Journal of Education and Learning (EduLearn)
Vol. 19, No. 2, May 2025, pp. 792~804
ISSN: 2089-9823 DOI: 10.11591/edulearn.v19i2.21930

Assessing pedagogical competence of productive teachers in vocational secondary schools: a mixed approach

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Article Info

Article history:

Received Mar 27, 2024
Revised Aug 6, 2024
Accepted Aug 28, 2024

Keywords:

Mixed approach
Pedagogical competence
Productive teacher
Teacher performance
Vocational secondary school

ABSTRACT

The objective of this study is to evaluate the effectiveness of teachers in implementing pedagogical skills. The present study used a mixed methods approach. The participants in this study consisted of 55 highly effective educators employed in vocational secondary schools. The research data were acquired using effective teacher questionnaires, peer evaluations, observations, and comprehensive interviews. The findings indicated that a majority of highly effective educators possess a strong comprehension of the practical application of pedagogical competence. Nevertheless, a marginal disparity exists between academic knowledge and its practical application in the respective domain. The facilitation and support of teachers in the development of their pedagogic competences is a crucial responsibility of school principals. Effective and well-structured ongoing training is essential to bridge the divide between theoretical concepts and practical application, and to guarantee that educators possess the requisite expertise and understanding to tackle the demands of the current and future educational landscape. Hence, it is imperative to allocate resources towards teacher professional development and ensure the availability of sufficient assets in vocational secondary schools in order to attain educational excellence in Indonesia.

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1. INTRODUCTION

Having a strong pedagogic competence is crucial for any teacher [1], [2]. The topic of pedagogic competence has been thoroughly studied in numerous nations, such as Australia [3], [4], Switzerland [5], [6], Sweden [7], [8], Iran [9], Belgium [10], and India [11], through considerable international study. Pedagogical competence encompasses various aspects such as teaching and learning strategies, planning, management, and a range of skills, abilities, and talents that are specifically cultivated within the pedagogical setting. This primarily involves the utilization of instructional methods to facilitate learning, as well as the implementation of planning practices and the acquisition of disciplinary competencies to effectively comprehend students [12]–[14].

Furthermore, the concept of pedagogic competence places emphasis on the essential information, abilities, and attitudes that are necessary within a specific field of study for effective teaching [1], [15].

Teaching effectively in today's competitive educational landscape requires teachers to possess pedagogical competence, which involves delivering high-quality instruction [16], [17]. When it comes to ensuring quality teaching, it's important to adhere to a standard of competence [18]. In Indonesia, there are four Teacher Competency Standards that encompass pedagogic competence, social competence, professional competence, and personal competence [19]. Assessing a teacher's performance in implementing competency standards is of utmost importance and requires careful attention [20], [21]. In addition, schools conduct assessments of teacher performance to ensure the presence of highly skilled educators [22], [23].

Several studies have provided empirical support for the notion that teachers who possess strong pedagogical competence have the potential to enhance students' academic achievements [24]. Furthermore, pedagogical competence has been found to positively influence teacher performance [21], [25]. Additionally, the educational attainment of teachers has been found to have an impact on their pedagogical competence [26]. Lastly, the role of the school principal in fostering pedagogical competence has been identified as crucial [27]. A study conducted by [28], [29] found that the teacher's knowledge can offer valuable insights about their assignments, school culture, motivation, and the external elements that influence its development. Pedagogical competence in teachers pertains to the aptitude and proficiency of teachers in instructing and directing pupils during the process of learning [14].

In recent years, there has been an increasing focus on research pertaining to the evaluation of teacher proficiency [30], [31]. Nevertheless, there is a scarcity of original research that employs mixed approaches to evaluate the pedagogic competence of effective instructors in vocational secondary schools. Hence, it is imperative to conduct a complete and comprehensive investigation into the evaluation of teacher performance in effectively executing pedagogical competence in order to identify the true attributes of effective teachers in vocational education. The implementation of this research is crucial for vocational high schools, as it serves as a valuable contribution towards improving pedagogical competency in formal secondary education both in Indonesia and globally. Hence, it is of great interest in this study to delve deeper into the pedagogical proficiency of effective educators and distribute the findings to the international research community.

The objective of this study is to evaluate and provide a comprehensive analysis of the implementation of pedagogical competence among instructors in vocational high schools. The aim is to examine the effectiveness of teachers in executing pedagogical competence and determine whether they are successful or unsuccessful in doing so. During the course of the study, numerous issues were identified within the educational institution where the research was conducted. It is imperative for researchers to acquire authentic, precise, and dependable study findings. Within the domain of vocational secondary education, the responsibilities of educators surpass conventional pedagogical approaches, encompassing the provision of practical competencies that are important for students' prospective professional trajectories. Productive teachers with strong pedagogical competence are crucial for the effectiveness of vocational education. Pedagogical competence comprises a wide range of skills, such as instructional design, classroom management, assessment procedures, and the capacity to modify teaching approaches to accommodate the various requirements of learners. Evaluating the pedagogical proficiency of vocational educators is crucial in guaranteeing the standard of education and equipping students with the necessary skills for the labor market.

Evaluating pedagogical competency has many objectives in the vocational education setting. To begin with, it aids in the identification of instructors' areas of proficiency and areas in need of enhancement, hence enabling the implementation of focused professional development efforts. Additionally, it guarantees conformity with educational standards and goals, promoting uniformity and excellence among vocational institutions. Furthermore, it fosters the cultivation of reflective teaching practices by prompting educators to engage in critical evaluation of their instructional methodologies and their influence on student developmental achievements.

2. LITERATURE REVIEW

2.1. Performance assessments

Adlington *et al*. [32] and Arista and Abbas [33] highlight that teacher performance assessment is a method used to evaluate the competence and effectiveness of teachers in the classroom. This process focuses on measuring the quality of teachers based on specific criteria, providing an objective evaluation of their work. Teacher performance assessment seeks to measure the competence of teachers in terms of their ability to facilitate learning, offer guidance, and carry out additional duties that align with the school's objectives.

The promotion of active involvement and provision of feedback are key components of effective assessment procedures in education, as highlighted by [34]–[36]. Teacher work performance encompasses the level of excellence and productivity exhibited by teachers in the execution of their responsibilities, which is impacted by factors such as training, work motivation, and teacher competency. In addition, the evaluation of

teacher performance places emphasis on a methodical methodology that involves the examination, interpretation, and collection of data that can be utilized to comprehend a teacher's attributes and draw inferences or ascertain the degree to which educational goals have been attained.

Teacher performance assessment can be used as a determining measure in implementing policies related to development, ensuring that teachers are prepared to serve students in the learning environment [37]. Based on that, teacher performance assessment is included in measuring the tasks and responsibilities assigned to teachers to enhance the quality of education [38], [39]. Furthermore, teacher performance assessment is also utilized for conducting planned evaluations designed to measure teacher readiness before delivering services in the learning process and as a process to evaluate teacher performance based on specific applicable standard criteria [40], [41].

The assessment of teacher performance in the field of Education in Indonesia is conducted in accordance with the competency specifications mandated by the government. According to Ana *et al*. [42] and Usman and Zahra [43], the four competences under consideration encompass pedagogic competence, personal competence, professional competence, and social competence. Teachers should enhance their pedagogical proficiency in order to provide instruction that is engaging, fun, innovative, and purposeful, employing diverse forms of media [44]–[48].

2.2. Pedagogical competence

Teachers require significant efforts to improve their pedagogical competency, which involve engaging in professional development programs such as training, workshops, and mentorship [49], [50]. Pedagogical competence encompasses the aptitude of educators to proficiently incorporate, devise, and execute instructional and learning methodologies that encompass proficiency in educational technology within pedagogical approaches, while effectively addressing the diverse learning styles of students [51], [52]. According to Flores [53], it is imperative for educators to possess a strong foundation in pedagogical competence across multiple domains, including but not limited to classroom management, comprehension of student attributes, curriculum design, lesson preparation, and effective teacher communication. According to Emiliasari [54], it is common for young educators to demonstrate exceptional proficiency in particular domains, such as information and communication technology (ICT) and the utilization of media in instructional practices. The significance of evaluating teachers' pedagogical ability in order to enhance teacher performance has been emphasized in several studies [55].

According to Azizah *et al*. [26], pedagogic competence encompasses various indicators that must be satisfied, demonstrated through the execution of the learning process, and customized to align with the demands and criteria of performance evaluation. The indicators of teacher pedagogic competence utilized in this study are based on the guidelines outlined in the Minister of Education regulations in Indonesia. These indicators encompass the following: i) proficiency in understanding learner characteristics, ii) mastery of learning theory and principles, iii) curriculum development, iv) implementation of educational learning activities, v) cultivation of learner potential, vi) effective communication with learners, and vii) assessment and evaluation. This study thoroughly examines the evaluation of effective teachers in vocational secondary schools, focusing on pedagogic competence assessed through various indicators. These indicators include the teacher's mastery of learner characteristics, their understanding of educational learning principles and theories, curriculum development, educational learning activities, the development of learner potential, communication between the teacher and learners, and the ability to conduct evaluations and assessments.

3. METHOD

The present study utilizes a mixed methods approach , specifically employing a sequential explanatory design model [56], [57], to evaluate the dimensions of teacher performance criteria pertaining to pedagogic competence. All educators who are involved in this study are highly effective instructors who teach at vocational secondary schools located in Padang, Indonesia. When quantitative and qualitative research methodologies are integrated, the resulting data will possess enhanced depth, comprehensiveness, reliability, validity, and objectivity. Hence, in this study, the procedure of gathering data necessitates the use of comprehensive and dependable equipment. The research use questionnaires, peer assessments, systematic observations, and structured interviews as its collection instruments. The validity and reliability of all instruments have been assessed through rigorous testing [58]. The Pearson correlation was employed to assess the validity of the test, while Cronbach's alpha was utilized to evaluate the reliability. The analysis of the data was performed using the SPSS.

3.1. Participants and the collection of data

The research subjects consisted of productive instructors who held civil servant status and were teaching at a vocational secondary school located in the Padang City. This research utilizes both primary and secondary data sources. The key sources consist of the questionnaire results, peer judgments, observations, and interviews. Secondary data is derived from pre-existing documents provided by external entities. There are a total of 55 research subjects, as indicated in Table 1. Out of these, nine individuals were interviewed. Interviews were carried out with the school principal, the deputy principal, and the departmental chief. Data is gathered through face-to-face interactions with participants, utilizing various methods such as questionnaires, peer assessments, structured observations, and structured interviews. Statistical approaches are employed for the processing of quantitative data, whereas qualitative data validation procedures are utilized for the processing of qualitative data outcomes [59].

Table 1. Respondent(s)

Unit	Department(s)	n
1	Computer and network engineering	5
2	Vehicle engineering	5
3	Metalwork craft	9
4	Woodwork craft	16
5	Textile craft	8
6	Ceramic craft	5
7	Fashion design	7
8	Interview informant	9

3.2. Data analysis

The data was subjected to quantitative analysis by the author, followed by a qualitative description to enhance its comprehensiveness. Respondent conversion value criteria can be seen in Table 2. In a quantitative manner, the author adheres to a series of steps:

- When revising the substance of the questionnaire, the writer promptly initiates communication with the respondent in order to obtain the necessary responses.
- The process of tabulating involves the relocation of responses within the questionnaires.
- Evaluating each questionnaire using identical criteria and methodology.
- Conducting a statistical analysis using percentages to examine the data obtained from the questionnaire.
- The research findings are presented in order to examine the patterns of the frequency distribution and the rate of achievement among the respondents.

Table 2. Respondent conversion value criteria range

No	Answer range (%)	Conversion value
1	90-99	Very good (A)
2	80-89	Good (B)
3	70-79	Enough (C)
4	60-69	Less good (D)
5	< 60	Not good (failed)

The process of analyzing observation data involves several techniques such as editing, tabulating, scoring, percentage analysis, and data descriptions. These techniques are applied to structured observations conducted within the school environment and classrooms, specifically during learning hours in each department. Conversely, the examination of interview data employs interactive models that involve data reduction, data display, and drawing/verifying conclusions.

4. RESULTS AND DISCUSSION

The evaluation of teacher performance in conveying teacher competency standards pertaining to pedagogic proficiency is conducted through the utilization of the following tools. Those are: the evaluation process involves assessing seven sub-indicators: i) mastering learner characteristics, ii) understanding learning theories and teaching principles, iii) curriculum development, iv) educational activities, v) developing learner potential, vi) communication with learners, and vii) assessment and evaluation. These sub-indicators are assessed using questionnaires, peer assessments, observations, and interviews.

4.1. Mastering the characteristics of learners

Comprehensive data were gained through the processing of questionnaires, peer assessments, observations, and interviews. Survey: The respondents achieved an average score of 4.1 out of a maximum score of 5, with 82% falling into the good category in the sub-indicator. Additionally, they underwent peer assessment. The study yielded an average score of 4.0, with a maximum score of 5, indicating the respondents' accomplishment level in the sub-indicator falling inside the good category at 80%. Additionally, the study involved observation. The mean score achieved was 4.1, with a maximum score of 5.0, indicating the respondents' accomplishment level in the sub-indicator. Specifically, 82% of the respondents fell inside the good group. Additionally, an interview was conducted. Positive outcomes were obtained from the interviews conducted with many departments, including the computer engineering and networking department, The Vehicle Engineering Department, The Metal Craft Department, The Woodcraft Department, The Textile Craft Department, The Ceramic Craft Department, and The Boutique Fashion Department. In order to enhance the credibility of the data in the study, the researcher utilized triangulation techniques in the form of conducting interviews with additional informants to corroborate the information obtained from the primary source. The interview with the school revealed that they have achieved a high level of proficiency in mastering characteristics. They possess a strong understanding of the subject matter, but their implementation is deficient. The implementation is currently at a level of approximately 80%, rather than 100%. Findings from the interview conducted with the vice principal responsible for curriculum management: In order to effectively instruct in a vocational secondary school, it is imperative that all teachers possess a comprehensive understanding of the unique attributes and traits of the learners. The educators have achieved a proficiency level of 90% in comprehending the attributes of our students. Otherwise, they will be unable of instructing [60], [61].

4.2. Mastering learning theories and educational teaching principles

Comprehensive data were gained through the processing of questionnaires, peer assessments, observations, and interviews. i) Questionnaire: The average score obtained was 4.2, with a maximum score of 5, indicating that the respondents achieved 84% in the good category. ii) Peer assessment: The average score obtained was 4.0, with a maximum score of 5, indicating that the respondents achieved 80% in the good category. iii) Observation: The average score obtained was 4.1, with a maximum score of 5, indicating that the respondents achieved 82% in the good category. vi) The interviews conducted with several departments, including computer engineering and networking, vehicle engineering, metal craft, woodcraft, textile craft, ceramic craft, and boutique fashion, produced positive outcomes. In order to enhance the credibility of the data in the study, the researcher utilized triangulation methodologies by conducting interviews with additional informants to corroborate the information obtained from the primary source. The findings from the interview with the school indicate that the level of proficiency in learning theories, encompassing concepts and principles of learning, is comparable. However, it is important to note that teachers have not yet achieved complete mastery, with approximately 80% of them having achieved mastery. Findings from the interview conducted with the Vice Principal responsible for curriculum management. In relation to the theories and principles of learning, it is possible to comprehend them. However, upon examining our current teachers, it becomes evident that, on average, they possess certifications that were acquired through rigorous means such as professional teachers' education and training, portfolios, and a rigorous selection process. Therefore, it is evident that teachers who have undergone this procedure have achieved a high level of proficiency in these principles [62].

4.3. Curriculum development

A comprehensive set of data was acquired through the processing of questionnaires, peer evaluations, observations, and interviews, which yielded the following information: i) The questionnaire achieved an average score of 4.5 and a maximum score of 5, indicating that the respondent achieved a rate of success of up to 90% in the sub-indicator for the "good" category. ii) Peer evaluation: achieved a mean score of 4.2 and a maximum score of 5, representing an optimal performance level; the respondent achieved 84% in the sub-indicator, which falls within the "good" category. iii) Observation: the respondent achieved an average score of 4.0 and a maximum score of 5.0, indicating that their rate of achievement for the sub-indicator was 80%, which falls within the acceptable category. and iv) Interviews with the departments of vehicle engineering, computer engineering and networking, textile craft, ceramic craft, boutique fashion, metal craft, and woodcraft all produced favorable results. In order to augment the credibility of the research data, the investigator utilized triangulation methods, which involved conducting interviews with additional sources of information to validate the data obtained from the primary source. The following are the outcomes of the school interview: "Likewise, curriculum development cannot be perfect; it appears that educators can develop no more than 70% of the curriculum." Interview outcomes with the vice principal of curriculum: our vocational secondary school has been utilizing the Kurikulum Tingkat Satuan Pendidikan (KTSP) or education unit level curriculum system

ever since its inception in 2007. Thus, KTSP's principal is an individual appointed by the institution itself. As a result, every educator participates in the development of the KTSP. The KTSP comprises development, learning aids, the lesson plan, and a syllabus to ensure that all instructors can comprehend it. The KTSP is developed by each department in accordance with the needs of the school; 90% of it has been mastered by all instructors.

4.4. Educational learning activities

Comprehensive data were gained through the processing of questionnaires, peer assessments, observations, and interviews. i) Survey: The mean score achieved was 4.2, with an optimal maximum score of 5. The sub-indicator yielded a response achievement level of 84%, which falls under the category of good. Additionally, the peer assessment yielded an average score of 4.1, with an optimal maximum score of 5. The respondent's achievement level within the sub-indicator was 82%, which falls within the category of good. iii) The result of the observation yielded an average score of 4.0, with an optimal maximum score of 5. The respondent's achievement level within the sub-indicator was 80%, which falls within the category of good. The outcomes of the interviews conducted with various departments, including computer engineering and networking, vehicle engineering, metal craft, woodcraft, textile craft, ceramic craft, and boutique fashion, were found to be favorable. In order to enhance the validity of the data in the study, the researcher utilized the triangulation technique, which involved conducting interviews with additional informants to corroborate the information provided by the primary informant [63].

According to the interview with the school, in the context of educational learning, a teacher's role extends beyond being an instructor to that of an educator. This is because it encompasses the development of behavior and character, which is particularly important as we are currently increasing character education. We have achieved some advancement in this regard, however not yet at a level of 100%, possibly about 75%. According to the interview with the Deputy Head of School responsible for curriculum, we have observed that teachers in the workshop consistently start and conclude their job promptly, in order to facilitate learning according to the established regulations. This entails donning functional attire and prepping the equipment beforehand. The regulation of break times is also implemented to safeguard personal safety. Acclimating to such procedures constitutes an integral component of the educational endeavors undertaken by students inside the workshop. It is generally observed that no instructor permits pupils to engage in random labor [64].

4.5. Developing the potential of learners

Comprehending data was gained through the processing of questionnaires, peer assessments, observations, and interviews, resulting in a comprehensive dataset. i) The questionnaire yielded an average score of 4.0, with a peak score of 5.0. The respondents' level of success in the sub-indicators was assessed at 80%, indicating a favorable category rating. ii) Peer assessment: The average score obtained was 3.9, with a maximum score of 5.0. The level of achievement of respondents in the sub-indicators was measured at 7.8%, indicating a good category rating. iii) Observation: The average score obtained was 4.0, with a maximum score of 5.0, and the level of achievement of respondents in the sub-indicators was measured at 80%, also indicating a good category rating. The interview conducted with various departments, including computer engineering and networking, vehicle engineering, metal craft, woodcraft, textile craft, ceramic craft, and boutique fashion, produced positive outcomes. In order to establish the credibility of the data in the study, the researcher utilized the triangulation method by conducting interviews with several informants to corroborate the information relayed by the primary informant. According to the interview conducted with the school, it was seen that certain aspects of learner development exhibit positive progress, while not yet reaching a state of complete excellence. According to the interview with the deputy head of the school responsible for curriculum, we encounter difficulties in developing the potential of our students due to a lack of genuine enthusiasm in their selected majors. It might be argued that a mere 20% or 30% of students have achieved progress in this particular area, indicating that not all students are fully realizing their potential for growth.

4.6. Communication with learners

The acquisition of complete data was facilitated through the processing of questionnaires, peer assessments, observations, and interviews. i) Questionnaire: The average score obtained was 4.3, with a maximum score of 5. The degree of achievement of respondents in the sub-indicators was assessed at 86%, indicating a good category rating. ii) Peer assessment: The average score obtained was 3.9, with a maximum score of 5.0. The level of achievement of respondents in the sub-indicators was measured at 78%, indicating a good category rating. iii) Observation: The average score obtained was 3.9, with a maximum score of 5, and the level of achievement of respondents in the sub-indicators was measured at 78%, also rating it as good. iv) The interview: The findings from the interviews conducted with several departments, including computer engineering and networking, vehicle engineering, metal craft, woodcraft, textile craft, ceramic craft, and boutique fashion, demonstrated favorable outcomes. In order to establish the credibility of the data in the study, the researcher utilized triangulation methods

by conducting interviews with additional informants to corroborate the information obtained from the primary sources. According to the interview with the school, the communication is satisfactory. However, there are still some teachers who maintain a somewhat harsh communication style that does not align with the expected demeanor of a teacher. This is the specific area that need improvement. During the discussion with the vice principal responsible for curriculum, it was revealed that our students can be broadly classified into two groups based on their communication abilities: females and males, that is, on average. Women often possess superior communication abilities, whereas men tend to employ more assertive language. Nevertheless, it is imperative that all students comply with the current regulations [65].

4.7. Assessment and evaluation

Through the utilization of questionnaires, peer assessments, observations, and interviews, a comprehensive dataset was produced. i) Questionnaire: English translation with accurate English grammar: "The average score obtained was 4.1, with an optimal maximum score of 5. The respondents' achievement level in the sub-indicators was 82%, which falls within the good category." ii) Peer evaluation: accurately translated into English with proper English grammar: "The average score achieved was 4.0, with an optimal maximum score of 5.0. The participants' performance in the sub-indicators was 80%, which falls within the category of good. Additionally, the observation yielded an average score of 4.0, with a desired maximum score of 5.0. The degree of achievement among the respondents in the sub-indicators was 80%, which falls within the category of "good." The outcomes of the interviews conducted with various departments, including computer engineering and networking, light vehicle engineering, metal craft, woodcraft, textile craft, ceramic craft, and boutique fashion, were encouraging. In order to assure the accuracy and reliability of the data in the research, the researcher utilized triangulation techniques by conducting interviews with additional informants to corroborate the information obtained from alternative sources. During the discussion with the school, it was said that the assessment and evaluation process is already comprehensive and free from any more problems. According to the vice principal responsible for curriculum, the assessment in schools is already regulated by ISO. Consequently, teachers are mandated to adhere to a prescribed structure for each item, ensuring compliance with the assessment guidelines. Failure to adhere to established procedures indicates a lack of compliance. The teachers adhere to the established assessment protocols, and in the event that any teachers make errors in their assessments, it is necessary to revise or reprocess them.

In the contemporary era of globalization, the significance of education has emerged as a fundamental cornerstone in the cultivation of a nation's human capital. With the aim of enhancing the standard of education, the Ministry of National Education of the Republic of Indonesia has undertaken efforts to implement government regulation number 74 of 2008. One of the provisions outlined in this rule pertains to the incorporation of teacher performance evaluations, which serve multiple purposes, including the augmentation of instructor proficiency. This study employed a mixed-methods approach, including questionnaires, peer assessments, observations, and interviews, to understand the application of this regulation. The objective of this study is to investigate and offer a comprehensive understanding of the implementation of pedagogic competence among effective teachers in vocational high schools.

This study focused on the participants who were highly effective educators in vocational secondary schools. The interviews included principals, vice principals responsible for curriculum management, and department heads. This study took place in a learning environment specifically designed for the seven existing departments. The implementation of the implementation was guided by the established indicators of pedagogic competence. Despite the considerable variation in respondents across different departments, the research findings indicate that none of the respondents shown a substantial rejection towards the implementation of this study. The findings of this research demonstrate a notable disparity in the implementation of pedagogical skills. Despite the commendable average score, there exist a number of problems. Certain educators have seen variations in the application of this skill, particularly when comparing permanent and non-permanent teachers. Furthermore, freshly appointed teachers encounter additional problems, namely in adapting to the varied qualities of their students.

This evidence is consistent with other scholarly works that highlight the significance of pedagogic competence. The significance of this competency in facilitating effective teaching practice has been highlighted by Adlington [32] and Arista and Abbas [33]. In addition, research such as Burke *et al.* [3] and Malva *et al.* [5] recognizes pedagogic competence as the fundamental aspect of teacher professionalism. Teachers must possess pedagogic competence in order to deliver diverse, engaging, innovative, and significant instruction [44]. Prior research [66] has demonstrated that effective assessment procedures in education facilitate student learning through the promotion of active involvement and the provision of feedback.

The recognition of pedagogic ability as a fundamental component of teacher professionalism has been prevalent on a global scale. In alignment with existing scholarly works that highlight the significance of pedagogic competence in teacher effectiveness [2], [3], [5], [7], [67], the findings of this research offer valuable

insights into the implementation of pedagogic competence within vocational high schools. It is crucial to bear in mind that pedagogic competency is intricately linked to the capacity to effectively instruct and possess a profound comprehension of both the pupils and the subjects being taught [1], [68]. A study conducted by Hairudin *et al*. [69] revealed that principals have a pivotal role in fostering pedagogic competence.

Pedagogic competence is recognized as one of the four established standards for teacher competency in Indonesia. This study reveals that teachers from different departments had a commendable level of proficiency in comprehending pupils and learning theories, as well as educational learning principles. The average scores obtained by these teachers ranged from 4.0 to 4.2 out of the maximum possible score. Upon conducting interviews with representatives from the seven departments, it became evident that there exists a degree of variability in the perceptions and implementation of pedagogic competence among teachers. While the majority of participants expressed favorable assessments, a subset highlighted the distinctions between permanent and non-permanent (honorary) educators, as well as the necessity for recently appointed teachers to enhance their ability to accommodate the unique attributes of their students.

The research findings suggest that the level of pedagogic competency is satisfactory. The findings of this research are consistent with prior studies that have been examined in a wider scope. It is commonly acknowledged that pedagogic competence, which encompasses the comprehension of student characteristics and learning theories, is a fundamental component of teacher professionalism. Nevertheless, the inclusion of this skill, as mentioned by one of the interview participants, underscores the need of not just having knowledge but also skillfully utilizing it in everyday situations [16], [18]. In light of this, it is imperative to acknowledge that although numerous educators demonstrate commendable pedagogical proficiency, certain domains necessitate further focus, particularly in the application of competence inside the educational sphere. Furthermore, the diversity in replies from participants in seven distinct departments highlights the significance of a customized strategy to continuous professional growth, taking into account the particular requirements of teachers in different departments and their career phases.

The findings of this study validate and contribute to the current body of knowledge on instructors' pedagogical proficiency. An in-depth comprehension of student attributes was identified as a fundamental element of pedagogic proficiency, aligning with the perspectives of Moreira *et al*. [12], who link pedagogic competence with instructional and learning methodologies, organization, and administration. Moreover, the results of this study validate the significance of pedagogic competency in augmenting students' educational achievements. This finding is consistent with other scholarly investigations [26], which suggest that educators possessing strong pedagogical skills have the potential to enhance students' scholastic performance. This finding illustrates the significance of teachers' pedagogic skills in facilitating students' academic achievement.

Furthermore, the findings of this study underscore the significance of educational institutions in fostering the pedagogical proficiency of educators, as indicated by the research conducted by Hairudin *et al*. [69]. The significance of leadership in facilitating the professional growth of teachers becomes evident, emphasizing the crucial function of assisting teachers in improving the caliber of their instruction. This conversation highlights the notable difficulties associated with the implementation of learning theories and principles of educative instruction. While teachers may possess knowledge and comprehension of theories, there exist obstacles to their practical application in their daily teaching. The literature by Bastian *et al*. [31] and Bird and Charteris [70] highlights the significance of addressing the potential disparity between theoretical concepts and their practical application.

The research places significant emphasis on teacher performance assessment, drawing upon the scholarly works of Adlington *et al*. [32]. These authors define performance assessment as a means of evaluating the proficiency and efficacy of educators within the educational setting. By acquiring a profound comprehension of teacher performance, we can gain a more comprehensive understanding of how to improve the caliber of instruction and knowledge acquisition in the classroom. Further measures are required to enhance instructors' pedagogical proficiency. The implementation of continuous education and training strategies could potentially serve as a viable solution for addressing the difficulties associated with enhancing teachers' pedagogic competency [44].

This research makes a substantial contribution to the educational literature by thoroughly examining teachers' pedagogic competence, offering a more precise understanding of how it is applied in the classroom, and providing guidance for educational decision-makers to enhance teachers' professional growth. In the Indonesian setting, instructors require assistance in effectively implementing this competence. One drawback of this study is its exclusive emphasis on vocational high schools. Consequently, the results may not be entirely applicable to other educational settings in Indonesia. Based on the aforementioned findings and constraints, it is recommended that a practical approach be taken to establish continuous training initiatives for educators, particularly those who have recently assumed their roles, in order to augment their pedagogical proficiency. Subsequent investigations could prioritize the identification of obstacles encountered by teachers when implementing pedagogical competency and the development of efficient approaches to surmount them. This research offers valuable insights into the implementation of pedagogic competence in secondary schools in

Indonesia. Despite the presence of promising potential, there is still need for further improvement, particularly in the practical application of pedagogical competency information. Hence, providing assistance for the continued growth and advancement of instructors is the subsequent crucial measure in enhancing the standard of education in Indonesia.

5. CONCLUSION

This research on the assessment of pedagogic competence of productive teachers in vocational secondary schools highlights the importance of understanding and implementing adequate pedagogic competence to enhance the quality of education. The research findings indicate that most productive teachers have a good understanding of implementing pedagogic competence. However, there needs to be more theoretical knowledge and its implementation in the field. The school principal plays a crucial role in facilitating and supporting teachers in developing their pedagogic competence. Teacher performance assessment, which reflects their effectiveness and competence in the classroom, is identified as a vital tool for promoting student learning and elevating educational standards. Continuous training and well-designed educational approaches are required to bridge the gap between theory and practice and to ensure that teachers have the necessary skills and knowledge to face challenges in the present and future educational environments. Data triangulation through various sources validates the research findings and affirms the importance of pedagogic competence in improving learning outcomes. Therefore, investment in teachers' professional development and adequate resources in vocational high schools is essential to achieve educational excellence in Indonesia.

ACKNOWLEDGEMENTS

The authors would like to thank the Balai Pembiayaan Pendidikan Tinggi (BPPT), Pusat Layanan Pembiayaan Pendidikan (Puslapdik), Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia and Lembaga Pengelola Dana Pendidikan (Endowment Fund for Education Agency) for funding this research with contract number: 02133/BPPT/BPI.06/9/2023.We thank anonymous reviewer for their valuable feedback on this paper. This article is part of the ongoing doctoral study (DS, MAH, and MH) at the Graduate School of Technology and Vocational Education (TVE) at Universitas Negeri Yogyakarta (UNY), Indonesia.

REFERENCES

[1] A. V. Fakhrutdinova, M. R. Ziganshina, V. A. Mendelson, and L. G. Chumarova, "Pedagogical competence of the high school teacher," *International Journal of Higher Education*, vol. 9, no. 8, pp. 84–89, 2020, doi: 10.5430/ijhe.v9n8p84.

[2] Ä. Leijen, L. Malva, M. Pedaste, and R. Mikser, "What constitutes teachers' general pedagogical knowledge and how it can be assessed: a literature review," *Teachers and Teaching*, vol. 28, no. 2, pp. 206–225, Feb. 2022, 10.1080/13540602.2022.2062710.

[3] P. F. Burke, S. Schuck, P. Aubusson, M. Kearney, and B. Frischknecht, "Exploring teacher pedagogy, stages of concern and accessibility as determinants of technology adoption," *Technology, Pedagogy and Education*, vol. 27, no. 2, pp. 149–163, Mar. 2018, doi: 10.1080/1475939X.2017.1387602.

[4] F. Reichert, D. Lange, and L. Chow, "Educational beliefs matter for classroom instruction: a comparative analysis of teachers' beliefs about the aims of civic education," *Teaching and Teacher Education*, vol. 98, pp. 1–13, 2020, doi: 10.1016/j.tate.2020.103248.

[5] L. Malva, Ä. Leijen, and F. Arcidiacono, "Identifying teachers' general pedagogical knowledge: a video stimulated recall study," *Educational Studies*, vol. 49, no. 4, pp. 588–613, Jul. 2023, doi: 10.1080/03055698.2021.1873738.

[6] N. Fancourt, "The educational competence of the European Court of Human Rights: judicial pedagogies of religious symbols in classrooms," *Oxford Review of Education*, vol. 48, no. 2, pp. 131–147, Mar. 2022, doi: 10.1080/03054985.2021.1933406.

[7] C. Player-Koro and L. Sjöberg, "Becoming a primary education teacher - pedagogic discourses in the teacher education program's examination practice," *Nordic Journal of Studies in Educational Policy*, vol. 4, no. 2, pp. 78–91, May 2018, doi: 10.1080/20020317.2018.1474702.

[8] S. Carlsson and S. Willermark, "Teaching here and now but for the future: vocational teachers' perspective on teaching in flux," *Vocations and Learning*, vol. 16, no. 3, pp. 443–457, Dec. 2023, doi: 10.1007/S12186-023-09324-Z/FIGURES/1.

[9] S. Zolfaghari, H. Ashraf, H. Khodabakhshzadeh, and G. Zareian, "Examining learner-centred pedagogy and assessment practices in teacher training program at Universities of Iran: investigating teachers' and students' attitudes," *Teaching English Language*, vol. 16, no. 1, pp. 235–259, Jan. 2022, doi: 10.22132/TEL.2022.151498.

[10] M. Evens, J. Elen, C. Larmuseau, and F. Depaepe, "Promoting the development of teacher professional knowledge: integrating content and pedagogy in teacher education," *Teaching and Teacher Education*, vol. 75, pp. 244–258, Oct. 2018, doi: 10.1016/J.TATE.2018.07.001.

[11] C. Kumar Sahana, "Pedagogical competence: quality education for future introduction," *Journal Homepage: International Journal of Research in Social Sciences*, vol. 8, pp. 2249–2496, 2018.

[12] M. A. Moreira, B. R. Arcas, T. G. Sánchez, R. B. García, M. J. R. Melero, N. B. Cunha, M. A. Viana, and M. E. Almeida, "Teachers' pedagogical competences in higher education: a systematic literature review," *Journal of University Teaching & Learning Practice*, vol. 20, no. 1, pp. 90–123, Jan. 2023, doi: 10.53761/1.20.01.07.

[13] I. A. Darmawan, N. E. Budiyanta, D. Aribowo, M. Fatkhurokhman, M. A. Hamid, Y. Guntara, and S. Nurhaji, "Electricity course on vocational training centers: a contribution to unemployment management," *Journal of Physics: Conference Series*, vol. 1456, no. 1, p. 012048, Jan. 2020, doi: 10.1088/1742-6596/1456/1/012048.
[14] F. L. Fabelico and B. T. Afalla, "Revisiting the curriculum: Insights from pedagogical competence and academic performance of preservice teachers," *Cogent Education*, vol. 10, no. 2, p. 2272597, Dec. 2023, doi: 10.1080/2331186X.2023.2272597.
[15] M. A. Hamid, E. Permata, D. Aribowo, I. A. Darmawan, M. Nurtanto, and S. Laraswati, "Development of cooperative learning based electric circuit kit trainer for basic electrical and electronics practice," in *Journal of Physics: Conference Series*, 2020, vol. 1456, no. 1.
[16] P. Thomsen, M. Leenen-Young, S. Naepi, K. Müller, S. Manuela, S. Sisifa, and T. Baice, "In our own words: pacific early career academics (PECA) and pacific knowledges in higher education pedagogical praxis," *Higher Education Research & Development*, vol. 40, no. 1, pp. 49–62, Jan. 2021, doi: 10.1080/07294360.2020.1852188.
[17] M. Leenen-Young, S. Naepi, P. S. Thomsen, D. T. M. Fa'avae, M. Keil, and J. Matapo, "'Pillars of the colonial institution are like a knowledge prison'': the significance of decolonizing knowledge and pedagogical practice for Pacific early career academics in higher education,'" *Teaching in Higher Education*, vol. 26, no. 7–8, pp. 986–1001, Nov. 2021, doi: 10.1080/13562517.2021.1928062.
[18] N. Nikolayeva, N. Mikhaylov, S. Semenova, E. Mikhaylova, and Y. Derevleva, "Professional standards for training of teachers to ensure the quality of education in a city," *SHS Web of Conferences*, vol. 98, p. 03014, 2021, doi: 10.1051/SHSCONF/20219803014.
[19] M. Nurtanto, P. Sudira, and H. Sofyan, "A bibliometric analysis of teacher professional identity (TPI) for vocational education from 2004 to 2021," *AIP Conference Proceedings*, vol. 2671, no. March, 2023, doi: 10.1063/5.0114242.
[20] B. R. Werang, I. M. Suarjana, K. K. Dewi, and S. I. Asaloei, "Indonesian language teachers' teaching performance and students' learning outcomes," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 12, no. 3, pp. 1271–1277, Sep. 2023, doi: 10.11591/ijere.v12i3.24949.
[21] N. Kanya, A. B. Fathoni, and Z. Ramdani, "Factors affecting teacher performance," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 10, no. 4, pp. 1462–1468, Dec. 2021, doi: 10.11591/ijere.v10i4.21693.
[22] H. C. Jeong and W. Y. So, "Difficulties of online physical education classes in middle and high school and an efficient operation plan to address them," *International Journal of Environmental Research and Public Health 2020, Vol. 17, Page 7279*, vol. 17, no. 19, p. 7279, Oct. 2020, doi: 10.3390/IJERPH17197279.
[23] M. S. Amrulloh and A. Galushasti, "Professional development teacher to improve skills of science process and creativity of learners," *Journal of Education and Learning (EduLearn)*, vol. 16, no. 3, pp. 299–307, Aug. 2022, doi: 10.11591/edulearn.v16i3.20404.
[24] W. M. Channa and Z. Sahito, "Effect of pedagogical competences of English language teachers on their students' academic achievement: a qualitative study," *Theory and Practice in Language Studies*, vol. 12, no. 11, pp. 2274–2281, Nov. 2022, doi: 10.17507/TPLS.1211.06.
[25] G. M. Geletu, "The effects of teachers' professional and pedagogical competencies on implementing cooperative learning and enhancing students' learning engagement and outcomes in science: Practices and changes," *Cogent Education*, vol. 9, no. 1, Dec. 2022, doi: 10.1080/2331186X.2022.2153434.
[26] N. Azizah, Mumpuniarti, S. Rudiyati, and D. Evans, "Elementary teachers' pedagogical competencies in supporting students with learning difficulties," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 13, no. 2, pp. 723–730, Apr. 2024, doi: 10.11591/IJERE.V13I2.26345.
[27] L. Saptono, "The effect of personal competence and pedagogical-didactical competence of high school economics teachers in media literacy on teaching effectiveness," *International Journal of Media and Information Literacy. 2022*, vol. 7, no. 2, 2022, doi: 10.13187/ijmil.2022.2.545.
[28] E. E. van Dijk, J. Geertsema, M. F. van der Schaaf, J. van Tartwijk, and M. Kluijtmans, "Connecting academics' disciplinary knowledge to their professional development as university teachers: a conceptual analysis of teacher expertise and teacher knowledge," *Higher Education*, vol. 86, no. 4, pp. 969–984, Oct. 2023, doi: 10.1007/S10734-022-00953-2/METRICS.
[29] A. S. Mayeaux and D. F. Olivier, "Professional kinship using social media tools: Bridging and bonding to develop teacher expertise," *Journal of Applied Learning and Teaching*, vol. 5, no. Sp. Iss. 1, pp. 27–34, Feb. 2022, doi: 10.37074/JALT.2022.5.S1.3.
[30] J. Kolman, "Teacher performance assessments as policy: perspectives from New York State," *The New Educator*, vol. 18, no. 4, pp. 325–327, Oct. 2022, doi: 10.1080/1547688X.2022.2145072.
[31] K. C. Bastian, G. T. Henry, Y. Pan, and D. Lys, "Teacher candidate performance assessments: Local scoring and implications for teacher preparation program improvement," *Teaching and Teacher Education*, vol. 59, pp. 1–12, Oct. 2016, doi: 10.1016/J.TATE.2016.05.008.
[32] R. Adlington, J. Charteris, and A. Nye, "Formative performance assessment in preservice teacher education – working through the black boxes," *Asia-Pacific Journal of Teacher Education*, vol. 51, no. 1, pp. 90–104, Jan. 2023, doi: 10.1080/1359866X.2022.2162848.
[33] A. Arista and B. S. Abbas, "Using the UTAUT2 model to explain teacher acceptance of work performance assessment system," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 4, pp. 2200–2208, Dec. 2022, doi: 10.11591/IJERE.V11I4.22561.
[34] I. Finefter-Rosenbluh, T. Ryan, and M. Barnes, "The impact of student perception surveys on teachers' practice: Teacher resistance and struggle in student voice-based assessment initiatives of effective teaching," *Teaching and Teacher Education*, vol. 106, p. 103436, Oct. 2021, doi: 10.1016/J.TATE.2021.103436.
[35] M. Sofyan, M. Barnes, and I. Finefter-Rosenbluh, "Fair assessment as an aspect of effective teaching: teachers' and students' perceptions of and positioning within assessment practices in Indonesian vocational higher education," *Journal of Vocational Education & Training*, vol. 76, no. 4, pp. 795–817, Aug. 2024, doi: 10.1080/13636820.2022.2098170.
[36] P. H. Yen, N. A. Thi, L. T. Thao, P. T. Thuy, N. H. Tra, and H. T. A. Thu, "Assessment strategies in outcome-based education: preferences and practices among university lecturers in Vietnam," *International Journal of Learning, Teaching and Educational Research*, vol. 22, no. 10, pp. 416–432, 2023, doi: 10.26803/IJLTER.22.10.23.
[37] N. Spina, R. Spooner-Lane, J. Mascadri, E. Briant, N. Spina, R. Spooner-Lane, J. Mascadri, and E. Briant, "Enquiring into a teacher performance assessment: towards intelligent professional responsibility in initial teacher education," *London Review of Education*, vol. 20, no. 1, p. 47, Dec. 2022, doi: 10.14324/LRE.20.1.47.
[38] S. D. Sugiyanti, R. Widayanti, M. B. Ulum, G. Firmansyah, and A. H. Azizah, "Design dashboard monitoring teacher performance assessment at Cinta Kasih Tzu Chi High School," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 1, pp. 46–56, Sep. 2022, doi: 10.34306/ITSDI.V4I1.569.

[39] N. Kholifah, M. Nurtanto, G. Kassymova, H. Subakti, and M. A. Hamid, "The influence of work motivation, organization culture, soft skills competence on the innovative work behavior: evidence from a maritime lecturers in Indonesia," *Journal of Education and Learning (EduLearn)*, vol. 18, no. 4, 2024, doi: 10.11591/edulearn.v18i4.21018.
[40] S. A. Lyness, K. Peterson, and K. Yates, "Low inter-rater reliability of a high stakes performance assessment of teacher candidates," *Education Sciences 2021, Vol. 11, Page 648*, vol. 11, no. 10, p. 648, Oct. 2021, doi: 10.3390/EDUCSCI11100648.
[41] C. Parkes, S. L. Holden, N. O'Leary, and J. Brunsdon, "'I can help them become better teachers, but I can't help them with educative teacher performance assessment': cooperating teachers' knowledge and experience of the educative teacher performance assessment in physical and health education," *Percept Mot Skills.*, vol. 129, no. 4, pp. 1283–1301, May 2022, doi: doi: 10.1177/00315125221095933.
[42] A. Ana, I. Kustiawan, E. Ahman, S. Zakaria, M. Muktiarni, V. Dwiyanti, S. Saripudin, and I. Kahoerunnisa, "Defining vocational teacher competencies in industry 4.0 from the perspective of policymakers," *Journal of Engineering Education Transformations*, vol. 34, no. Special Issue, pp. 159–167, 2020, doi: 10.16920/JEET/2020/V34I0/157884.
[43] A. Usman and S. Zahra, "Analysis of competency of educators in Khoirul Ummah School Malang from the perspective of Law Number 14 of 2005 about Teachers and Lecturers," *Didaktika Religia*, vol. 8, no. 1, pp. 117–137, Jun. 2020, doi: 10.30762/DIDAKTIKA.V8I1.1536.
[44] W. W. Susilowati and U. A. Dahlan, "Teacher competence in implementing higher-order thinking skills oriented learning in elementary schools," *Premiere Educandum : Jurnal Pendidikan Dasar dan Pembelajaran*, vol. 11, no. 1, pp. 1–14, Jun. 2021, doi: 10.25273/PE.V11I1.7762.
[45] M. A. Hamid, P. Sudira, M. B. Triyono, M. A. Rizqillah, I. Irwanto, D. Setiawan, D. Desmira, M. Martias, M. Hakiki, T. S. Subramaniam, and A. Abdurrahman, "Variable frequency drive trainer kits for electronic control system subjects in vocational secondary schools," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 13, no. 5, p. 3036, Oct. 2024, doi: 10.11591/ijere.v13i5.29333.
[46] M. A. Hamid, S. A. Rahman, I. A. Darmawan, M. Fatkhurrokhman, and M. Nurtanto, "Performance efficiency of virtual laboratory based on Unity 3D and Blender during the Covid-19 pandemic," *Journal of Physics: Conference Series*, vol. 2111, no. 1, 2021, doi: 10.1088/1742-6596/2111/1/012054.
[47] A. Rahmat, A. R. Nugroho, A. Saregar, M. A. Hamid, M. R. N. Prastyo, and A. Mutolib, "Small hydropower potential of rivers in Sukabumi Regency, West Java, Indonesia," *Journal of Physics: Conference Series*, vol. 1155, p. 012041, Feb. 2019, doi: 10.1088/1742-6596/1155/1/012041.
[48] Desmira, M. A. Hamid, N. A. Bakar, M. Nurtanto, and Sunardi, "A smart traffic light using a microcontroller based on the fuzzy logic," *IAES International Journal of Artificial Intelligence*, vol. 11, no. 3, pp. 809–818, 2022, doi: 10.11591/ijai.v11.i3.pp809-818.
[49] M. G. Sergeeva, L. N. Kodaneva, A. E. Islamov, E. S. Kornakova, A. V. Serebrennikova, I. V. Panko, and T. V. Avdeeva, "The development of teachers pedagogical competence in the conditions of professional educational organization," *Humanities & Social Sciences Reviews*, vol. 7, no. 4, pp. 827–832, Oct. 2019, doi: 10.18510/HSSR.2019.74109.
[50] N. Kholifah, H. Sofyan, P. Pardjono, P. Sudira, and M. Nurtanto, "Explicating the experience of beginner vocational teachers," *TEM Journal*, vol. 10, no. 2, pp. 719–723, 2021, doi: 10.18421/TEM102-28.
[51] L. L. Mariscal, M. R. Albarracin, F. D. Mobo, and A. L. Cutillas, "Pedagogical competence towards technology-driven instruction on basic education," *International Journal of Multidisciplinary: Applied Business and Education Research*, vol. 4, no. 5, pp. 1567–1580, May 2023, doi: 10.11594/IJMABER.04.05.18.
[52] H. Hidayatullah, S. Syafi, and A. Qomariyah, "Vocational high school teachers' pedagogical competence in teaching English," *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP*, vol. 9, no. 2, pp. 217–223, Dec. 2022, doi: 10.33394/JO-ELT.V9I2.6641.
[53] M. A. Flores, "Learning to teach: knowledge, competences and support in initial teacher education and in the early years of teaching," *European Journal of Teacher Education*, vol. 43, no. 2, pp. 127–130, Mar. 2020, doi: 10.1080/02619768.2020.1733828.
[54] R. N. Emiliasari, "An analysis of teachersâ€™ pedagogical competence in lesson study of mgmp smp majalengka," *Eltin Journal: Journal of English Language Teaching in Indonesia*, vol. 6, no. 1, pp. 22–33, Apr. 2018, doi: 10.22460/ELTIN.V6I1.P22-33.
[55] I. A. K. Y. B. Witari and I. B. S. Manuaba, "Correlation between pedagogical competence and personality to teacher performance," in *Proceedings of the 2nd International Conference on Technology and Educational Science (ICTES 2020)*, 2021, vol. 540, pp. 405–412.
[56] M. M. Asad, A. Naz, P. Churi, A. J. M. Guerrero, and A. A. Salameh, "Mix method approach of measuring VR as a pedagogical tool to enhance experimental learning: motivation from literature survey of previous study," *Education Research International*, vol. 2022, 2022, doi: 10.1155/2022/8262304.
[57] J. W. Creswell, M. D. Fetters, V. L. Plano Clark, and A. Morales, "Mixed methods intervention trials," *Mixed Methods Research for Nursing and the Health Sciences*, pp. 159–180, Oct. 2009, doi: 10.1002/9781444316490.CH9.
[58] J. W. Creswell and D. L. Miller, "Determining validity in qualitative inquiry," *Theory into Practice*, vol. 39, no. 3, pp. 124–130, 2000, doi: 10.1207/S15430421TIP3903._
[59] W. Olsen, "Systematic mixed-methods research for social scientists," *Systematic Mixed-Methods Research for Social Scientists*, pp. 1–245, Jan. 2022, doi: 10.1007/978-3-030-93148-3/COVER.
[60] E. P. Galloway, L. B. Hsin, B. Jensen, M. D. LaRusso, M. K. Hong, and K. Mankowski, "Examining the role of learner and classroom characteristics in the later language learning of Latinx youth and their classmates," *Journal of Applied Developmental Psychology*, vol. 77, p. 101353, Nov. 2021, doi: 10.1016/J.APPDEV.2021.101353.
[61] A. C. M. Yang and H. Ogata, "Evaluation and modeling of students' persistence and wheel-spinning propensities in formative assessments," *Smart Learning Environments*, vol. 10, no. 1, pp. 1–15, Dec. 2023, doi: 10.1186/S40561-023-00283-5/TABLES/4.
[62] P. Chen, A. Goncharova, J. Li, and D. Frommberger, "Competence-based approaches in curricula: a comparative analysis of Russian and Chinese commercial vocational education and training programmes," Research in Comparative and International Education, vol. 19, no. 1, pp. 63–90, Dec. 2023, doi: 10.1177/17454999231219840.
[63] I. Bakkenes, J. D. Vermunt, and T. Wubbels, "Teacher learning in the context of educational innovation: learning activities and learning outcomes of experienced teachers," *Learning and Instruction*, vol. 20, no. 6, pp. 533–548, Dec. 2010, doi: 10.1016/J.LEARNINSTRUC.2009.09.001.
[64] V. I. Toktarova, "Pedagogical management of learning activities of students in the electronic educational environment of the university: a differentiated approach," *International Education Studies*, vol. 8, no. 5, p. p205, Apr. 2015, doi: 10.5539/IES.V8N5P205.
[65] M. Van Nuland, G. Thijs, P. Van Royen, W. Van den Noortgate, and J. Goedhuys, "Vocational trainees' views and experiences regarding the learning and teaching of communication skills in general practice," *Patient Education and Counseling*, vol. 78, no. 1, pp. 65–71, Jan. 2010, doi: 10.1016/J.PEC.2009.05.002.

[66] P. E. Rawlusyk, "Assessment in higher education and student learning.," *Journal of Instructional Pedagogies*, vol. 21, p. 1, Oct. 2018.
[67] N. Kholifah, M. S. Kurdi, M. Nurtanto, F. Mutohhari, M. Fawaid, and T. S. Subramaniam, "The role of teacher self-efficacy on the instructional quality in 21st century: a study on vocational teachers, Indonesia," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 12, no. 2, pp. 998–1006, Jun. 2023, doi: 10.11591/IJERE.V12I2.23949.
[68] M. Nurtanto, P. Sudira, H. Sofyan, N. Kholifah, and T. Triyanto, "Professional identity of vocational teachers in the 21st century in Indonesia," *Journal of Engineering Education Transformations*, vol. 35, no. 3, pp. 30–36, 2022, doi: 10.16920/jeet/2022/v35i3/22085.
[69] H. Hairudin, A. Suriansyah, and M. Saleh, "Principal's strategy in developing teacher pedagogic and professional competency to improve education quality (multi-case ttudy at SMAN 1 Lampihong and SMAN 1 Tebing Tinggi)," *International Journal of Social Science and Human Research*, vol. 06, no. 06, Jun. 2023, doi: 10.47191/IJSSHR/V6-I6-31.
[70] J. Bird and J. Charteris, "Teacher performance assessments in the early childhood sector: wicked problems of regulation," *Asia-Pacific Journal of Teacher Education*, vol. 49, no. 5, pp. 503–516, Oct. 2021, doi: 10.1080/1359866X.2020.1843596.

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