validation. As shown in Table 2, Aiken's V increased from 0.78 to 0.89 for both authentic learning activities and implementation clarity. Both revised components therefore met the required content-validity criterion and were considered suitable for subsequent field implementation.

The expert review resulted in several substantive revisions to the OBALM prototype. These revisions strengthened the authenticity of the learning contexts, incorporated learner characteristics and learning needs into the problem analysis stage, improved the alignment among learning objectives, instructional strategies, learning activities, and assessment, and replaced strategy presentation with teaching simulation. The feedback stage was expanded to incorporate both lecturer and peer feedback, while the reflection stage was refined to emphasize performance evaluation and the formulation of strategies for improvement.

Collectively, these revisions enhanced the coherence of the six-stage OBALM syntax by establishing a progressive sequence from authentic problem orientation and problem analysis to strategy design, implementation, feedback, and reflective improvement. The revised prototype thus provided a more structured learning process for developing students' instructional decision-making, teaching performa, classroom management, and reflective competence as prospective vocational educators.

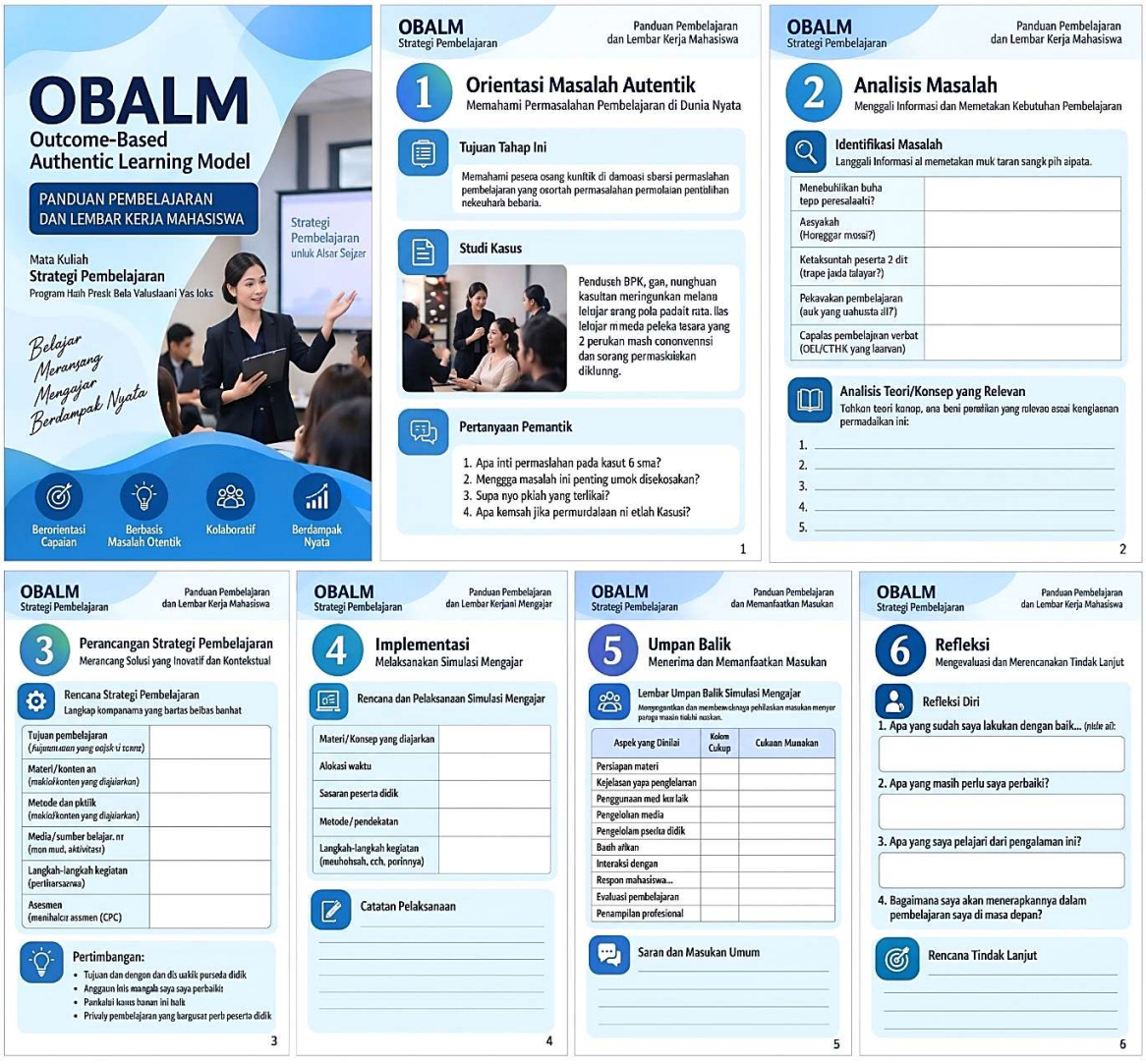

Figure 2. Revised OBALM learning guide and simulation worksheet

Figure 2 presents the revised learning guide and simulation worksheet developed in response to the expert review. The revised materials provide structured guidance for students to analyze authentic instructional problems, design appropriate instructional strategies, conduct teaching simulations, receive formative feedback, and critically reflect on their performance.

Following the second round of expert validation, in which the two previously deficient components achieved Aiken's V coefficients of 0.89, the revised OBALM prototype was considered sufficiently refined for field implementation with third-semester students in the Vocational Makeup Education Study Program at the Institute of the Arts Padangpanjang. The implementation stage subsequently examined the enactment of the revised OBALM syntax within an authentic vocational learning context and documented students' responses to the learning activities.

Implementation Stage

The implementation stage involved 54 third-semester students of the Vocational Makeup Education Study Program at the Institute of the

Arts Padangpanjang. The revised OBALM prototype was implemented in the Instructional Strategies course to examine the feasibility and practicality of the model in an authentic vocational learning context. The implementation followed six interconnected stages: Authentic Problem Orientation, Problem Analysis, Strategy Design, Implementation, Feedback, and Reflection. The implementation results and practicality assessment are presented in Table 3.

Table 3. Results of OBALM implementation and practicality assessment

Assessment Aspect	Percentage	Category
Stage-level implementation (n = 54 students)		
Authentic Problem Orientation	90.0%	Very Practical
Problem Analysis	82.0%	Very Practical
Strategy Design	80.0%	Practical
Implementation	84.0%	Very Practical
Feedback	86.0%	Very Practical
Reflection	83.0%	Very Practical
Practicality assessment		
Model implementation	84.2%	Very Practical
Lecturer response	86.0%	Very Practical
Student response	84.8%	Very Practical
Overall average	**85.0%**	**Very Practical**

Implementing OBALM showed that the six syntax stages could be delivered in a structured learning sequence, although ease varied across stages. Authentic Problem Orientation was the easiest stage to implement, with a score of 90.0%. Presenting realistic instructional problems gave students a clear starting point for understanding the learning situation and identifying the problems to address. This finding indicates that students readily accepted authentic problem contexts, which facilitated engagement at the beginning of the learning process.

The Strategy Design stage was the main area requiring classroom adjustment, scoring 80.0%. At this stage, students translated problem-analysis results into instructional decisions aligned with learning objectives, instructional methods, learning media, activities, forms of assistance, and assessment. The relatively lower score indicates that students needed more structured guidance to transition from analyzing instructional problems to developing coherent instructional strategies. Problem Analysis (82.0%) and Reflection (83.0%) also required greater attention because these stages involved interpreting instructional conditions, evaluating performance, and determining appropriate improvements.

The Implementation stage (84.0%) and Feedback stage (86.0%) were conducted relatively consistently. Teaching simulations gave students opportunities to apply their instructional designs in practice. In contrast, feedback from lecturers and peers provided direct information about instructional delivery, classroom management, and learner responses. The sequence from practice to feedback helped connect students' instructional decisions with their actual teaching performance.

The average implementation score across the six stages was 84.2%, categorized as Very Practical. The findings indicate that the main adjustment required in classroom implementation concerned the transition from Problem Analysis to Strategy Design. At this point, additional lecturer guidance helped students establish

stronger connections among the identified instructional problem, learning objectives, instructional strategies, and assessment. Thus, the implementation findings demonstrate that the OBALM syntax was feasible for classroom use while identifying a specific stage that required stronger instructional support.

The practicality assessment further covered model implementation, lecturer response, and student response. The scores were 84.2%, 86.0%, and 84.8%, yielding an overall practicality score of 85.0%, categorized as Very Practical. These results indicate that the OBALM model and its supporting materials were sufficiently clear and feasible for use in the Instructional Strategies course. The findings also suggest that the revisions made after expert validation were reflected in classroom implementation, particularly through integrating authentic problems, teaching simulations, feedback, and reflection.

Evaluation Stage

The evaluation stage examined changes in students' professional competence after implementing the Outcome-Based Authentic Learning Model (OBALM) in the Instructional Strategies course. Performance was assessed before and after implementation across seven dimensions: instructional problem analysis, strategy design, strategy implementation, problem solving, communication, decision-making, and reflection.

The professional performance rubric was independently scored by two lecturers with expertise in instructional design and instructional strategies. Both raters used the same standardized professional performance rubric to independently assess students' teaching performance across the seven competency dimensions. Inter-rater reliability was examined using Cohen's kappa coefficient to determine the degree of agreement between the two raters beyond chance.

Table 4. Inter-Rater reliability of the professional performance assessment

OBALM Stage	Observer 1 (%)	Observer 2 (%)	Percentage Agreement (%)	Cohen's κ	Interpretation
Authentic Problem Orientation	89.8	90.3	98.1	0.962	Almost perfect agreement
Problem Analysis	82.4	81.5	96.3	0.935	Almost perfect agreement
Strategy Design	79.9	80.1	99.1	0.981	Almost perfect agreement
Implementation	84.0	84.0	100.0	1.000	Perfect agreement
Feedback	86.6	85.4	95.4	0.917	Almost perfect agreement
Reflection	82.2	83.8	93.5	0.870	Almost perfect agreement
Overall	84.2	84.2	97.1	0.946	Almost perfect agreement

The simulated analysis indicated high agreement between the two raters across the six OBALM stages. The Cohen's kappa coefficients ranged from $\hat{e} = 0.870$ to $\hat{e} = 1.000$, with an overall coefficient of $\hat{e} = 0.946$, indicating almost perfect agreement. The percentage agreement ranged from 93.5% to 100.0%, demonstrating a high level of consistency between the two independent raters in assessing students' professional performance.

Students' Professional Competence

Students' professional competence was assessed through authentic performance tasks involving case analysis, instructional strategy design and implementation, response to feedback, and reflective practice. Assessment was conducted before and after the implementation of OBALM across seven competency dimensions: instructional problem analysis, strategy design, strategy implementation, problem solving, communication, decision-making, and reflection. Changes in students' over professional competence were first examined through a comparison of pretest and posttest scores.

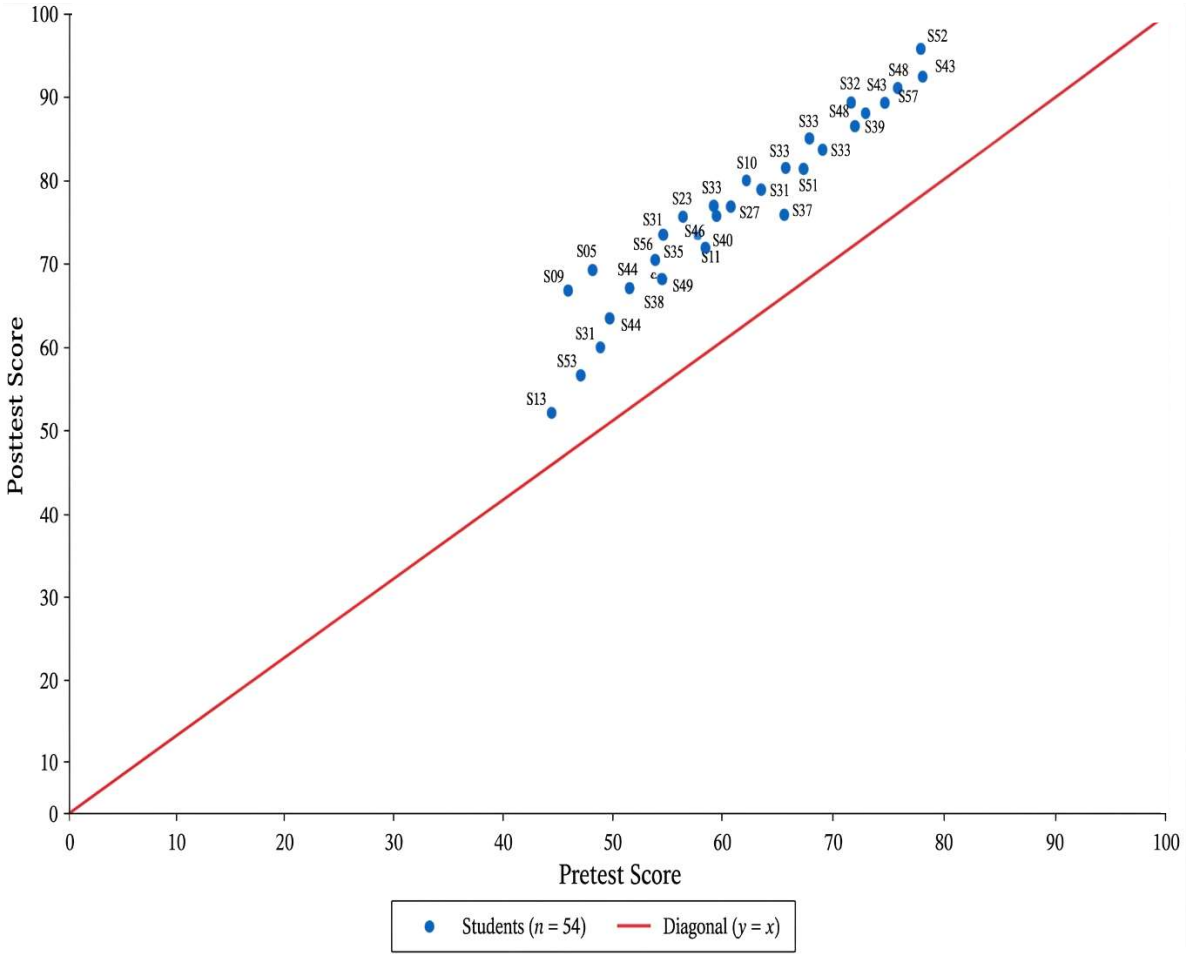

Figure 3. Scatter plot of students' pretest and posttest professional competence scores ($n = 54$)

Figure 3 illustrates the relationship between students' pretest and posttest professional competence scores ($n = 54$). The 45° reference line represents equal pretest and posttest scores. Most observations are distributed above the reference line, indicating that posttest scores were generally higher than pretest scores. This pattern indicates an overall increase in students' professional competence following the implementation of OBALM.

To provide numerical evidence of changes across the seven competency dimensions, descriptive and dimension-level inferential statistics were calculated for the pretest and posttest scores.

Table 5 shows that all seven professional competence dimensions improved from pretest to posttest, with statistically significant differences ($p < .001$). Mean differences ranged from 20.00 to 21.32 points. Communication showed the

Table 5. Pretest–Posttest results by professional competence dimension

Competency Dimension	Pretest M	Posttest M	Mean Difference	N-gain	*p*
Instructional Problem Analysis	60.00	80.00	20.00	0.518	< .001
Strategy Design	61.00	82.00	21.00	0.555	< .001
Strategy Implementation	62.00	83.00	21.00	0.572	< .001
Problem Solving	63.00	84.00	21.00	0.584	< .001
Communication	64.00	85.00	21.00	0.608	< .001
Decision-Making	62.00	82.00	20.00	0.551	< .001
Reflection	63.26	84.58	21.32	0.595	< .001

highest N-gain (0.608), while Instructional Problem Analysis showed the lowest N-gain (0.518). The findings indicate improvement across all targeted dimensions, although the magnitude varied among competencies.

Overall, students' professional competence increased from a mean of 62.18 at pretest to 82.94 at posttest, with a mean difference of 20.76 and an N-gain of 0.55. The paired-samples *t*-test indicated a statistically significant difference, $t(53) = 13.44$, $p < .001$, with a Cohen's *dz* of 1.83.

Inferential Analysis

Inferential statistics were used to examine the overall pretest–posttest difference. The Shapiro–Wilk test indicated that the paired differences were normally distributed ($W = 0.98$, $p = .43$); therefore, a paired-samples *t*-test was conducted. The mean professional competence score increased from 62.18 at pretest to 82.94 at posttest, yielding a mean difference of 20.76 and an overall N-gain of 0.55. The paired-samples *t*-test showed a statistically significant difference between the pretest and posttest scores, $t(53) = 13.44$, $p < .001$. The change was substantial, with a Cohen's *dz* of 1.83, indicating a very large effect size. These findings indicate a substantial increase in students' professional competence following participation in the OBALM learning process.

The overall findings were consistent with the dimension-level results presented in Table 5, which showed statistically significant improvements across all seven professional competence dimensions. The N-gain values ranged from 0.518 to 0.608, indicating variation in the magnitude of improvement across the targeted competencies.

Alignment of OBALM Activities with Professional Competence

Improvement across the seven competency dimensions aligned with OBALM's sequential structure. Authentic Problem Orientation and Problem Analysis engaged students in identifying instructional needs and analyzing authentic problems. Strategy Design translated these analyses into instructional plans, while Implementation enabled students to apply and adapt their plans through teaching simulations. Feedback refined instructional decisions and responses to learners, while Reflection supported self-evaluation and performance improvement. This sequence integrated analytical, practical, interpersonal, decision-making, and reflective processes within a coherent learning cycle.

Interpretation of the Evaluation Findings

The evaluation findings indicate improvement in students' professional competence following the implementation of

OBALM. Figure 3 illustrates individual changes between pretest and posttest scores, while Table 5 presents the numerical results for the seven targeted professional competence dimensions. All seven dimensions showed statistically significant pretest–posttest improvements ($p < .001$), although the magnitude of improvement varied across dimensions.

Overall, the mean professional competence score increased from 62.18 to 82.94, with a mean difference of 20.76 and an N-gain of 0.55. The pretest–posttest difference was statistically significant, $t(53) = 13.44$, $p < .001$, with a Cohen's dz of 1.83. These findings provide preliminary empirical evidence that students' professional competence improved following the implementation of OBALM.

Overall, the findings suggest that OBALM provided a structured learning process connecting problem analysis, instructional planning, practical implementation, feedback, and reflection. Integrating these activities supported the development of professional competence through authentic instructional practice in vocational teacher preparation.

CONCLUSION

The Outcome-Based Authentic Learning Model (OBALM) integrates outcome-based learning, authentic instructional problems, and performance-based activities through six stages: Authentic Problem Orientation, Problem Analysis, Strategy Design, Implementation, Feedback, and Reflection. Developed using the ADDIE framework, OBALM demonstrated high content validity (Aiken's V = 0.89) and high practicality (85.0%).

Among 54 students, professional competence increased from a mean of 62.18 to 82.94, with an N-gain of 0.55. The pretest–posttest difference was statistically significant, $t(53) = 13.44$, $p < .001$, with a very large effect size (Cohen's $dz = 1.83$). Improvement was observed across the seven targeted competency dimensions, although the magnitude varied across dimensions.

Overall, OBALM provides a structured approach that connects authentic problem analysis, instructional planning, practical implementation, feedback, and reflection to support professional competence development among prospective vocational educators. Overall, OBALM provides a structured learning model for supporting professional competence development among prospective vocational educators. Further research with larger samples, comparison groups, and longer implementation periods is needed to examine its effectiveness and generalizability across vocational education contexts.

DECLARATION OF GENERATIVE AI USAGE IN THE WRITING PROCESS

AI-based tools were used as supplementary tools in the preparation of this manuscript to support the writing process. All research procedures, data analysis, interpretation, and conclusions were conducted and determined by the authors. The manuscript was reviewed and proofread by the authors, who take full responsibility for its accuracy, integrity, and final content.

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