Volume 18 Number 1 (2026)
January-June 2026
Page: 563-576

E-ISSN: 2656-9779
P-ISSN: 1907-6355
DOI: 10.37680/qalamuna.v18i1.8729

QALAMUNA
JURNAL PENDIDIKAN, SOSIAL, DAN AGAMA

The Importance of Understanding Learning Models for Prospective Agriculture Vocational High School Teachers

Dwi Haryanta [1], Pramita Laksitarahmi Isrianto [2], Marmi [3], Sunaryo [4], Endrayana Putut Laksminto Emanuel [5]

[1] Universitas Wijaya Kusuma Surabaya; Indonesia; dwi_haryanta@uwks.ac.id
[2] Universitas Wijaya Kusuma Surabaya; Indonesia; pramitasetiawan_fbs@uwks.ac.id
[3] Universitas Wijaya Kusuma Surabaya; Indonesia; marmi_fbs@uwks.ac.id
[4] Universitas Wijaya Kusuma Surabaya; Indonesia; sunaryo_fbs@uwks.ac.id
[5] Universitas Wijaya Kusuma Surabaya; Indonesia; endrayana_fbs@uwks.ac.id

Received: 16/12/2025 Revised: 13/03/2026 Accepted: 16/04/2026

Abstract

This study aims to examine the ability of teacher professional program students to identify instructional problems and formulate effective solutions through classroom action research, and develop a reflective learning model based on classroom action research findings to support teachers' professional development. This qualitative research design adopted a transcendental phenomenological approach and involved 17 prospective Vocational High School (VHS) teachers participating in the Teaching Practicum Program in Purwosari, Pasuruan, and Gondang, Nganjuk. They were selected purposively based on data accessibility. Data were collected through classroom observations and semi-structured interviews and analyzed to identify patterns in problem identification, instructional decision-making, and the effectiveness of learning models implemented. The results showed that teachers improved their teaching practices by implementing student-centered strategies, such as project-based and problem-based learning, as well as other context-responsive approaches. The development of adaptive learning models that address both teacher and student needs led to improvements in average student achievement and higher completion rates of learning materials. The findings suggest that instructional quality in VHS, particularly in agribusiness, can be strengthened through the systematic application of reflective learning models grounded in classroom action research. Teachers should emphasize the development of classroom action research competencies to enable prospective teachers to diagnose instructional challenges and implement evidence-based solutions effectively.

Keywords Classroom Action Research; Learning Effectiveness; Learning Models

Corresponding Author
Dwi Haryanta
Universitas Wijaya Kusuma Surabaya; Indonesia; dwi_haryanta@uwks.ac.id

1. INTRODUCTION

The gap between the quality of agricultural vocational high school graduates and the workforce standards required by business and industry can be addressed, among others, by promoting collaboration between educational institutions and industry, integrating work-related skills and competencies into the curriculum as references for defining learning outcomes, and developing

appropriate instructional models and methods(Chewachong & Hayward, 2021). Efforts to improve the quality of agricultural education graduates should begin by fostering students' interest and motivation to pursue careers in agriculture (Haryanta et al., 2025). Vocational schools are expected to provide students with opportunities to develop job-related skills, obtain competency certification, and earn credits toward vocational qualifications (Rice et al., 2025).

The transformation of agricultural vocational education in the era of the Industrial Revolution 4.0 requires integrated learning approaches that go beyond cognitive aspects and encompass affective and contextual dimensions (Utomo et al., 2025). The development of instructional models should aim to produce vocational school graduates who possess the 4Cs—critical thinking, communication, collaboration, and creativity—that significantly impact graduates' work-readiness (Jumhur et al., 2024). Appropriate instructional models are essential to ensure the production of graduates equipped with practical, job-ready skills, thereby contributing to the reduction of unemployment and poverty (Chewacong & Hayward, 2021). Instructional models include lecture-based learning, project-based learning, simulation-based training, case-based learning, and experiential learning. The use of diverse teaching methods has been shown to have a positive and significant impact on students' competencies (He & Jen, 2025). Instructional strategies for instilling sustainable agriculture concepts in vocational students include the implementation of the Operational Curriculum, enhancement of teacher competencies through workshops and benchmarking, development of instructional tools, instructional innovation, project-based learning, dissemination of best practices, increased utilization of agricultural mechanization, and the organization of mini-exhibitions of cultivation products (Fitriani et al., 2024). Fieldwork-based learning, industrial class models, and teaching factory models have also been identified as effective solutions for meeting industry workforce standards in vocational education (Pradana et al., 2023).

Agricultural vocational teachers need to be familiar with innovative instructional models to teach effectively, bridge the gap between theory and practice, and guide students to engage directly with real-world contexts (Cakrawati et al., 2024). Vocational education teachers are required to possess competencies in complex problem-solving, critical thinking, creativity, collaboration, communication, technological skills, and career life skills. They must also demonstrate learning management literacy, with an orientation toward inductive, deductive, and verificative reasoning (Alayda et al., 2022). Teachers are expected to identify key factors influencing student achievement, which provide essential information for improving school management (Istiqomah et al., 2019). Vocational teachers play a strategic role in introducing advanced technology-based teaching methods, enabling students to make informed career decisions (Wismansyah et al., 2024). Educators in the 21st century are increasingly challenged to design and implement instructional methods that enhance creative thinking skills and learning outcomes (Wally et al., 2024).

Agricultural teacher education programs are designed to prepare competent teachers who are ready to teach in schools. One essential aspect of agricultural teacher education is ensuring that teachers are prepared to lead learning across various areas of agricultural education in vocational schools, including the instruction of technical agricultural skills (Solomonson et al., 2022). Teaching Practicum (PPL) is a compulsory component for prospective teachers to apply theoretical knowledge and develop teaching, administrative, and classroom management competencies directly in school settings (Retallick & Miller, 2007). However, many prospective teachers encounter difficulties during teaching practice, particularly in selecting and implementing effective instructional models and methods to deliver learning materials (Kurniasy et al., 2023). Prospective teachers observe students' needs, practice instructional strategies, and develop or integrate approaches aligned with the subject matter, thereby fostering creativity in selecting appropriate teaching methods (Rachmawati et al., 2023). Professional development tailored to the specific attributes and needs of agricultural teachers strengthens their capacity to design effective instructional strategies, including facilitating in-depth critical discourse on agricultural dilemmas (Goldman & Alkaher, 2024).

Although agricultural teacher education programs aim to prepare competent educators, many participants come from non-education backgrounds and therefore have limited prior knowledge of educational theory. Challenges commonly faced during initial teaching practice include difficulties in creating dynamic classroom environments, selecting and implementing appropriate instructional models or methods, and effectively executing lesson plans. This study is expected to contribute to the literature on field teaching practice by documenting instructional challenges and constraints, thereby serving as a valuable reference for future research aimed at developing solutions for preparing competent agricultural teachers. Specifically, this study seeks to enhance the ability of students in the Teacher Professional Program specializing in plant agribusiness to identify instructional problems, develop appropriate solutions through the design of effective learning models, create innovative practice-based instructional approaches, and design relevant contextual learning experiences, ultimately preparing vocational school graduates to meet the challenges of modern agribusiness.

2. METHODS

This study employed a qualitative research design, integrating a transcendental phenomenological approach with classroom action research (Creswell, 2014). The phenomenological approach was applied to explore the lived experiences of prospective vocational high school teachers in identifying instructional problems and designing learning solutions. At the same time, CAR was used to examine the effectiveness of the developed learning models in improving student learning outcomes and critical thinking skills in real classroom settings.

The research subjects were 17 prospective teachers participating in a teaching practicum (PPL) at two State Vocational High Schools in East Java: Purwosari State Vocational High School in Pasuruan and Gondang State Vocational High School in Nganjuk. Participants were selected through purposive sampling based on specific criteria, including active involvement in teaching practicum activities, teaching agribusiness-related subjects, and willingness to participate in interviews and classroom action research. The number of participants was considered sufficient for both phenomenological inquiry and classroom action research.

The study was conducted in East Java from April to August 2025. Data collection was carried out using two methods. The first method involved conducting semi-structured interviews through direct visits to the schools where prospective teachers were undertaking their teaching practicum. The interview questions focused on challenges encountered in implementing learning and on selecting instructional models to address them. Problem-solving activities conducted by each prospective teacher were structured in the form of classroom action research; therefore, instructional strategies applied to instill the concept of sustainable agriculture among vocational high school students included the implementation of the Operational Curriculum, enhancement of teacher competencies through workshops and benchmarking, development of instructional tools, instructional innovation, development of project-based learning, dissemination of best practices, increased utilization of agricultural mechanization, and the organization of mini-exhibitions showcasing cultivation products (Fitriani et al., 2024). The second method involved measuring the effectiveness of instructional models through classroom action research, in which innovative learning models were incorporated into instructional planning through teaching modules. In general, the classroom action research cycle implemented by each prospective teacher consisted of the preparation of teaching modules, pre-cycle implementation, evaluation and reflection, data processing, preparation of classroom action research modules for Cycles 1 and 2, implementation of Cycle 1 followed by evaluation and reflection, implementation of Cycle 2 followed by evaluation and reflection, and final data processing. All problem-solving activities were encouraged to be carried out individually or collaboratively, with the teacher primarily serving as a facilitator, providing guidance, feedback, and reinforcement when necessary. During the implementation of the actions, the researcher observed the ongoing learning

process to document its impact and collect information for the reflection stage, using observation sheets to record learning activities, questionnaires to assess critical thinking skills, and tests to measure the quality of learning outcomes. During the reflection stage, the researcher and teachers jointly evaluated the observation results and reflected on plans for subsequent cycles; if the evaluation results had not met the intended objectives, instructional plans were revised, whereas if improvements in critical thinking skills and learning outcomes had been achieved, the classroom action research was concluded.

Table 1. Names of PPG Students or Aspiring Educators Taking Part in the Study

No	Names of PPG students	Place of PPL
1	Isna Khofifah	SMK Negeri I Purwosari Pasuruan
2	Fiska Noviandana	SMK Negeri I Purwosari Pasuruan
3	Fifi Rosyidah	SMK Negeri Gondang Nganjuk
4	Shelpia Maully	SMK Negeri Gondang Nganjuk
5	Firda Rachmawati	SMK Negeri I Purwosari Pasuruan
6	Firyaliza Alya	SMK Negeri I Purwosari Pasuruan
7	Qiurita Fortuna	SMK Negeri Gondang Nganjuk
8	Yeni Listiana	SMK Negeri Gondang Nganjuk
9	Dwi Lindah Permatasari	SMK Negeri I Purwosari Pasuruan
10	Moh Dwi Zainol	SMK Negeri I Purwosari Pasuruan
11	Nuriatus Sholikah	SMK Negeri I Purwosari Pasuruan
12	Savira Putri	SMK Negeri Gondang Nganjuk
13	Sika Putri Tania	SMK Negeri Gondang Nganjuk
14	Kukuh Khumairo	SMK Negeri I Purwosari Pasuruan
15	Muhammad Zinidin	SMK Negeri I Purwosari Pasuruan
16	Rizki Alifya	SMK Negeri Gondang Nganjuk
17	Khoulin Sakila	SMK Negeri I Purwosari Pasuruan

3. FINDINGS AND DISCUSSIONS

Findings

Most PPG students reported encountering classroom situations in which a group of students showed low learning motivation, lacked concentration during lessons, talked with peers while the teacher was explaining the material, and obtained test scores below the minimum competency standard (KKM). These problems emerged because most lessons still applied a teacher-centered learning (TCL) model, in which the teacher entered the classroom, explained the material using presentation slides, and occasionally asked students whether they had understood the content. Based on this classroom reality, the majority of PPG students (prospective teachers) changed the existing instructional approach to a student-centered learning (SCL) model that actively involved students from the beginning of the lesson and adapted learning media to students' needs. The prospective teachers implemented project-based learning (PBL), problem-based learning (PBL), and their variants. The learning models applied by each PPG student are presented in Table 2. A total of 17 participants were involved in the study; however, one participant was unable to provide information during the interview regarding the

learning model to be implemented.

Table 2. Action Research Activity Formats for Plant Agribusiness Vocational High School PPL Students

No	Name of PPG Students	Learning Models of PTK	Form of Activities
1	Isna Khofifah	Cooperative Learning Model Index Card Match Cooperative Model	Application of the index card cooperative learning model. Use the following syntax to match type: Prepare the materials (problem cards and answer cards), shuffle the cards, give each student a card at random, and ask them to find a pair of the problem and its answer. Finally, conclude and provide clarifications. Material: figuring out how much fertilizer is needed
2	Fiska Noviandana	TGT (Team Games Tournament) Cooperative Learning Model Bamboozle Media Assistance	Forming groups, presenting the information, holding group discussions, using Bamboozle to administer a tournament quiz, and rewarding the top group are all components of implementing learning in line with the TGT model syntax. The observations focus on the utilization of learning media, group interaction, involvement, and students' willingness to respond to questions. Content: Identification of Fertilizer
3	Fifi Rosyidah	Inquiry	Motivate students to learn more about the subject by facilitating group discussions, utilizing practical resources, and visualizing the learning phases. Students' comprehension of the processes and justifications for temperature treatment, hard seed scarification, and seed treatment increased when the inquiry approach was used.
4	Shelpia Maully	Problem-Based Learning Mnemonic Method	Student engagement with the debate and presentation techniques was extremely poor during the pre-cycle. The "window shopping" strategy, which separated the roles of presenter and information seeker in each group, was then used to develop this through a debate. They each gave a presentation from their seat. Visitors to other groups' work would receive explanations from the presenters. Students could discuss phrases they had created using their mnemonic technique and new information they had learned from a variety of learning resources in this exercise.
5	Firda Rachmawati		
6	Firyaliza Alya	Problem-Based Learning Gamification Wordwall	Wordwalls are interactive assessment and activity tools designed to improve student motivation, boost engagement, and make content easier to understand. They can improve students' academic performance by fostering an enjoyable and productive learning environment.
7	Qiurita Fortuna	Learning Based on Problems Learning through guided discovery	The goal of PBL is to help students understand the subject by having them observe issues that arise in a school setting with plenty of fresh materials. Two sets of data were collected: a checklist to assess emotional and psychomotor skills, and a formative exam with 20 multiple-choice questions to assess cognitive abilities. The outcomes of the pre-cycle assessment or post-test were then contrasted with these data. Likewise, cycle 1 and cycle 2 were contrasted.

No	Name of PPG Students	Learning Models of PTK	Form of Activities
8	Yeni Listiana	Learning Based on Problems	By using relevant and significant projects, project-based learning aims to promote active student participation. Grafting, or the process of joining plants with paper flower plants (Bougainvillea), is the project for this exercise. The instructor first identifies the issue and discusses the significance of grafting procedures in horticulture and agriculture. Students develop grafting techniques and prepare equipment and supplies during the planning phase. Students use the budding technique to perform grafting during project implementation. Students are in charge of the entire grafting process, get an understanding of agricultural methods, and hone their problem-solving abilities.
9	Dwi Lindah Permatasari	Problem-Based Learning	Regarding the detection and management of food crop diseases, pupils responded well.
10	Moh Dwi Zainol	Project-Based Learning	While cycle II focused on cutting procedures, cycle I is project-involved vegetative proliferation through grafting. Both theoretical and practical explanations were part of the learning process. Documentation, examinations, questionnaires, and observation sheets were employed in the assessments.
11	Nuriatus Sholikah	Guided Inquiry-Based Practice	After explaining the theory of vegetative plant propagation in class, students work with the teacher to perform it outside of the classroom. Written exams and skill-related observations are used in the assessment process.
12	Savira Putri	Problem-Based Learning Gamification Wordwall	During the planning phase, PBL is used to develop lesson plans, student worksheets (LKPD) with contextual issues, gamification content, word walls in quiz form, and evaluation tools. The teacher introduces the topic of orange farmers who have not harvested and improper post-harvest handling of oranges at the start of the implementation stage. After being split up into groups, the students are instructed to practice and solve scenarios. Pupils are asked to select one number at random from the word wall application. After gathering responses and solutions, students and their groups present them. A post-test is given at the conclusion of the session: harvest and post-harvest materials.
13	Sika Putri Tania	Problem-Based Learning PUPIN Media (PUPUK PINTAR / smart fertilizer)	Student worksheets (LKPD) in the form of sheets with tables with pictures of fertilizer were used in cycle I, and the instructor employed a lecture-based learning approach. Students used the Kahoot platform, a game-based learning platform that can be used as educational technology to deliver engaging experiences during assessments, to take a posttest at the conclusion of the learning activity. The PBL learning paradigm and E-LKPD, accessed via the liveworksheet platform, were employed by the instructor in cycle II. PUPIN, which stands for PUPUK PINTAR, was the interactive medium used. A variety of fertilizers were placed in bottles and given access to a QR code containing information about each fertilizer's packaging. Students used the live worksheet to complete the e-LKPD after identifying

No	Name of PPG Students	Learning Models of PTK	Form of Activities
			with PUPIN media. Using the Kahoot platform, a post-test was administered at the conclusion of the exercise.
14	Kukuh Khumairo	Guided Inquiry Model Practice-Based Learning	After explaining the idea of generative plant propagation in class, students work with the teacher to put it into practice outside of class. Written exams and observations of the Generative Plant Propagation Material's skills component are used for assessment.
15	Muhammad Zinidin	Guided Inquiry	Pupils' independent learning, critical thinking, and active inquiry processes. The purpose of daily student assessments is to assess students' comprehension of the subject matter.
16	Rizki Alifya	Experiential Learning	Plant pruning is the subject. To enhance their knowledge and abilities, students are encouraged to participate directly in hands-on pruning of citrus plants. In addition to assessments on the game-based ZEP online platform, students are given worksheets integrated with it.
17	Khoulin Sakila	Problem-Based Learning	The steps involved in putting problem-based learning into practice include: After giving a brief overview of the material on fertilization techniques relevant to cases in agricultural land, the teacher divides the class into groups and assigns each group the task of solving problems based on the LKPD the teacher has prepared. The students then conduct investigations with the teacher acting as a facilitator, present their findings (LKPD filling), and give other groups a chance to ask questions and respond. A post-test on fertilization procedures is administered at the conclusion of the session.

The students implemented problem-based learning and project-based learning models, along with several derivative approaches, including the Index Card Match cooperative learning model, the Teams Games Tournament (TGT) cooperative learning model, mnemonic methods, Wordwall-based gamification, discovery learning, guided inquiry-based practice, and practice-based learning.

The Impact of Implementing Student-Centered Learning Models on Instructional Effectiveness

Implementing student-centered learning models was measured by changes in average pre-test and post-test scores, as well as by the percentage of students who achieved the minimum mastery criterion (KKM). The classroom action research experiences of all PPG students showed increases in average test scores and/or improvements in learning mastery percentages. Detailed data on changes in learning outcomes, presented as average scores and mastery percentages relative to the KKM, are shown in Table 3.

Table 3. Learning Result Changes According to Average Scores and Completion Percentage Based on KKM Scores

No	Name of PPG Students	Learning Model of PTK	Indicators	Initial Achievements	Final Achievements	% of Increasements
1	Isna Khofifah	Index card match type cooperative model	Average Score	62,72	83,03	32,38
			Completion (%)	30,30	84,85	180,03

No	Name of PPG Students	Learning Model of PTK	Indicators	Initial Achievements	Final Achievements	% of Increasements
2	Fiska Noviandana	TGT Cooperative Learning Model	Average Score	54,55	81,82	50,00
		Bamboozle Media Assistance	Completion (%)	6,00	82,00	1266,67
		Inquiry	Average Score	62,00	85,00	37,10
3	Fifi Rosyidah		Completion (%)	70,00	86,00	22,86
4	Shelpia Maully	Problem-Based Learning	Average Score	59,00	81,00	37,29
		Mnemonic Method	Completion (%)	50,00	93,75	87,50
5	Firda Rachmawati		Average Score			
			Completion (%)			
6	Firyaliza Alya	Problem-Based Learning	Average Score	54,54	96,36	76,68
		Gamification Wordwall	Completion (%)	12,12	100,00	725,08
7	Qiurita Fortuna	Learning Based on Problems	Average Score	52,50	72,50	38,09
		Guided by Discovery	Completion (%)	17,65	52,94	199,94
8	Yeni Listiana	Project-Based Education	Average Score	51,23	76,20	48,74
			Completion (%)	16,00	57,00	256,25
9	Dwi Lindah Permatasari	Learning Based on Problems	Average Score	65,50	84,80	29,47
			Completion (%)	45,50	84,80	86,37
10	Moh Dwi Zainol	Project-Based Education	Average Score			
			Completion (%)	54,28	91,42	67,77
11	Nuriatus Sholikah	Guided Practice Based on Inquiry	Average Score			
			Completion (%)	38,89	100,00	157,14
12	Savira Putri	Problem-Based Learning with	Average Score	46,56	80,47	72,83

No	Name of PPG Students	Learning Model of PTK	Indicators	Initial Achievements	Final Achievements	% of Increasements
		Gamification Wordwall	Completion (%)	3,10	93,30	2909,68
13	Sika Putri Tania	Learning Based on Problems	Average Score	50,00	83,00	66,00
		PUPIN Media (Pupuk Pintar/smart fertilizer)	Completion (%)	10,00	93,00	830,00
14	Kukuh Khumairo	Practice-Based Learning	Average Score			
			Completion (%)	63,89	100,00	56,52
15	Muhammad Zinidin	Guided-Inquiry	Average Score	75,00	95,00	26,67
			Completion (%)	34,20	97,10	183,92
16	Rizki Alifya	Experiential Learning	Average Score	55,28	67,39	21,91
			Completion (%)	0,00	18,75	
17	Khoulin Sakila	Problem-Based Learning	Average Score	37,58	81,21	116,10
			Completion (%)	3,03	75,76	790,00

Discussion

Students enrolled in the Teacher Professional Program (PPG) are required to identify appropriate instructional models to address challenges encountered during teaching practice and optimize the learning process in plant agribusiness vocational high schools. Problem analysis examined the role of student-centered learning models—such as problem-based and project-based learning and their derivatives—in improving instructional effectiveness in vocational education. Prospective teachers actively developed instructional models aligned with learning content, including derivative approaches such as the Index Card Match cooperative learning model implemented by Isna Khofifah, the Teams Games Tournament (TGT) cooperative learning model implemented by Fiska Noviandana, the mnemonic model implemented by Shelpia Maully, and Wordwall-based gamification implemented by Firyaliza Alya. These approaches can be broadly categorized under problem-based learning and project-based learning. The development of instructional models is essential to address the needs of both teachers and students in vocational education.

Students in plant agribusiness vocational high schools tend to prefer learning methods that combine theory and practice, as such approaches provide a deeper understanding and greater relevance to workplace demands. They also favor group-based learning, which facilitates discussion and collaboration. Research by Fania et al. (2024) indicates that experiential learning models positively affect students' motivation to learn and academic achievement in vocational schools. Implementing industry-based experiential learning requires collaboration among schools, government, and industry to provide students with direct learning experiences and enhance their readiness to enter the workforce.

Seven prospective teachers chose to implement problem-based learning (PBL). PBL aims to enhance student engagement, creativity, and technological proficiency by fostering independent learning. A comprehensive PBL approach involves knowledge acquisition through collaborative project work and the application of real-world experiences. Science-based PBL models have been shown to improve higher-order thinking skills among vocational high school students effectively (Sole & Anggraeni, 2020). Gamification-based instructional media, as a derivative of PBL, has demonstrated significant effects on improving learning outcomes and increasing students' interest in learning. Gamified learning media support student autonomy and reduce reliance on teacher-centered explanations (Faza et al., 2024). Numerous studies confirm that PBL effectively enhances critical thinking skills, learning outcomes, student engagement, confidence, and competency attainment by connecting learning materials to real-life problems and providing constructive feedback (Ndruru, 2023).

Two prospective teachers selected project-based learning (PBL) for implementation. PjBL has been shown to improve conceptual understanding, problem-solving skills, and students' collaboration and communication abilities. However, challenges in implementing PjBL include limited facilities, teacher readiness, and the need for industry support in project development. Synergy among schools, industry, and government is therefore essential to enhance the effectiveness of PjBL in equipping students with workforce-relevant skills (Yusuf et al., 2025). As an innovative pedagogical approach, PjBL prepares vocational students for employment and contributes to the advancement of global vocational education by fostering active, skills-oriented learning (Ulaini & Fitrisia, 2025). Project-based methods are effective in facilitating product-oriented learning through students' creative work and teamwork, particularly in practical, production-based learning contexts (Rafini et al., 2023)(Wijaya et al., 2021). Integrated industry-based project learning models, such as the Industry-Integrated Self-Directed Project Learning (i-SDPL) model, further familiarize students with professional work environments (Sudarsono et al., 2025). Comprehensive assessment in PjBL includes cognitive evaluation through pre-tests and post-tests, as well as assessment of attitudes and skills through presentations, portfolios, and reflective journals (Sofiyana & Sholihah, 2022).

Prospective teachers must be able to adapt to technological advancements and address instructional challenges efficiently and responsibly in order to foster students' critical thinking skills and their ability to plan, monitor, and evaluate learning and problem-solving processes (Sofiyana & Shilihah, 2022). Three prospective teachers implemented practice-based learning or contextual teaching and learning (CTL). The application of CTL-based practical learning has been shown to positively influence students' vocational competency attainment, increase enthusiasm, enhance the relevance of learning to industrial contexts, and improve both technical and non-technical skills, such as teamwork. Teachers reported that such approaches facilitated instruction and improved students' understanding and application of learning materials. Industry involvement has proven crucial in preparing vocational graduates for workplace challenges, highlighting the importance of collaboration among schools, government, and industry (Suryadi, 2024).

Additional findings indicate that discovery learning enhances learning outcomes, student confidence, motivation, independence, responsibility, and willingness to engage with learning challenges (Tulenan et al., 2022). Experiential learning contributes to improving students' general competencies in agricultural crop production and their attitudes toward agricultural activities (A. Sagario & D. Versano, 2023). Reflective learning encourages reflective thinking practices that help prospective teachers gain deeper insights from experience and better prepare for professional practice (Mahendra et al., 2024). The GIReSiMCo learning model (Guided Inquiry, Reading, Sharing, Mind Mapping, and Communication) has demonstrated greater effectiveness in improving students' cognitive performance compared to conventional learning models(Mahendra et al., 2024).

Student-oriented learning models, such as group discussions and work-based learning, are most effective when supported by structured collaboration with industry partners (Ramadhan et al., 2025). The STEM (Science, Technology, Engineering, and Mathematics) learning approach integrates scientific

and technical disciplines into a cohesive framework and is particularly well suited to vocational high schools, as it combines theoretical knowledge with practical learning experiences to prepare students for challenges in business and industry (Grepon et al., 2022). Furthermore, the implementation of AI-based teaching factory models in vocational high schools has the potential to enhance the quality of vocational education and align student competencies with the demands of Industry 4.0 (Mahendra et al., 2024) (Senisum et al., 2022).

4. CONCLUSION

Based on the research findings, all PPG students in the field of plant agribusiness who were undertaking their teaching practicum (PPL) at vocational high schools selected and implemented instructional models as strategies to address low student interest in learning, lack of concentration during lessons, and, consequently, low assessment scores. The PPG students predominantly adopted student-centered instructional models, particularly problem-based learning and project-based learning, which encourage students to develop higher-order thinking skills. The teacher professional program students demonstrated the ability to identify instructional problems, obstacles, and challenges encountered during field teaching practice. The implementation of appropriate instructional models proved effective in addressing issues related to low student motivation and low academic achievement that did not meet the minimum mastery criterion. The implications of this study highlight the importance of equipping prospective teachers with adequate knowledge and understanding of instructional models, as these are essential for resolving various challenges that arise during teaching practice.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the Rector of Wijaya Kusuma University Surabaya for the encouragement to pursue academic advancement toward the rank of professor. Appreciation is also extended to the Dean of the Faculty of Teacher Training and Education, as well as to the Principals of State Vocational High School 1 Purwosari and State Vocational High School Gondang, for granting permission to involve PPG students undertaking their teaching practicum as research data sources.

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