
Towards the alignment of conceptual mastery and teaching practice competence: A case study in vocational education

Hafid Rahmandan^{1*}, Retno Eka Pramitasari², Nahindi Putra Gitama³

¹ Universitas Negeri Gorontalo, Gorontalo, Indonesia

² Universitas Hasyim Asy'ari, Jombang, Indonesia

³ Politeknik Negeri Malang, Malang, Indonesia

*Corresponding Author: hafidrahmandan@ung.ac.id

Submission: 16 June 2026

Revision: 26 June 2026

Accepted: 8 July 2026

Abstract

The alignment between conceptual mastery and teaching practice competence has rarely been examined in small classes through individual pattern analysis, leaving their relationship insufficiently understood. This study aimed to identify the alignment pattern between students' conceptual mastery and teaching practice competence in vocational education. A case study approach with qualitative analysis following the Miles, Huberman, and Saldaña model was employed using participation, assignment, midterm examination, and micro teaching assessment data. The findings revealed that all students with complete data demonstrated a positive alignment pattern, with teaching practice scores consistently exceeding conceptual mastery scores by 7–10 points. These results indicate that conceptual understanding develops into teaching competence through learning that integrates theory with authentic teaching practice. This study also proposes a conceptual model explaining the relationship among conceptual mastery, teaching practice competence, pedagogical implications, assessment improvement, and educational quality in vocational education.

Keywords: Authentic assessment; Case study; Conceptual mastery; Teaching practice competence; Vocational education.

Abstrak

Keselarasan antara penguasaan konsep dan kompetensi praktik mengajar masih jarang dikaji pada kelas berukuran kecil melalui analisis pola individu, sehingga hubungan keduanya belum dipahami secara komprehensif. Penelitian ini bertujuan mengidentifikasi pola keselarasan antara penguasaan konsep dan kompetensi praktik mengajar mahasiswa dalam pembelajaran kejuruan. Penelitian menggunakan pendekatan studi kasus dengan analisis kualitatif model Miles, Huberman, dan Saldaña terhadap data partisipasi, tugas, UTS, dan *micro teaching* (UAS). Hasil penelitian menunjukkan bahwa seluruh mahasiswa dengan data lengkap memiliki pola keselarasan positif, ditandai oleh capaian praktik yang secara konsisten lebih tinggi daripada capaian konseptual dengan selisih 7–10 poin. Temuan ini menunjukkan bahwa penguasaan konsep berkembang menjadi kompetensi praktik melalui pembelajaran yang mengintegrasikan teori dan pengalaman mengajar. Penelitian ini juga menghasilkan model konseptual yang menjelaskan hubungan antara penguasaan konsep, kompetensi praktik, implikasi pedagogis, pengembangan asesmen, dan peningkatan kualitas pendidikan kejuruan.

Kata Kunci: Asesmen autentik; Kompetensi praktik mengajar; Pendidikan kejuruan; Penguasaan konsep; Studi kasus.

Introduction

Vocational education aims to prepare prospective teachers who not only possess strong conceptual mastery but are also capable of applying that knowledge effectively in teaching practice (Ogbuanya & Shodipe, 2022). Mastery of learning theories provides the foundation for students to understand learners' characteristics, select appropriate instructional strategies, and design learning processes aligned with educational objectives (Winget & Persky, 2022). Meanwhile, teaching practice competence reflects students' ability to translate this knowledge into authentic instructional activities (Böttcher-Oschmann et al., 2021). These two competencies should develop in a balanced manner, as the education sector requires graduates who not only understand concepts at an academic level but are also able to manage learning professionally. Therefore, higher education institutions are responsible for ensuring that the learning process integrates the development of conceptual mastery and teaching practice competence as complementary components of teacher preparation.

The Vocational Learning Strategies course is designed to foster both competencies through different forms of assessment (Sotiriadou et al., 2020). Conceptual mastery is evaluated through a Midterm Examination (MTE) consisting of essay questions that assess students' ability to understand learning theories, analyze instructional strategies, and design learning scenarios appropriate to specific instructional content (Barth & Higginbottom, 2021). In contrast, teaching practice competence is assessed through a microteaching examination based on Problem-Based Learning (PBL) and Project-Based Learning (PjBL), requiring students to apply their knowledge in teaching situations that closely resemble authentic classroom settings (Cook, 2021). The distinct characteristics of these two assessments provide an opportunity to examine how conceptual mastery is reflected in teaching practice competence. Consequently, the evaluation results not only indicate students' learning achievement but also provide insight into the alignment between conceptual understanding and practical teaching competence developed throughout the course.

The alignment between conceptual mastery and teaching practice competence represents a critical indicator for evaluating the effectiveness of preservice teacher education. Students with strong conceptual understanding are expected to apply their knowledge consistently during teaching practice (Falloon, 2020). Conversely, a discrepancy between these two forms of achievement may indicate the need to improve instructional strategies or assessment systems. In classes with relatively few students, individual achievement patterns can be examined in greater depth than in larger classes, where analyses generally focus on group averages (Hickendorff et al., 2018). Therefore, examining a small class is not merely a consequence of limited enrollment but rather an opportunity to gain a more comprehensive understanding of how each student's competencies develop over time.

Examining individual achievement patterns also provides insights that are not always apparent from final grades alone. Students with high conceptual mastery do not necessarily demonstrate equivalent teaching practice competence, just as those who perform well in practice may not achieve equally high conceptual outcomes (Miller et al., 2021). This variation suggests that learning evaluation should not focus solely on individual assessment components but also on the relationships among different forms of assessment. Such an approach enables instructors to develop a more comprehensive understanding of students' competency development while identifying individual achievement patterns that require particular attention. These insights are essential for refining instructional strategies and strengthening academic support within teacher education courses.

Numerous studies have examined learning and assessment practices in vocational education. Loveys and Riggs (2019) demonstrated that students' engagement in project-based activities enhances teaching readiness while reinforcing conceptual understanding. Sokhanvar et al. (2021) found that authentic assessment provides a more comprehensive representation of students' competencies than written examinations because it evaluates actual performance. Northey et al. (2018) reported that active participation throughout the learning process contributes positively to academic achievement, whereas Simon (2024) showed that teaching practice plays a pivotal role in shaping prospective teachers' professional readiness. Nevertheless, previous studies have primarily focused on the effectiveness of instructional models or assessment methods, whereas research specifically investigating the alignment between conceptual achievement and teaching practice competence at the individual level, particularly in small-class settings, remains limited.

Against this background, the present study aims to identify the alignment pattern between students' conceptual achievement and teaching practice competence in the Vocational Learning Strategies course within a small-class context. This study is significant because it examines how these two competencies develop simultaneously in individual students rather than merely reporting the outcomes of each assessment separately. The findings are expected to provide instructors with evidence for evaluating the appropriateness of instructional strategies and assessment systems while facilitating the early identification of students requiring additional academic support. Furthermore, this study seeks to enrich the literature on the evaluation of preservice vocational teacher education by introducing an individual pattern analysis perspective that remains relatively underexplored in vocational education research in Indonesia.

Method

This study employed a case study approach to identify the alignment pattern between students' conceptual achievement and teaching practice competence in the Vocational

Learning Strategies course. The study was conducted in one teacher education program at Universitas Negeri Gorontalo during the second semester of the 2025/2026 academic year (Rashid et al., 2019). The participants consisted of six students enrolled in the course. All students were included using a total sampling technique because the population size was identical to the number of enrolled students. The data were obtained from course assessment records, including participation scores, structured assignment scores, Midterm Examination (MTE) scores, and Final Examination (FE) scores. The MTE represented students' conceptual achievement, whereas the FE, administered in the form of a Problem-Based Learning (PBL) and Project-Based Learning (PjBL)-based microteaching video, represented their teaching practice competence.

The data were analyzed using the qualitative data analysis model proposed by Miles, Huberman, and Saldaña (2019), which consists of four stages: data condensation, data display, conclusion drawing, and verification. During the data condensation stage, all assessment records were reviewed and refined to retain only the components relevant to the research objectives, namely the MTE, FE, participation, and assignment scores. The data display stage involved tabulating each student's scores to facilitate the identification of alignment patterns between conceptual achievement and teaching practice competence. Subsequently, conclusions were drawn by interpreting the patterns identified for each participant. These interpretations were then repeatedly verified by comparing all assessment components to ensure a consistent representation of the competency alignment patterns observed within the class.

Results and Discussion

Positive alignment between conceptual mastery and teaching practice competence

The relationship between conceptual mastery and teaching practice competence remains a subject of debate in preservice teacher education. Chew and Cerbin (2021) argued that students who possess a strong understanding of instructional concepts are not necessarily able to apply them effectively in authentic teaching situations. In contrast, de Bruin (2019) suggested that practical teaching experiences not only reinforce but also reflect students' existing conceptual mastery. These contrasting perspectives indicate that conceptual achievement and teaching practice competence do not always develop in parallel across different learning contexts. Therefore, examining both forms of achievement is essential to determine whether conceptual mastery develops in alignment with teaching practice competence or whether discrepancies emerge at the individual level.

Table 1. Summary of students' achievement across all assessment components

Student	Participation (10%)	Assignment (20%)	MTE (30%)	FE (40%)	Final Grade	Letter Grade
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M1	93.75	94.00	80.00	89.00	87.78	A–
M2	100.00	93.00	83.00	90.00	89.50	A–
M3	93.75	94.00	80.00	89.00	87.78	A–
M4	100.00	93.00	80.00	90.00	88.60	A–
M5*	93.75	93.00	82.00	– (0)	52.58	D
M6*	75.00	50.00	75.00	– (0)	40.00	E

Source: Processed by the authors (2026).

Overall, Table 1 reveals two distinct groups of student achievement. The first group consisted of four students who completed all assessment components, providing complete conceptual and practical performance data. This group demonstrated relatively consistent achievement, with participation scores ranging from 93.75 to 100, assignment scores from 93 to 94, MTE scores from 80 to 83, and FE scores from 89 to 90, resulting in a final grade of A–. In contrast, the second group comprised two students who did not complete the practical assessment, leading to substantially lower final grades even though one of them achieved a relatively high conceptual score. These differences indicate that completing the practical assessment is a critical factor in comprehensively representing students' competency development and serves as the basis for identifying the alignment between conceptual mastery and teaching practice competence.

Table 2. Alignment between conceptual mastery and teaching practice competence

Student	MTE (Conceptual Mastery)	FE (Teaching Practice)	Difference	Pattern
M1	80	89	+9	Teaching practice exceeded conceptual mastery
M2	83	90	+7	Teaching practice exceeded conceptual mastery
M3	80	89	+9	Teaching practice exceeded conceptual mastery
M4	80	90	+10	Teaching practice exceeded conceptual mastery

Source: Processed by the authors (2026).

The pattern presented in Table 2 indicates that no student obtained a teaching practice score that was lower than or equal to their conceptual mastery score. Instead, all students demonstrated higher performance in the practical assessment, with score differences ranging from seven to ten points. These findings suggest that students' conceptual mastery extended beyond theoretical understanding and developed into stronger teaching practice competence when applied through microteaching activities. Consequently, the relationship between the two forms of assessment demonstrates a

positive alignment, indicating that conceptual knowledge was consistently translated into teaching practice. The findings also suggest that the learning process provided students with opportunities to transform conceptual understanding into more effective instructional performance.

Table 3. Typology of the alignment between conceptual mastery and teaching practice competence

Typology	Characteristics	Students
Positive alignment	Teaching practice competence consistently exceeded conceptual mastery by 7–10 points	M1, M2, M3, M4
Alignment could not be identified	Conceptual mastery data were available, but teaching practice competence could not be evaluated because the practical assessment was not completed	M5, M6

Source: Synthesized by the authors (2026).

The synthesis presented in Table 3 indicates that the class was predominantly characterized by a pattern of positive alignment between conceptual mastery and teaching practice competence. The four students with complete assessment records consistently demonstrated teaching practice performance that exceeded their conceptual achievement. In contrast, the alignment pattern for the remaining two students could not be identified because they did not complete the practical assessment, preventing a comprehensive examination of the relationship between the two competencies. These findings highlight the importance of assessment completion in providing a complete representation of students' competency development. Furthermore, the identified typology demonstrates that analysis within a small-class context can reveal variations in individual achievement that are often overlooked when evaluation relies solely on class averages.

These findings are consistent with those of Voon et al. (2019), who reported that practical experience strengthens the application of conceptual knowledge in authentic learning environments. Likewise, Bünger et al. (2021) found that performance-based assessment provides a more comprehensive representation of students' competencies than written examinations. However, the present findings differ from those reported by Bhardwaj et al. (2025), who identified discrepancies between conceptual understanding and practical competence among some students. In contrast, the current study found a consistent pattern in which teaching practice competence exceeded conceptual mastery among all students who completed the assessment process. This finding suggests that the instructional approach implemented in the course successfully bridged conceptual understanding and practical application within the context of the class under investigation.

The present study also extends the work of Kahu and Nelson (2018), who emphasized the importance of student engagement throughout the learning process. Students who consistently maintained active participation and completed their assignments

demonstrated stable performance through to the practical assessment. Conversely, students who failed to complete the practical assessment were unable to demonstrate the relationship between conceptual mastery and teaching practice competence despite achieving satisfactory conceptual scores. These findings suggest that evaluating prospective teachers' competencies should not rely solely on conceptual achievement but should also require the completion of practical assessments. Therefore, analyzing a small class provides deeper insights into individual competency development while offering valuable information for improving the evaluation of teaching and learning processes.

Implications of the alignment between conceptual mastery and teaching practice competence in vocational education

The positive alignment identified in this study indicates that conceptual mastery serves as the primary foundation for developing students' teaching practice competence. Students who achieved strong conceptual performance in the Midterm Examination (MTE) were also able to demonstrate high-quality performance during the microteaching assessment. These findings suggest that understanding instructional strategies extends beyond theoretical knowledge and develops into the ability to implement instruction in authentic classroom-like settings. König et al. (2020) reported that pedagogical knowledge provides the foundation for the development of prospective teachers' instructional competence. Similarly, Yang et al. (2020) found that the quality of teaching practice is strongly influenced by the depth of students' conceptual understanding. Therefore, the findings of the present study reinforce the view that conceptual mastery is a fundamental prerequisite for the sustainable development of teaching practice competence.

Nevertheless, this study revealed a particularly noteworthy finding: all students with complete assessment records achieved higher scores in teaching practice than in conceptual mastery, with differences ranging from seven to ten points. This pattern suggests that the microteaching assessment provided students with opportunities to demonstrate competencies that were not fully captured through written examinations. During teaching practice, students were required not only to recall concepts but also to organize learning activities, manage classroom interactions, implement the instructional syntax of Problem-Based Learning (PBL) and Project-Based Learning (PjBL), and make instructional decisions in real time. These findings are consistent with those of Cardozo-Gaibisso et al. (2020), who argued that performance-based assessment provides a more comprehensive representation of students' competencies than conventional assessment methods. However, Hoyer and Hastie (2023) reported that practical competence does not always develop in parallel with conceptual understanding. In contrast, the present study identified a remarkably consistent pattern among all students who completed the assessment process.

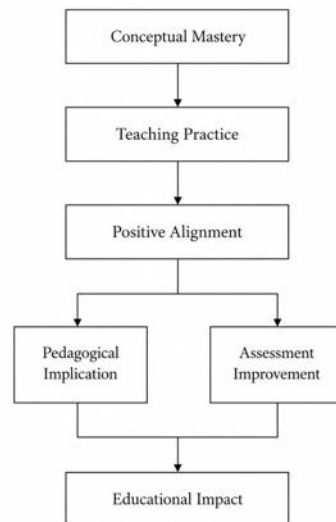


Figure 1. Conceptual model of the alignment between conceptual mastery and teaching practice competence

Source: Developed by the authors based on the findings of this study (2026).

Figure 1 illustrates that the alignment between conceptual mastery and teaching practice competence extends beyond students' academic achievement and generates broader implications for vocational education. The proposed conceptual model demonstrates that conceptual mastery serves as the foundation for developing teaching practice competence, which subsequently evolves into positive alignment, contributing to pedagogical enhancement, assessment improvement, and the overall quality of vocational education. Accordingly, the relationship between these two competencies is not linear but represents a mutually reinforcing cycle of competency development. These findings are consistent with those of Orland-Barak and Wang (2021), who emphasized that preservice teacher education should continuously integrate conceptual knowledge with practical experience. Likewise, Jensen et al. (2018) demonstrated that the effectiveness of teacher education largely depends on the ability to connect theoretical knowledge with practice through authentic learning experiences.

The first implication of these findings concerns the strengthening of instructional strategies in vocational education. Students with strong conceptual mastery consistently demonstrated the ability to apply their knowledge during microteaching activities. This finding indicates that learning processes integrating theoretical instruction with teaching practice accelerate the internalization of pedagogical competence. Colomer et al. (2020) similarly reported that practical experience enables students to develop deeper conceptual understanding through reflection on teaching experiences. Likewise, Fischetti et al. (2022) found that integrating conceptual learning with practical experience enhances prospective teachers' confidence and professional readiness. Therefore, vocational education should be designed as an integrated

process that connects theory, learning experiences, and reflective teaching practice in a continuous manner.

Table 4. Implications of the alignment between conceptual mastery and teaching practice competence in vocational education

Research findings	Pedagogical implications	Assessment implications	Impact on vocational education
Conceptual mastery developed in alignment with teaching practice competence	The integration of theory and practice should be maintained	Conceptual and practical assessments should be implemented complementarily	Strengthening prospective teachers' pedagogical competence
Teaching practice competence exceeded conceptual mastery	Teaching experiences should be expanded through microteaching	Authentic assessment should become an essential component of learning evaluation	Improving students' professional readiness
Assessment completion determined the identification of competency patterns	Continuous academic support should be provided	Completion of all assessment components should be ensured	More accurate evaluation of competency development
Individual pattern analysis generated more detailed information	Students' progress should be monitored individually	Assessment results should be used to improve instructional practices	Enhancing the quality of vocational education

Source: Synthesized by the authors based on the findings of this study (2026).

Based on Table 4, the next implication concerns the development of assessment systems. The findings indicate that combining conceptual and practical assessments provides a more comprehensive representation of students' competencies than relying on a single form of evaluation. Written examinations effectively measure students' conceptual mastery, whereas microteaching provides direct evidence of their ability to apply conceptual knowledge in instructional practice. Koh et al. (2018) similarly emphasized that authentic assessment offers a more representative evaluation of prospective teachers' competencies than conventional assessment methods. In contrast, Rose et al. (2020) continued to position written examinations as the primary indicator of learning success. The present study demonstrates that these two forms of assessment complement one another, resulting in a more comprehensive evaluation of students' competencies.

The presence of students who did not complete the practical assessment also provides important insights into the implementation of learning evaluation. One student demonstrated strong conceptual mastery based on the MTE but could not be evaluated

in terms of teaching practice competence because the microteaching assessment was not completed. This finding suggests that the quality of learning evaluation depends not only on the assessment instruments employed but also on the completeness of the performance evidence collected throughout the assessment process. Demetroulis et al. (2024) similarly argued that performance-based assessment requires full student participation to provide a comprehensive representation of competency development. Likewise, Ajjawi et al. (2020) emphasized that the effectiveness of authentic assessment depends on students' participation throughout every stage of the learning process. Therefore, instructors should ensure that all students complete every assessment component to enable a comprehensive evaluation of their competency development.

The broader implications of these findings are reflected in the professional readiness of prospective vocational teachers. The alignment between conceptual mastery and teaching practice competence indicates that students not only understand instructional strategies theoretically but are also capable of applying them in authentic teaching contexts. This capability provides an essential foundation for entering the teaching profession, which requires a balanced combination of subject-matter expertise, pedagogical competence, and classroom management skills. These findings are consistent with those of Manasia et al. (2019), who reported that integrating theory and practice enhances prospective teachers' professional readiness. Similarly, Bürgener and Barth (2018) found that teaching practice contributes substantially to the continuous development of pedagogical competence. Therefore, the alignment between these two competencies may be regarded as a key indicator in preparing vocational education graduates who are responsive to the evolving demands of the educational profession.

This study also makes a conceptual contribution through the model presented in Figure 1 and the synthesis of implications summarized in Table 4. Unlike most previous studies, which have focused primarily on examining relationships among variables using statistical approaches, the present study adopts a case study perspective that uses individual achievement patterns as the basis for constructing a conceptual model. The proposed model illustrates how conceptual mastery develops into teaching practice competence, leading to positive alignment that contributes to pedagogical enhancement, assessment improvement, and the advancement of vocational education quality. These findings extend the work of Suárez-Eiroa et al. (2019), who discussed the relationship between theory and practice without proposing an integrated conceptual framework. Therefore, the conceptual model and synthesized implications developed in this study provide an initial foundation for future research on learning evaluation in vocational education.

Conclusion

This study demonstrates a positive alignment between conceptual mastery and teaching practice competence among students who completed all assessment components in the Vocational Learning Strategies course. This alignment was reflected in teaching practice scores that consistently exceeded conceptual mastery scores by seven to ten points. The findings indicate that conceptual understanding extends beyond theoretical knowledge and develops into the ability to implement instructional strategies through microteaching. This pattern emerged because the learning process integrated conceptual instruction with authentic teaching experiences and was supported by the continuous use of both conceptual and authentic assessments. These findings suggest that the development of prospective vocational teachers' competencies can be enhanced when learning is designed as an integrated process that systematically connects theory, practice, and assessment.

This study contributes a conceptual model illustrating the alignment between conceptual mastery and teaching practice competence, which may serve as a framework for evaluating learning in preservice vocational teacher education. In addition, the findings demonstrate that individual pattern analysis in a small-class setting provides deeper insights into students' competency development than class-average scores alone. Nevertheless, this study is limited by its small number of participants from a single class, meaning that the findings are context-specific and not intended for broad generalization. Future research is therefore encouraged to involve larger samples across different institutional contexts and to combine individual pattern analysis with quantitative or mixed-methods approaches in order to develop a more comprehensive understanding of the relationship between conceptual mastery and teaching practice competence in vocational education.

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