Competence Development as Part of Professional Growth Through Vocational Apprenticeships among Students of Civil Engineering Program in Indonesia

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Abstract: This research examines how vocational apprenticeships contribute to the professional growth of civil engineering students in Indonesia. We use qualitative research methods to gather detailed insights into this process. Our study is guided by the Competence Development Theory. This theory helps us understand how students improve their skills and knowledge through their apprenticeship experiences. Competence Development Theory includes several important ideas. Reflective Practice is about students thinking deeply about their experiences to learn from them. Experiential Learning refers to gaining knowledge through practical, hands-on experiences rather than just studying theory. Adaptation of Mental Models involves changing the way students think based on new information and experiences. Continuous Improvement is the ongoing effort to get better over time. In this research, we explore how these concepts apply to apprenticeships for civil engineering students. We look at how these students apply what they learn in their academic studies to real-world situations during their apprenticeships. We also investigate how their experiences help them reflect, adapt their thinking, and continually improve their skills. By understanding these processes, we aim to highlight the role of apprenticeships in shaping the professional growth and competence of civil engineering students.

Keywords: vocational apprenticeship, civil engineering, competence development, professional growth

1. Introduction

1.1. Background and Research Problem

Previous studies that talk about career development in Indonesia have mostly talked about jobs in the nursing, secretarial, accounting, and teaching professions [1]. Previous studies on student competency development in Indonesia have mostly talked about improving or developing student competencies through expertise certification activities. One of them is research on strategies for improving student competency through a competency certification model [5]. Another study is improving competency through a heavy equipment operator certification model for students of

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the Heavy Equipment Engineering Study Program [6]. Similar research discusses perceptions of accounting professional certification among accounting students [7]. Based on a review of several studies mentioned above, it can be seen that there is a research gap regarding competency development or improvement. That, the development or improvement of competence is still limited to the issue of expertise certification. Meanwhile, this study talks about the development or improvement of competence through internship activities. In addition, this study is also expected to be able to contribute to the discussion on the development of competence in terms of various professions, namely professions related to the field of Civil Engineering.

1.2. Research Aim Related to Theoretical Review

The aim of this research is to investigate students' professional growth that are shaped during their apprenticeship.

1.3. Literature Review

To answer the research question, this study relies on the theory of Competence Development. Competence development is a process that involves the creation and refinement of knowledge, skills, and abilities in response to needs, which can include the acquisition of new skills or the adaptation of existing competencies based on feedback and experience [9]. Competence development is a process that requires professionals to continually update their skills and knowledge in response to a changing environment [10]. Competence development is achieved through reflective practice [8]. Reflective practice is a method by which professionals continually examine and evaluate their actions to improve their practice and address new challenges [8]. Reflective practice does not simply involve one's experiences; it also requires a commitment to learning from those experiences and using those lessons to improve actions and decisions [12]. Learning is the process by which knowledge is created through the transformation of experiences [13]. Experiential learning is a learning process that involves direct experience and reflection on that experience to develop new skills and knowledge [9]. Adaptation of mental models allows humans to respond more effectively to change and challenges through updating understanding and strategies [10]. The continuous cycle of reflection and adaptation is essential in achieving continuous improvement in a professional context [11].

2. Method

2.1. Research Design

In this study, a qualitative approach is employed, focusing particularly on narrative investigation to explore into the specifics of individual experiences. In qualitative research, methods aim to gain a deep understanding of human behavior and social contexts through non-numeric data, while narrative investigation zeroes in on the

comprehensive storytelling of individuals to expose how they make sense of their experiences [14].

2.2. Research Participant

The study is based on informants who are selected purposively for their significance. The method of purposive sampling requires purposely selecting persons who possess specific features or experiences that are directly relevant to the research enquiries, which supports in gaining comprehensive and nuanced insights that might not be apprehended through random sampling methods [15].

2.3. Data Collection

This research employs interview, particularly semi-structured interview. In qualitative research, interviews are applied to gather detailed information through interactive dialogue, with semi-structured interviews providing a organized yet adaptable method that permits investigators to discover programmed queries while remaining open to new subjects that appear during the conversation [16].

2.4. Data Analysis

This study uses a qualitative descriptive analysis method. This method of analysis is carried out by identifying and categorizing data based on its main characteristics, which allows researchers to have a clear and detailed picture [17].

3. Result and Discussion

Students involved in construction work have extensive experience in various technical activities in the field, such as measuring bowplank points, placing anchors on pedestal columns, revising shop drawings, and supervising the marking and ironing process. In carrying out these tasks, students use precision measuring tools such as theodolites and prism sticks to ensure accurate measurement results. With the working drawing guide generated from Autocad, students are responsible for ensuring that each stage of work is carried out according to the specifications that have been determined. In addition, students also check the suitability between field conditions and planning, provide the necessary direction, and coordinate with various parties to ensure the smooth and quality of construction work. This role includes supervision and problem solving, so that construction results can be achieved with high precision.

Internship students involved in construction projects have an important role in ensuring the smooth running of each stage of the work. The process that must be gone through involves systematic steps such as identifying problems, collecting relevant information, analyzing with the team, finding alternative solutions, and evaluating the solutions taken. Accuracy is needed, especially when revising shop drawings. The revision must be clear, well-documented, and ensured to be understood by all parties involved so that similar errors are not repeated, especially in drawings that are typical and often used in projects. In addition, students' ability to read and understand working drawings is crucial to prevent human error, for example in adding reinforcing

steel. Small errors in interpreting drawings can have a big impact on the final results of construction, so students are required to have extra attention to every detail. Not only that, effective communication with other members of the construction team is also key to solving problems that arise in the field. With a deep understanding of working drawings and good coordination, students can help ensure that the project runs according to plan and the standards that have been set.

In the systematic decision-making process in construction projects, steps such as problem identification, information gathering, analysis, evaluation, and selection of the best solution are essential to ensure the smooth running of the project. In the early stages, decisions are often made based on the technical understanding of students or workers involved, but still need to be confirmed by the Site Engineer to ensure accuracy. This process provides space for independent decision-making, but with control from more experienced parties. In addition, discussions with the surveyor team are also an important part, especially when there is a discrepancy in the marking of walls or other elements in the field. Small errors in marking can have a big impact on the final results of construction, so collaboration between students, surveyors, and Site Engineers is essential. The academic knowledge possessed by students is integrated into practice in the field, so that the theories learned can be applied in real terms in the construction process. Effective communication with workers is also no less important. Students must ensure that the instructions given are in accordance with the distributed working drawings, so that workers can carry out their tasks properly. Alignment between design and implementation in the field is the key to the success of the project, and clear communication and good understanding of the working drawings play an important role in achieving this goal.

Interns in construction projects need to understand the importance of facing challenges and changes that often occur during the construction process. Therefore, making a clear plan with systematic steps is very much needed, including setting work priorities, collecting information related to resource requirements, and coordinating with stakeholders. This is important so that work continues to run according to the schedule and standards that have been set. One challenge that often arises is the lack of understanding of the consultant's revision notes. In this situation, interns must proactively discuss with the drafter staff or Site Engineer to clarify the revision. Although this discussion is sometimes colored by differences of opinion, it is actually an opportunity for students to hone the communication and rhetorical skills that have been acquired during their studies. Thus, students can be more confident in conveying ideas and solutions, and learn to negotiate in a professional atmosphere. Effective coordination with various parties will help overcome obstacles in the field and ensure the project runs smoothly.

During the internship, students face various challenging tasks that enrich their experience and improve their technical skills. Among them are leveling the elevation of excavations using a waterpass, which requires high precision to ensure accurate measurement results. In addition, students are also assigned to draw more complicated and complex projects, which hone their ability to read and interpret technical drawings. The task of being a quantity surveyor with a tight deadline is one of the big challenges that encourages students to work efficiently and on time. In this process, students not only learn about time management but also get guidance and tricks to complete tasks better. Concrete evaluation, known as one of the most complex tasks,

helps students understand more about concrete quality and strengthens their skills in using Microsoft Excel to manage and input data accurately. These challenges enrich students' experience in the construction world.

Students involved in construction projects must understand the importance of being active in facing challenges in the field. When experiencing difficulties, a proactive attitude such as asking stakeholders and seeking relevant information is very necessary. In addition, students need to make independent observations to understand the work process, record important things conveyed by the mentor related to methods, materials, and time to carry out work. When facing problems, students can take advantage of various resources, such as tutorials on YouTube, to deepen their understanding. Not only that, discussing with the supervisor on the project is also an important step in finding the right clarification and solution. This proactive attitude not only helps students in completing assignments, but also improves their ability to overcome obstacles independently and expand technical knowledge in the field.

Internship experience provides students with a valuable opportunity to learn and develop their skills, both in a drafting role and in the field. Working on larger, more complex building projects broadens their understanding and introduces them to new knowledge not always taught in the classroom. Involvement in field work with surveyors provides practical insight into measurement and construction methods, which adds to the knowledge gained in lectures. Working with engineers helps students develop the technical knowledge they have previously acquired in theory and apply it to real-world situations. This experience provides a balance between workload and growing skills, while still making a significant contribution to the project. Students learn how to take on challenges, collaborate with a team and develop their skills in understanding design and construction as a whole.

Interns in construction projects often get bored because of their monotonous tasks, such as drawing in the office or handling numbers as a quantity surveyor. To overcome this boredom, they occasionally take the time to go to the field. This activity not only helps to refresh the mind, but also provides an opportunity to see the results of the work firsthand. By being in the field, students can better understand the construction process, interact with the implementer, and get clarification related to images or data that are poorly understood. This not only enriches their experience, but also increases their understanding and engagement in the project.

Interns seek to gather, listen, and understand the various viewpoints and ideas of experts, the community, and their colleagues. Active collaboration and discussion allow them to find better and innovative solutions to the problems they face. In the application of new ideas, interns are selective by ensuring that the ideas are truly beneficial for their future personal and professional development. In addition, interns also actively develop themselves through training and experimentation. They are trying to adapt to the latest technologies and methodologies to remain relevant in the field of construction. These efforts not only broaden their skills, but also improve their ability to contribute effectively to projects and prepare for future challenges.

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During an internship in a construction project, significant differences are often found between the theory learned in lectures and practice in the field. To overcome these challenges, interns need to actively ask questions to stakeholders, conduct self-observations, and take notes on explanations and directions from field mentors to understand the practical application of the theory learned. Monotonous tasks, such as drawing in the office, can lead to boredom. Therefore, it is very important for drafters to occasionally go to the field to understand the work process directly and see the results of the work that has been done. In addition, the work environment in the field is not always harmonious, so maintaining a focus on project objectives and continuously improving professionalism is key to staying productive and effective in carrying out tasks. These efforts help interns adapt to the realities of the field and make meaningful contributions to the project

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The internship experience significantly helps in improving understanding and skills, especially in learning new things relevant to the field of work. Meticulousness in checking the work in the field, such as when finding installation errors that do not match the shop drawings, is essential to prevent bigger problems in the future. In addition, internships provide valuable preparation for the real world of work, including adapting to different types of people and different backgrounds. These interactions help interns develop the interpersonal and professional skills necessary for success in a diverse and dynamic work environment.

4. Conclusion

During the internship process, in daily activities, when students carry out tasks in the field, students carry out thinking while acting activities. Students gain new insights in terms of problem solving during the internship, decision making, and overcoming unexpected challenges or changes. These new insights contribute to the development of students as future professionals in the field of Civil Engineering, especially in terms of acquiring new skills. In addition, students try to find opportunities for experiential learning during the internship. They consider various factors when choosing internship tasks/activities that can facilitate their growth and development as professionals in the field of civil engineering. Students need to adjust their mindset to face certain problems or situations during the internship. They develop strategies to adapt and be open to new ideas and perspectives in the field they are studying. Although students face difficulties in changing their views and ways of thinking about a problem during the internship, they are able to overcome these challenges. Students continue to follow industry trends and advances in their fields. They experience situations where mindset adjustments have a positive impact on their work during the internship. Students take various initiatives or activities to continue learning in order to improve their skills and knowledge as professionals. Internship activities have become part of the realization of students' desire to continue learning continuously.

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References

[1] Mada, D., Asmirajanti, M., Setiawati, S., Inayah, I., & Rudhiati, F. (2022). Analisa Pelaksanaan Jenjang Karir Profesional Perawat. Jurnal Keperawatan Silampari, 5(2), 1198-1206.

[2] Hasibuan, M., & Zaki, A. (2023). Sosialisasi Manajemen Pengembangan Karir Profesi Guru di Era Kurikulum Merdeka Belajar di Sekolah SMA Daruss' adah Pangkalan Susu. Fusion: Jurnal Pengabdian Kepada Masyarakat, 2(1), 53-60.

[3] Rosidah, R., & Arantika, T. (2018). Peran Teknologi untuk Pengembangan Karir Sekretaris. Efisiensi: Kajian Ilmu Administrasi, 15(1), 43-50.

[4] Kurniyawati, I., & Listyowati, E. (2021). Tantangan, hambatan dan peluang karir profesi akuntan publik di Indonesia. Jurnal Sains Sosio Humaniora, 5(2), 723-731.

[5] Prawiyogi, A. G., & Toyibah, R. A. (2020). Strategi Peningkatan Kompetensi Mahasiswa Melalui Model Sertifikasi Kompetensi. ADI Bisnis Digital Interdisiplin Jurnal, 1(1), 78-86

[6] Irawansyah, I., Mutmainnah, O., & Nurmala, E. (2024). Peningkatan Kompetensi Lulusan Melalui Model Sertifikasi Operator Alat Berat pada Mahasiswa Program Studi Teknik Alat Berat AKOM Sumbawa. MARAS: Jurnal Penelitian Multidisiplin, 2(2), 935-950.

[7] Ubbadullah, U., & Budiwitjatsono, G. S. (2024). Analisis Motivasi Karir, Pengembangan Kompetensi, dan Penghargaan Finansial Terhadap Persepsi Minat Sertifikasi profesi Akuntansi (Studi Kasus Mahasiswa Akuntansi UPN "Veteran" Jawa Timur). Ekonomis: Journal of Economics and Business, 8(1), 59-64.

[8] Schön, D. A. (2017). The Reflective Practitioner: How Professionals Think in Action. Routledge.

[9] Argyris, C., & Schön, D. A. (2018). Organizational Learning II: Theory, Method, and Practice. Routledge.

[10] Argyris, C. (2019). Teaching Smart People How to Learn. Harvard Business Review Press.

[11] Schön, D. A. (2020). Reflective Practice and Professional Learning. Palgrave Macmillan.

[12] Senge, P. M. (2014). The Fifth Discipline: The Art & Practice of The Learning Organization (Edisi Revisi). Doubleday.

[13] Kolb, D. A. (2014). Experiential Learning: Experience as the Source of Learning and Development (Edisi ke-2). Pearson.

[14] Denzin, N. K., & Lincoln, Y. S. (Eds.). (2011). The SAGE Handbook of Qualitative Research (4th ed.). Sage Publications. Polkinghorne, D. E. (2007). Validity Issues in Narrative Research. In Clandinin, D. J. (Ed.), Handbook of Narrative Inquiry: Mapping a Methodology. Sage Publications.

[15] Creswell, J. W., & Poth, C. N. (2018). Qualitative Inquiry and Research Design: Choosing Among Five Approaches (4th ed.). Sage Publications.

[16] Silverman, D. (2016). Qualitative Research (4th ed.). Sage Publications. King, N., & Horrocks, C. (2010). Interviews in Qualitative Research. Sage Publications.

[17] Braun, V., & Clarke, V. (2013). Successful qualitative research: A practical guide for beginners. Sage Publications.