Influence of learning model and learning motivation to learning outcome of micro hydro power plant

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Abstract. This study aims to determine the effect of learning model and motivation toward the learning result of the training of Micro Hydro Power Plant (PLTMH) at Human resources development Centre of renewable Energy, Renewable Energy and Energy Conservation. The experimental method with the design of treatment by level 2 x 2 is used answer the research question how the influence of the learning model and the learning motivation toward the learning result of the training of Micro Hydro Power Plant (PLTMH). The result showed that the collaborative learning model can influence the learning result of the training of Micro Hydro Power Plant (PLTMH), while the learning motivation does not affect the learning result of motivation to learn in its effect on the learning result of PLTMH training. Based on the results of the study can be concluded that there is no single learning model that provides better learning outcomes in the eyes of PLTMH training for all trainees with different learning motivation.

1. Introduction

Microhydro Power Plant (PLTMH) is one of the most needed power plants in mountainous areas of Indonesia as shown in figure 1, figure 2, and figure 3. The technical specifications of MHP equipment are tailored to the needs of the community where the MHP is constructed, as shown in table 1 Therefore, the education and training of PLTMH officers in Indonesia becomes very important to continue to be done in order to provide better service to the users or consumers. Nevertheless, the results of education and training (Diklat) of Micro Hydro Power Plant (PLTMH) Center for Human Resource Development Electricity, Renewable Energy and Energy Conservation (PPSDM KEBTKE) the last two low force shown by the average value of 67.6 or less satisfactory, while the graduation limit of PLTMH training is 71.0. The result of observation and interview with Widyaiswara diklat PLTMH concluded there are two main factors cause, that is: selection of training model which tend to monotone by Widyaiswara and motivation factor of PLTMH low training participant. The expository training model in Borkulo's view [1] cannot be used to achieve complex learning objectives. While Conway [2] considers that the differences in training participants in running memory and their intelligence are controlled by their logical knowledge and reasoning. Both of them said Walker [3] will determine the success of training participants in solving learning problems, especially analytical skills and to construct offered solutions.
Motivation according to Walgito contains 3 (three) aspects: a state that encourages and readiness to move within the organism arising from physical needs, environmental conditions, mental state (thinking and memory); the treatment that arises and is directed by the circumstances; and the goals or objectives pursued by such behavior [4]. Therefore it is necessary to develop a learning model that can facilitate the interaction between the training participants and their learning environment as Banathy said [5]. Collaborative learning learning model may be an alternative in improving interaction in the PLTMH training process. The collaborative learning model according to Hennessy [6] as an environment for procedural problem solving in which talks between training participants are related to physical manipulation and feedback. The role of the Widyaiswara is crucial in our discussions, particularly the structure of tasks, their agenda and pedagogy to support learning through collaboration. This study aims to determine the effect of learning models and learning motivation on the learning outcomes of PLTMH training subject at the Center for Human Resources Development of Electricity, Renewable Energy and Energy Conservation.

Figure 1. Turbine and generator PLTMH.

Figure 2. Dams and intakes.

Figure 3. Penstock and house pipes generator.
Table 1. Technical Data of PLTMH.

| Turbine: Mechanical Transmission Flat Belt, nom diamature 200 mm, design head 8 M, design flow 200 Liter/sec / Cross Flow T12 / 20 kW |
| Generator: Freq.50 Hz; Rpm 1500; A Temp 30°C, PF 0.8 / Marelli Synchronous Generator / 3 Phase / Continuous duty 32 KVA / Standby duty 35 kVA |
| Ballast Load/ Dry / 32 kVA |
| Electronic Load Controller system |
| Concrete Dam: High 2 m; Wide 5 m |
| Intake: Long 1 m; Wide 1 m |
| Carrier Channel: Long 200 m; Wide 1 m; High 1 m |
| Settling Tub: Long 6 m; Wide 4 m; High 4 m |
| Calming Tub: Long 9 m; Wide 4 m; High 4 m |
| Powerhouse: Long 6 m; Wide 4 m; High 3 m; Tin Roof |
| Fast Pipe / Pensetock: Diameter 80 cm; Long 10 m |
| Exhaust duct: Long 3 m; Wide 80 cm; High 1 m |
| Number of Consumer 70 KK @ 1 A |

2. Literature review

2.1. Collaborative learning model
The theory of constructivism learns that everyone who learns actually has initial knowledge. However, the training participants tend to understand little and lose focus in the training process when Widyaiswara failed to use the learning model in accordance with the learning style of the training participants [7]. So knowledge is not passively transmitted from the beginning to the end of a teacher to the learners. Knowledge is built when learners are involved in the process of making meaning [8]. In other words collaborative learning provides an opportunity for learners to gain knowledge primarily by participating in social interaction, especially in the learning environment [9]. Collaborative learning at its core is learning from others and with others can encourage deeper learning in learners by creating groups with heterogeneous competency levels [10]. The collaborative learning model is also a pedagogical approach to facilitate the creation of meaningful learning experiences in the learning environment [11].

2.2. Motivation to learn
Motivation is said to Kelley is a more dynamic and nuanced conceptual system, while learning motivation is a more dynamic conceptual learning system in a person in his learning activitytas [12]. Keller, said that there are 4 (four) factors that influence the motivation learn a person, (1) Attention, that is learning strategy chosen by the teacher who can generate and keep the curiosity and attract learners. (2) Relevance, a learning strategy that supports the needs of participants, interest, and motives. Goal orientation as an important aspect of the relevance of learning. (3) Confidence, which is supported by clarity of learning objectives to be achieved learners. (4) Satisfaction, learners are encouraged to find ways that can drive them to learn intrinsically through pleasant feedback. In other words, the motivation
to learn the participants of PLTMH training is an internal factor that can influence their participation in PLTMH training based on the learning design developed by Widyaiswara [13].

3. Methods
The total of sample in this research 66 people of PLTMH training consisting of 33 people who follow PLTMH training with expository learning model as control group, and 33 people follow PLTMH training with model of collaborative learning as experiment group. Both groups consisted of 53 people who have high learning motivation, and 13 people who have low learning motivation. Figure 1 shows the research design with experimental research method Treatment by level 2 x 2.

| Instructional Model | Collaborative Instructional Model (A1) | Expository Instructional Model (A2) |
|---------------------|----------------------------------------|-------------------------------------|
| Learning Motivation |                                        |                                     |
| High Motivation (B1)| 25                                     | 28                                  |
| Low Motivation (B2) | 8                                      | 5                                   |

Figure 4. Design of treatment by level 2 x 2.

4. Discussions and conclusions
The average of training result of PLTMH training participants who study with expository learning model which has high learning motivation is 79,18. For PLTMH training participants who have low learning motivation 77,14. The average of training result of PLTMH training participants who study with collaborative learning model which has high learning motivation is 81,94. For PLTMH training participants who have low learning motivation 80,93. Based on the average of PLTMH training result with two models of learning, it appears that the high and low motivation of study participants of PLTMH training does not interact directly with the learning model chosen by Widyaiswara diklat PLTMH. Table 1 shows the average of MHP scores based on the level of learning motivation and learning model.

| Instructional Model | Learning Motivation Criteria | Mean    | Std. Deviation | N   |
|---------------------|-------------------------------|---------|---------------|-----|
| Collaborative       | Low                           | 78.9300 | 7.62541       | 8   |
|                     | High                          | 81.9436 | 9.02420       | 25  |
|                     | Total                         | 81.2130 | 8.69004       | 33  |
| Expository          | Low                           | 77.1429 | 5.34522       | 5   |
|                     | High                          | 79.1837 | 7.88646       | 28  |
|                     | Total                         | 78.8745 | 7.52341       | 33  |
|                     | Low                           | 78.2426 | 6.65295       | 13  |
|                     | High                          | 80.4855 | 8.47436       | 53  |
|                     | Total                         | 80.0437 | 8.15053       | 66  |

The purpose of this study is to obtain a complete picture of the influence of learning models and learning motivation to score learning outcomes in the eyes of PLTMH training. Pursuant to result of analysis of
variance of two lane on line of learning model got significance value p = 0.384. The result of significance is greater than the value of significant level (α> 0.328). This shows that the score of learning outcomes of PLTMH training participants who attended the training with collaborative model of 81.21 higher than the average score of learning outcomes of PLTMH training participants who followed the training with exposure model of 78.87. This means that training activities that provide more opportunities to PLTMH training participants work in collaboration to solve learning problems more precisely than the use of expository model, where the training participants only listen to material described by Widyaiswara. This is in line with the results of Valdivia’s study, et al that the learning outcomes with the collaborative learning model are higher in reasoning capacity and deduction than the training results with the expository model [14]. Implementation of collaborative learning model makes the training participants will better understand the subject matter diklat given by Widyaiswara. This is because collaborative learning models help training participants to utilize learning resources and skills for each other (asking for information on each other, evaluating ideas for each other, monitoring each other's work, and members in the group can actively interact with various experience and take on different roles). Each individual is interdependent and responsible to each other. This is in line with Kim's research results, that within the classroom, Widyaiswara many adopt formal learning, where the group of training participants can donate a large-scale project because someone will not be able to complete the work in the same timeframe. Large-scale projects maximize the group's thinking power, which produces more sophisticated and complex ideas, and turns capitalized on each student's training assets [15].

The result of the analysis of two-lane variance on the line of learning model and learning motivation got the significance value of p 0.852 ≠ 0, meaning there is no interaction between the use of learning model and the learning motivation in giving influence to the learning result of the training participants in the eyes of PLTMH training. This means that the learning outcomes of participants PLTMH training is more influenced by the use of learning models even though the training participants have high and low learning motivation. Learning motivation is not related to the model of learning, so that any learning model used by Widyaiswara, the learning outcomes of training participants get a good value. The absence of interaction between the learning model and the motivation to learn can be viewed from the side of the initial analysis of this study, especially in determining which internal factors that can affect the process and results of the MHP scheme. This is based on the results of House research which concludes that the use of instructional models of instructional collaborative design positive with the role of motivation participants training and confidence. This means not enough just to consider the motivation factors of training participants in general, but also the factor of confidence [16].

Based on the result of the research, it can be concluded that (1) Collaborative learning model can be used as an alternative in the PLTMH training process because the Collaborative learning model facilitates the training participants to understand the material given by collaborating with their group especially in finding the solution and making the decision. For Widyaiswara PLTMH training implementing Collaborative learning model should be able to guide the training participants to be able to utilize learning resources and skills of each other, monitor the work of each other, and members in the group can interact with each other. (2) Motivation to learn is an aspect that can be observed so that, in the implementation of PLTMH training both training providers, Widyaiswara and other related areas more review again in doing observations during training activities take place. The need for assessment of the training participants by fellow training participants in the hope that the training organizers can obtain good data and can perform a deeper analysis, especially the internal factors of training participants.

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