



Peer-Based Collaboration Learning in Vocational Apprenticeships among Students of Civil Engineering Program in Indonesia

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Abstract. This research investigates how peer-based collaboration during vocational apprenticeships helps civil engineering students in Indonesia learn and grow. We use qualitative research methods to explore this topic in detail. Our study is guided by the Community of Practice Theory, which provides a framework for understanding how students learn through working together. Community of Practice Theory includes several important ideas. Community participation and membership means that students are part of a group where they learn and work together. Mutual engagement and shared practice refer to how students interact with each other and work on common tasks, sharing their knowledge and skills. Learning as social participation highlights that students learn by being involved in group activities and discussions. Boundary crossing and community development involve students moving between different groups or areas of knowledge and helping to build and improve their learning community. In our research, we look at how these aspects of Community of Practice Theory apply to apprenticeships. We examine how students work together, share their experiences, and support each other. We also explore how students learn by participating in these collaborative activities and how moving between different groups helps them grow. This study aims to show how working closely with peers in apprenticeships helps civil engineering students develop their skills and knowledge effectively.

Keywords: Vocational Apprenticeship, Civil Engineering, Peer-based Collaboration, Professional Growth.

1. Introduction

1.1. Background and Research Problem

Collaborative-based learning with friends or colleagues is one type of learning method. Collaborative-based learning encourages sharing of diverse perspectives among members of a group of friends/colleagues, which can lead to deeper understanding and better problem-solving skills [1]. When the student work together, they develop not only academic skills but also important interpersonal skills that needed in the workplace [2].

The research topic of collaborative-based learning with friends or colleagues has been raised in many previous studies in Indonesia. These previous studies are

categorized into several sub-topics or focus variants, two of which are peer teaching [3] [4] [5] and peer assessment [6] [7]. Several other studies also raise the issue of peer feedback in collaborative-based learning with friends or colleagues [8] [9]. However, these previous studies only discussed the context of learning carried out as meetings in classrooms and laboratories. Thus, there is a research gap in terms of implementing collaborative learning with friends or colleagues in the context of internship activities. This research aims to investigate contribution of peer-based collaboration to learning outcomes and to the effectiveness of vocational apprenticeship programs

Internship activities are also teaching and learning activities that are no less important than learning activities in the classroom and in the laboratory. Through internship activities, students gain practical experience that is very important for mastering skills and making it easier for them to get jobs in their chosen fields [10]. In the context of internships, where students are involved in real-world work, students not only work together or collaborate with fellow students. Instead, they must also collaborate with workers in the internship environment and other people involved in the internship scheme.

1.2. Research Aim Related to Theoretical Review

This study aims to investigate the integration of theoretical knowledge and practical activities that occurs within the apprenticeship framework.

1.3. Literature Review

To reach the research aim, namely investigating contribution of peer-based collaboration to learning outcomes and to the effectiveness of vocational apprenticeship program, this study relies on Community of Practice Theory. It consists matters of community participation and membership, mutual engagement and shared practice, learning as social participation, boundary crossing and community development. To be an active member of a community involves engaging with a group that shares common interests, that is essential for accessing and contributing to collective knowledge and resources [11]. Collaboration and interaction among members of a community help to build a shared practice, which, in turn, fosters a sense of belonging and deepens expertise [12]. Learning in a community of practice is, essentially, about participating in the community's activities, highlighting that learning is interrelated to interaction and engagement rather than just individual knowledge gaining [13].

Learning is best understood as active engagement in which individuals gain knowledge through their interactions and contributions within the social context [14]. Boundary crossing and community development refer to ways members, who transition between different communities, introduce new ideas and practices, which promotes the development and expansion of the original community's knowledge [15]. To achieve the research goal, this study uses Community of Practice Theory which focuses on being part of a group, working together, and learning through interaction. This theory shows how engaging with a community helps you share and

gain knowledge, and how moving between different groups brings in new ideas that help the original group grow.

2. Method

2.1. Research Design

The study adopts a qualitative methodology, particularly stress narrative examination to gain understandings into the personal stories of participants. The essence of qualitative research lies in its ability to interpret and understand human behavior and experiences through comprehensive and contextual data, while account examination predominantly highlights the assembly and scrutiny of individual stories to expose deeper senses and understandings [16] [17].

2.2. Research Participant

Purposive informants are employed to provide targeted perceptions in this study. Purposive sampling is used to categorize and embrace participants who are precisely selected because they meet certain conditions that are vital for addressing the research enquiries, which allows investigators to gather information from those who are most well-informed about the subject matter [18].

2.3. Data Collection

This investigate employs interview, predominantly semi-structured interview. Interviews are a key qualitative research method used to gain comprehensive and nuanced information from participants through verbal communication, with semi-structured interviews subscription a steadiness between structured questions and the freedom to discover new ranges of interest that ascend during the conversation [19] [20].

2.4. Data Analysis

This research uses a descriptive analysis method. In qualitative research, descriptive analysis is a method that involves the process of categorizing data into themes that reflect observable content, which helps researchers to present an overview as well as a detailed picture of the main features of the data without complicated interpretation [21].

3. Result and Discussion

3.1. Result

Student been doing the internship activities as a means to gain direct work experience and complete a required course that equivalent to 20 credits. Internships can be done through the Ministry of Education, Culture, Research and Technology's program

called MSIB (*Magang dan Studi Independen Bersertifikat*/Certified Apprenticeship and Independent Studies) or by applying independent internships to the student's dream company. Most of the students apply for independent internships by forming groups and then submitting internship application proposals. After receiving a reply letter, the internship will be carried out for approximately 5 months, starting from February/March to June/July, or equivalent to 150 calendar days. After the internship completed, students will compile a final report consisting of 8 point of MPK. These points will later be converted into 20 credits and the students will receive their final grade after that report is collected.

Here are some projects where students carry out internship programs:

1. An on-going construction of Kampus III UIN Malang/PT. PP (Persero)
2. An on-going warehouse construction in Pasuruan
3. Paket CWI-02 construction in ITS campus/PT. Adhi Karya (Persero)
4. Warehouse and Office project owned by PT. Jawa Metalindo Prima Industri dan PT. Surabaya Pelleting Company/PT. Gemilang Makmur Jaya Raya (GMJR)

Students and their internship group mates collaborated to help ease up each other's workload, backing up absent interns' workload, and give opinions and mental support in dealing with the pressures of working in real life. Collaboration was also carried out with students from different campuses to fill in the gaps in the internship and help each other. Here is a following quote from a student, "At first, I felt a little anxious because this was the first big project I had participated in. However, this feeling changed over time because the dynamics of the workplace were very positive. We started by dividing the tasks based on the directions given by the Assistant Surveyor. I was responsible for the control of the theodolite and my friend was the one holding the prism stick. We did this in turns."

Students usually do their work by working together with their group mates and under the direction of their supervisor. During this collaboration, each student makes their own contribution. An example of collaborative activities carried out is working together when in the position of quantity surveyor. One of the students said that collaborative activities were carried out to calculate the need for ceramics, ceilings, plaster, brickwork, and so on in several buildings together with their group mates. The large workload requires students to divide tasks so that the work can be completed quickly and does not burden any party. The work is divided based on the number of groups, in this case, the student worked on the calculations for the 1st floor and his group mates worked on the 2nd floor in the same building.

Students usually talk directly or use tools such as handy talkies when collaborating with fellow interns. In addition to using intermediaries in the form of handy talkies, according to one student, direct communication and coordination are very useful in collaborating to unite co-workers or interns from various campuses who are placed in the same internship location. Here is a following quote from a student, "When I was chosen as a surveyor assistant, i'm collaborating with my friends when do we do the job like mark a point with a total station."

Students tend to collaborate when facing difficult work or interrelated work to get it done quickly. For example: updating the mapping's progress, listing daily work, checking the depth of excavation, controlling heavy equipment excavators, calculating needs when the students are chosen in quantity surveyor's team. One of the student said that in their internship, collaboration was carried out on the task of calculating material needs in the quantity surveyor. Their group was able to complete the calculations for 2 buildings within 2 weeks by dividing the tasks to make the work easier and faster. Here is a following quote from a student about the experience of collaboration during the internship, "During the internship process, it is impossible to do the workload alone, therefore I collaborate with each other in doing the work. Many things that I have completed with my friends are the result of collaboration, two of which are mapping progress, daily work lists, monitoring HS production and HS installation, etc."

Students felt their skills increase when after completed their work. In general, after being given work, interns will immediately do it unless the work requires collaboration between fellow interns or requires further guidance from the field supervisor. Therefore, once the work is finished after the collaboration, students often feel that their skills in doing field work have increased. Regarding this, one group of students shared their experience. During the internship, the group was assigned to control the excavator heavy equipment and check the depth of the excavation for making a certain channel. During the excavation process, there was a check from Quality Control which said that the excavation was too deep. The group then held a discussion. During the discussion, one member of the group asked specific questions about the parts that were still confusing. The other members in the group answered all of their colleagues' questions clearly, using analogies and practical examples that helped in terms of understanding complex concepts. After the discussion, the group members felt much more confident in doing the assignment.

Students experience differences of opinion during the work. These differences of opinion are usually resolved by communicating with group members and also asking the field supervisor to find a middle ground. As one example, during the internship, a group of students had different opinions regarding the method of implementing a job. Another example, in the process of mapping progress work, there is often confusion or differences of opinion regarding the center line of the wall. In addition, a group also said that during the implementation of steel transfer, they had different opinions regarding the maximum weight capacity that could be lifted by the crane. To solve the problem, they tried to ask this to the equipment operator.

Students who participate in internship programs mostly have experiences that tend to be similar, namely in terms of going directly into the field and dividing tasks based on different positions in each internship group. Some things that are different, namely there are groups whose internship positions change according to needs and working hours and responsibilities that tend to be greater than other groups. This great responsibility is related to the value and complexity of large projects. The differences that occur during internships are also related to the variety of positions provided by the company for interns. In addition, working hours are also one of the differences between one intern and another intern who are on different projects.

Students receive support in the form of information about internship locations, provide references related to internship reports that they have done, tell stories so that

their juniors can form useful relationships in the future, and tell about things that are not known/not taught in lectures. In addition, sharing their success stories and testimonials about the benefits of internships has motivated prospective interns to stay enthusiastic and focused on achieving their goals. Here is a following quote from a student about the role of alumni interns, "Alumni provide a role in relationships when new interns need information about a project that is being built. In addition, it can also be related to project data that may have been obtained in advance."

Students face socio-cultural issues such as language differences between individuals (students and employees), differences in the background of each individual, the length of working hours in the field and the diversity of campus origins of each intern. In addition, there is also the problem of differences in work culture in the project. This makes it difficult for students and they experience culture shock at the beginning. Here is a quote from one of the students regarding the problems faced during the internship, "Many differences occur when the internship process is carried out, such as the technology and innovation used, this occurs due to different campus backgrounds. In addition, the diversity of cultures held or owned by each individual and that is an interesting thing in the internship process."

4. Conclusion

1. Students are involved in internship activities as small group (2-4 persons) per project.
2. Students have roles and responsibilities during the internship and their participation and activeness in working in groups with fellow interns in the same place.
3. Students' participation in collaboration with fellow interns influences their view of themselves as future professionals in the field of civil engineering.
4. There are simple activities carried out collaboratively with fellow interns during the internship, as well as the contributions of each party.
5. There are tools, resources, or practices that are most useful for collaborating with fellow interns during the internship.
6. Challenges in the internship were successfully resolved through collaboration with fellow interns.
7. Students' understanding of a concept or skill has increased after discussions or activities with fellow interns during the internship.
8. There is a debate or difference of opinion with fellow interns about something related to the internship and they can reach an agreement in the midst of the debate.
9. Their group experiences during the internship, some are similar and some are different from the experiences of other groups in different internship locations.
10. There is a role for alumni or former interns in supporting and helping prospective interns in the future.

11. There are social and cultural issues that affect their learning experiences during the internship.

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