

Enhancing The Professionalism Of Vocational High School Teacher Candidates Through The Reflective Learning Model Based On The Unity Of Sciences

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Abstract

The Educational Personnel Training Agency has the responsibility of preparing vocational high school teachers who possess reflective learning skills. Reflective learning involves the practice of engaging in reflective thinking, where individuals delve into their experiences in order to gain fresh insights and appreciations. This study is motivated by the recognition of the importance of Micro Teaching in shaping aspiring vocational high school teachers. To address this concern, it is essential to develop a reflective learning model that is rooted in the Unity of Sciences, which will aid in the preparation of these candidates. The aim of this study is to establish a reflective learning model, grounded in the Unity of Sciences, that will contribute to the growth of professional vocational high school teachers. The research methodology employs a development model design, which encompasses various stages including initial investigation, design, implementation, testing, evaluation, revision, and widespread implementation. The findings of this study indicate that the developed reflective learning model, based on the Unity of Sciences, is valid, practical, and effective in enhancing the competitiveness of vocational high school teacher candidates in the era of digital revolution.

Keywords: Vocational School, Professional Teacher, Unity of Sciences, Reflective Learning

Abstrak

Badan Pelatihan Tenaga Kependidikan mempunyai tanggung jawab mempersiapkan guru SMK yang memiliki kemampuan belajar reflektif. Pembelajaran reflektif melibatkan proses berpikir reflektif, dimana individu mengeksplorasi pengalamannya untuk memperoleh pemahaman dan apresiasi baru. Penelitian ini didorong oleh kesadaran akan pentingnya Micro Teaching dalam membentuk guru SMK yang profesional. Untuk mengatasi permasalahan tersebut, diperlukan pengembangan model pembelajaran reflektif berbasis Kesatuan Pengetahuan dalam pembentukan calon-calon tersebut. Penelitian ini bertujuan untuk menciptakan model pembelajaran reflektif berbasis Kesatuan Sains yang dapat memberikan kontribusi terhadap pengembangan profesional guru sekolah kejuruan. Metodologi penelitian menggunakan desain model pengembangan yang mencakup berbagai tahapan seperti penyelidikan awal, desain, implementasi, pengujian, evaluasi, revisi, dan implementasi luas. Temuan penelitian ini menunjukkan bahwa model pembelajaran reflektif berbasis Kesatuan Sains yang dikembangkan valid, praktis, dan efektif dalam meningkatkan daya saing calon guru SMK di era revolusi digital.

Kata Kunci: SMK, Guru Profesional, Kesatuan Ilmu Pengetahuan, Pembelajaran Reflektif

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INTRODUCTION

The rapid and rapid development of the world has entered the era of a knowledge-based society and a digital and competitive economy. This era is characterized by competition in mastering knowledge and intense competition in the discovery of new knowledge. Work readiness is highly necessary as it involves mental and physical preparedness as well as other vocational resources to enter a competitive job market (Robert and Diene, 2004). The main goal of educators and education policy makers is how to shape students in a learning process that is oriented towards work readiness.

Vocational High Schools (SMK) require partners such as other SMKs, Teacher Education Institutions (LPTK), local governments, local education offices, industries, educational professional associations, and other relevant institutions (Irwanto, 2021). Therefore, the existence and sustainability of a partnership network between SMKs and all these elements is needed. The partnership between SMKs and their partner institutions must be based on the principle of mutual benefit in improving the partnership and the quality of performance of the parties involved.

One of the strategic issues that is a priority for the revitalization of SMKs is innovation in learning and the fulfillment and improvement of the professionalism of teachers who teach subjects that are relevant to their expertise. SMK teachers are required to have pedagogical, personal, professional, and social competencies. In addition, vocational teachers in productive programs need to have specific characteristics and requirements for professional competence, including having adequate practical skills in all productive study fields, being able to organize relevant learning that meets the competencies needed by the world of work, and being able to design learning both in school and in the business and industrial world.

To address the demands of the aforementioned needs, LPTK must train vocational high school teachers to engage in reflective learning. This learning approach involves incorporating reflective thinking into the educational process. Reflection, within the realm of learning, is a cognitive and emotional exercise that delves into experiences to gain fresh insights and perspectives. Reflective learning necessitates that learners analyze their encounters, make assumptions, assess, act, and implement their newfound knowledge (Boud, Keogh, & Walker, 1989).

The reflective learning model proves to be highly suitable for integration into Micro Teaching sessions within the Technical Education Study Program, as it necessitates student teachers to demonstrate the four essential teacher competencies during their teaching practices. In Micro Teaching sessions, students are encouraged to engage in reflection, enabling them to assess and enhance their teaching skills in order to facilitate an effective teaching and learning process (Insuasty & Castillo, 2010). Considering this complexity, a learning model is needed that can combine the unity of science. Unity of Science can be understood as the close connection or unity of human knowledge, both in the ontological, epistemological, and axiological aspects of that knowledge, in a unity of true knowledge.

This research is motivated by the fact that Micro Teaching is important in shaping professional vocational school teachers. In addition, there is concern about the low quality of learning, especially in vocational schools, due to the lack of professional values provided to prospective teachers during their education in higher education institutions. To overcome these problems, the development of a reflective learning model based on the Unity of Sciences is needed to shape professional vocational school teachers.

The significance of this study lies in developing a reflective learning framework grounded in the Unity of Sciences. This framework is built upon three key principles: the spiritual enhancement of

scientific knowledge, the humanization of religious knowledge, and the incorporation of local wisdom. The ultimate goal is to cultivate competent vocational school educators. The local potential of North Sulawesi can be utilized to improve the quality of learning for prospective vocational school teachers in the field of Engineering in various ways, including: (1) Utilizing the abundant local raw materials in North Sulawesi, such as wood, stone, and metal, can greatly enhance the learning experience for prospective teachers. This allows them to gain practical knowledge on effectively and efficiently processing these raw materials. (2) Additionally, collaborating with the local industry in North Sulawesi provides valuable opportunities for prospective teachers to engage in work practices within the industry. This hands-on experience exposes them to the production processes and technologies utilized by the local industry. (3) Furthermore, the development of local technology in North Sulawesi offers prospective teachers the chance to learn about innovation and technological advancements that can be applied in various industries.

By harnessing the local potential of North Sulawesi, the education of prospective vocational school teachers in Engineering can be more relevant and beneficial for students, ultimately contributing to the overall improvement of education quality in the region. The objective of this research is to create a reflective learning model based on the Unity of Sciences, aiming to enhance the competitiveness of prospective vocational school teachers in the digital revolution era.

METHOD

The methodology employed in this study is Research and Development (R&D), a research approach utilized to create a particular product and assess its efficacy (Sugiyono, 2012). In this study, Research and Development was employed to devise a reflective learning model grounded in the Unity of Sciences (UoS) for the preparation of future vocational high school educators.

The subjects of this study are students of the Electrical Engineering Education Program, Class of 2022, consisting of 18 students. The product trial was conducted in a small class consisting of 8 students. There are a total of 18 students, divided into three categories based on their understanding level: high, medium, and low. Each category consists of 6 students. The development model employed is development (Plomp, 1997), which encompasses five phases: (1) initial investigation phase, (2) design phase, (3) realization phase, (4) testing, evaluation, and revision phase, and (5) wide implementation phase.

The analysis technique used in this research and development is a technique that can support the achievement of objectives in research and development, namely validation test, normality test, homogeneity test, and t-test. If the normality and homogeneity tests are fulfilled, the effectiveness test of reflective learning based on the Unity of Sciences towards the professional competence of prospective electrical engineering teachers will be conducted.

RESULTS AND DISCUSSION

Initial Investigation Phase

Activities in the initial investigation phase are describing reflections on Micro Teaching lectures that have been carried out, reviewing theoretical studies on the development of a reflective learning model based on Unity of Sciences (UoS) to create professional prospective Electrical Engineering Education teachers. Micro Teaching is a course to train to become a prospective professional teacher. Micro Teaching courses require reflection, because students as prospective teachers must have an obligation to evaluate and reorganize their teaching abilities in order to optimize the teaching and learning process (Insuasty & Castillo, 2010).

Reflections found from Micro Teaching lectures include the need for reflective skills, namely evaluating the learning practices that have been carried out to find strengths and weaknesses. Next, a solution must be found to correct the deficiency. Reflective in Micro Teaching is carried out in relation to the fulfillment of professional teacher indicators. Reflective related to pedagogical competence includes mastering student characteristics, learning theories, learning strategy methods, curriculum development, strengthening information technology, and conducting assessments. Reflective professional competence related to mastery of concepts, mastery of basic competencies, creative development of material. Reflective personality competence includes the ability to act according to norms, an honest person, noble character, a stable person, wise, authoritative, has a high work ethic, upholds the teacher's code of ethics. Meanwhile, reflective social competence as a prospective professional teacher must be able to be inclusive, act objectively, not be discriminatory, communicate effectively, be empathetic, polite and adapt well (Fuady, 2017).

The implementation technique used in realizing UoS is through three main pillars, namely the spiritualization of scientific knowledge, the humanization of religious knowledge, and the use of local wisdom. The implementation of UoS in Micro Teaching courses is important in supporting the creation of professional electrical engineering education teacher candidates. The spiritualization of religious values in Micro Teaching, namely the emergence of good character through the learning process, is very supportive in creating personality and social competencies. The use of local wisdom in learning supports mastery of creative material development through real and contextual conditions and can be used as Ethnomathematics development (Chrissanti, 2018).

In the initial investigation phase, apart from reflecting on the implementation of Micro Teaching, we also carry out analysis of theories or references that will be used for device development and model learning (Drost, 2001; Harmer, 2007; Richards & Lockhart, 1996; Wallace, 1991; McKay, 2002 ; Lang & Wong, 2000). Study about learning reflective based on theory/references which include studies on the concept and implementation of UoS (Taufiq, Nisa, Supena, & Kholiq, 2015; Fanani, 2013). Study about Teacher professional based on theory, competence pedagogical, competence professional, social competence and, personality competence (Langeveld et al., 2012). In

this initial investigation phase, related reflection is also carried out (Kunter et al., 2013). Device development model learning use theory Plomp (Plomp, 1997).

Phase Design

Activity on phase, This is designing model learning reflective based UoS For creating prospective professional teachers for Electrical Engineering Education in the Micro Teaching course. This learning model designed to increase student creativity and channel their abilities in interaction Study teach as well as control draft And competence Which needed For become Teacher professionalism, instilling local cultural concepts combined with the Unity of Sciences into learning and learning processes that create learning concepts that are close to the environment a day day student And experience Which Once experienced in life so that produce understanding Which easy understandable And understood for student.

Table 1. Framework Conceptual Theory

Learning	Realm/Intelligence Which Developed		
	Affective	Cognitive	Psychomotor
Theoretical	Humanism	Cognitivism/ Constructivism	Behaviorism & Constructivism
Methodology	Cooperative Learning	Problem Solving	Problem Solving
ClassroomPractice	Reflective Learning Vocational based UoS		

Table 2. Steps Reflective Learning Vocational Unity of Sciences

No.	Steps	Lecturer Activities
1	Convey objective and motivating student	The lecturer conveys all the lesson objectives to be achieved and motivates student learning
2	Giving stimulation	Lecturers present information about students by constructing thoughts and experiences that have been carried out as well as the surrounding circumstances
3	Giving chance teach	Providing opportunities for students to teach in class in real conditions by including points of Unity of Science and local wisdom in learning.
4	Self-reflection and giving response	Lecturers provide opportunities for students to correct themselves and look for alternative solutions to problems, as well as providing opportunities for students who act as students to provide feedback and comments about the learning process that their friends have carried out.
5	Giving chance teach 2	After reflection and input, students are given a second opportunity to teach by prioritizing learning about the Unity of Knowledge and local wisdom.
6	Discussion, reflection And suitability	Lecturers and students hold discussions as a reflection on joint learning to increase the level of professionalism of prospective teachers.
7	Evaluate	Lecturers evaluate students' learning outcomes and performance and carry out self-evaluations as a reflection of their own learning.
8	Give award	Lecturers value both the effort and appearance of

		microteaching students and provide value and appreciation for students who have tried to perform optimally on stage.
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Phase Realization

Researchers make it happen learning model reflective based UoS in accordance with design plan Which has arranged For create candidate Teacher Electrical Engineering Education professional. Realization device learning furthermore developed every meeting lectures based on the RPS by writing down in full the learning activities that will be carried out. RPS used as guidelines implementation every meeting studying Micro Teaching. Application reflective learning learning steps Context, Experience, Reflection, Action, and Evaluation is explained in detail and must be carried out at each meeting. Practical activities Micro Teaching Context activities carry out Micro Teaching preparation which includes: making Scientific RPP, 4C, HOTS, Literacy, and implementation of Islamic values and local wisdom; props; power point; and assessment instruments. Experience activities carry out micro practices in accordance with RPP that has been prepared. The Reflection stage is to reflect on good learning practices practitioners, observers, students who act as students, and lecturers using instruments professional teacher assessment. Action identifies what will be done during PPL and become teacher, for students who have not yet practiced identifying actions to be taken micro practice. Evaluation writes a reflective journal of micro teaching practices and what will be carried out (Drost, 2001; Harmer, 2007; Richards & Lockhart, 1996; Wallace, 1991; McKay, 2002; Lang & Wong, 2000).

Table 3. Implementation Reflective Learning Vocational Unity of Sciences

O'clock to:	Activity Lecturer	Activity Student	That intelligence developed
1-2	The lecturer explained about plans activity learning in a way general. (Orientation, Apperception, Motivation)	Students follow explanation with carefully, And submit question if not understand.	Student understand importance ability interact
2-3	Lecturer guides students for do practice teach.	Students take turns do practice teach in class with implement <i>Unity of Science</i> points And values wisdom local.	Interpersonal And visual.
		<i>Context</i> : students are directed make model learning	
		<i>Experience</i> : student do practice teach with model that has been in design	
	Lecturer gives opportunity to student For reflect self And give input.	<i>Reflection</i> : do reflection practice teaching who has done to see model suitability has designed.	

	Lecturer gives second chance to students to do back to practice teach as part of the results reflection Which done previously.	<i>Action</i> : do practice teach again as well able to identify process Which done	
2-3	Lecturer gives suggestions, and reflections learning has done asexperience for student	Student opportunitygive opinions and listen to suggestions and reflection from the lecturer aspossible experience used as material reflection moment become Teacher professional.	Ability interpersonal and Ability to express self
		<i>Evaluation</i> : Students understand learning materials and understand function And can identify it	
3-4	Lecturer discuss And evaluate learning.	Discuss accuracy/ suitability implementationpractice teach	Appreciation
	Lecturer gives rewards And appreciation.		

The realization of teaching materials in this research is the development of modules containing material in accordance with achievements learning And indicator on every meeting. Development material teach Also pay attention to the required learning motivation, provide information about competencies or practice carried out, and provide feedback on what students should do after practice (Dick & Carey, 1996). The development of teaching materials also pays attention to learning needs reflective and UoS implementation relevant to the material discussed. The UoS load explained so that it is interesting and makes it easier for students to understand the material. Instrument realization Assessments are developed based on learning outcomes in Micro Teaching courses and indicators professional teacher with mastery of four competencies according to Minister of Education and Culture Regulation Number 16 of 2007.

Indicator main evaluation competence pedagogy covers know: (1) characteristics participant educate, (2) master the theory and principles of learning, (3) curriculum development, (4) activities educational learning, (5) developing student potential, (6) communication with participants students, (7) assessment and evaluation. The main indicators for assessing personality competence: (1) acting in accordance with national religious, legal, social and cultural norms, (2) shows a person who is mature And example, (3) ethos Work And not quite enough answer Which tall, flavor proud become Teacher. The main indicators for assessing social competence are: (1) being inclusive, acting objectively, as well no, (2) discriminatory, Communication with fellow teachers, education staff, parents, participants students, and society. The main indicators for assessing professional competence: (1) mastery of the material, structure, consp And pattern think science Which support eye lesson Which taught, (2) develop professionalism through action Which reflective amount. Indicator main

every Competencies are developed using question items of which there are 76 assessment instruments in total statement items. Realization of validation instruments developed to measure the learning model UoS-based reflective Micro Teaching lectures are valid and practical, so they can be used in class For see effectiveness in creating candidate Teacher professional electrical engineering education.

The RPS validation instrument consists of 11 question items, namely: (1) according to the University's LP3M regulations Manado State, (2) according to study program learning achievements, (3) according to course learning achievements, (4) ability end each meeting, (5) explanation indicator learning, (6) material study, (7) application of the reflective model, (8) implementation of UoS, (9) learning experience, (10) time allocation, (11) operations can be applied in learning. RPS validation indicators include: (1) synchronous with college contract, (2) there are Context activities, (3) there are Experience activities, (4) there are Reflection activities, (5) there are Action activities, (6) there are Evaluation activities, (7) operations can be applied to learning. Indicator validation material study learning includes: (1) material in accordance with indicator meeting achievements, (2) there is UoS content, (3) there are references, (4) the material can be used well. Whereas indicator instrument validation evaluation Micro Teaching includes: (1) competence pedagogical, (2) competence personality, (3) competence social, (4) competence professional, (5) Instrument evaluation Which developed can used with Good. Results realization device reflective learning based on UoS Micro Teaching lectures to create prospective electrical engineering education teachers professional which includes: (1) Semester Learning Plan (RPS), (2) Lecture Contact, (3) Material teach, (4) Instrument Evaluation Micro Teaching called with prototype I.

Phase Test

Phase activities test namely carrying out an evaluation and revision through several stage. Early stage on The test phase is to validate the UoS-based reflective learning model in the form of RPS, lecture contact, teaching materials, assessment instruments (prototype I) to expert validators. Learning model validity data Reflections on UoS-based Micro Teaching lectures were obtained from validation questionnaires that had been completed by two person validator expert from college tall.

The results of the validation that have been carried out show that all learning models are in order value range $3.4 < x \leq 4.2$ in the good category. Thus the reflective learning model UoS-based Micro Teaching lectures can be used after revisions are made based on notes given by the validator. Practicality assessment is based on observations of the learning process reflective which has gone very well. Context activities for all students to practice making device learning Micro Teaching form lesson plan, material teach, media learning, ppt, And assessment instrument. Experience activities carry out teaching practice in accordance with the RPP that has been provided developed. Reflection activities reflect on learning practices to see mastery material, strategy learning, interaction, And Also exemplary sidkap And action. Practical action activities identify practical teaching activities, PPL and also when you become a teacher. Evaluation activities by making reflective journals from learning

practices as a basis for self- evaluation for the development of prospective professional teachers. Practicality is also obtained from filling response questionnaire by practitioners, namely lecturers who teach Micro Teaching courses after practicing model learning reflective based UoS.

The normality test shows $L_0 = 0.12289 < F$ table, then H_0 is accepted, meaning that the two classes are homogeneous or equal. After the assumptions of normality and homogeneity are met, the effectiveness of UoS-based reflective learning is then tested on the professional competency abilities of prospective teachers. With the calculated t value $> t$ table ($4.384 > 1.671$), then H_0 is rejected. This means that there is a significant difference between the average professional competence of prospective teachers. This shows the professional competence of prospective teachers. The results of the analysis above can be seen to say that the reflective UoS learning model based on Micro teaching is effective in creating professional electrical engineering teacher candidates.

CONCLUSION

The Science Unity-based reflective learning model has been proven to be valid, practical, and effective in enhancing the competitiveness of aspiring vocational school teachers during the digital revolution era. It also harnesses the power of Nationalism, Science, and Technology to support Indonesia's progress.

REFERENCES

- Auta, M. 2020. Work place performance of university technology and vocational education (TVET) student-teachers: A tracer study. *Journal Plus Education*, 26 (1), 229-238.
- Central Bureau of Statistics. (2023). Aceh Province in Numbers. Banda Aceh: Aceh Central Statistics Agency.
- Boud, D., Keogh, R., & Walker, D. (1989). *Reflection: Turning Experience into Learning*. London: Kogan Page
- Charles, H., & Akpomi, ME 2021. Assessment of teachers' competence in pedagogy for improved teaching of business studies in secondary schools in port harcourt metropolis. *International Journal of Modern Innovation and Knowledge*, 2(2), 84-95
- Cochran-Smith, M. 2020. Teacher education for justice and equity: 40 years of advocacy. *Action in Teacher Education*, 42(1), 49-59.
- Fajriana, et al., 2023. Analysis Model Good School Governance on School Vocational. *Journal Education And Counseling*, 5(1), 1777-1785
- Gaybullayevna, SR 2020. Pedagogical tools that serve the development of cultural views in the subjects of the educational process. *JCR*, 7(12), 3104-3108.
- Goodwin, AL, & Low, E. L. 2021. Rethinking conceptualisations of teacher quality in Singapore and Hong Kong: A comparative analysis. *European Journal of Teacher Education*, 08 April 2021, 1-18.

- McGarr, O., & McDonagh, A. 2021. Exploring the digital competence of pre-service teachers on entry onto an initial teachers education programme in Ireland. *Irish Educational Studies*, 40(1), 115-128.
- Irwanto. 2021. Link and Macth Education Vocational with World Business And Industry in Indonesia. *Innovation Journal Education*, 2 (2), 549-562.
- Ismayati, E., Muslim, S., Kusumawati, N., Rahmadyanti, E., Hilmi, M., & Wrahatnolo, T. 2020. Critical study of research results about TVET and TEFA's role in social, economic, and education development in the country. *Journal of Education, Teaching and Learning*, 5(1), 106-113.
- Ministry of Education and Culture. 2020. Technical Instructions for Government Assistance to Facilitate Vocational High Schools Developed into a Priority Center of Excellence in the Machining Sector And Construction. Jakarta: Directorate vocational school.
- Nurhadi, D., & Lyau, NM 2017. A conceptual framework for the development of twenty-first centuries vocational teachers' professional competencies. *International Forum of Teaching and Studies*, 13 (2), 8-20.
- Okolie, UC, et. al., 2021. A critical perspective on TVET teachers' pedagogical practices: insights into the guiding pedagogical principles in practice. *Journal of Vocational Education & Training*, 9 March 2021, 1-20.
- Pavlova, m 2019. Emerging environmental industries: impact on required skills and TVET systems. *International Journal of Training Research*, 17(sup1), 144-158.
- Siraj, et al., 2022. Integrated Education: Integration of Islamic Values, Nationality, Acehan in Learning. *Journal on Teacher Education*, 4(1), 537-545.
- Siraj, et al., 2023. Implementation of Education Based on the Islamic Edutechnopreneur Model. *Journal on Education*, 5(3), 9944-9951.
- Tang, S. Y., Wong, A. K., Li, D. D., & Cheng, m m 2021. Re-conceptualising professional competence development of students teachers in initial teachers education. *Research Papers in Education*, 36(2), 152-175.
- Thompson, AM, Elmore, R., & Oetker, LM 2020. Free and valid teacher social competence scale for school social workers. *Children & Schools*, 42(1), 63-66.
- Vyas-Doorgapersad, S., & Aktan, C. C. (2017). Progression from ideal state to good governance: an introductory overview. *International Journal of Business and Management Studies*, 9: (1).