THE ROLES OF VOCATIONAL EDUCATION IN THE PREPARATION OF PROFESSIONAL LABOR FORCE

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DEVELOPMENT OF STUDENTS’ METACOGNITION AT THE INDUSTRIAL ELECTRONICS VOCATIONAL PROGRAM IN VOCATIONAL HIGH SCHOOLS

Purnamawati
Universitas Negeri Makassar
tari_purnamawati@yahoo.com

Abstract
The purposes of this study are: developing students’ metacognition in Industrial Electronics Vocational Program (IEVP) in Vocational High School that satisfy the criteria for valid, effective, and practical. The procedure of development of students’ metacognition in IEVP, through four stages, which consist of: (1) initial investigation stage, (2) the design stage, (3) the realization stage, and (d) stage of testing, evaluation, and revision. The results show the following development. First, the development of students’ metacognition in IEVP can be done by training the students’ skills through: (1) Self-regulation learner, (2) the ability to think, and (3) self study. Before being used in learning, this development must be tested, namely (1) individual trials and (2) small group trials. But the results of field trials on the development of students’ metacognition IEVP is not satisfy the criteria of practicality and effectiveness. Therefore, the development of IEVP students’ metacognition requires revision in the terms: component syntax (combining phase III and phase IV). Second, the researcher recommends to the researcher in education who wishes to follow up this study for: (1) carry out the implementation, utilization, and empowerment of students’ metacognitive, both in learning and in solving problem, (2) empowerment through integrating the components of metacognitive in each IEVP instructional package, (3) the scope of this study is limited to learning the IEVP in VHS. It is therefore advisable to research the field of vocational education for advanced research with learning approaches, learning materials, and levels of education (classes) are different, to increase the repertoire of knowledge, especially the implementation, utilization, and empowerment of cognitive function and metacognitive of students both in learning and in solving problem.

Keywords: Development, Industrial Electronics Vocational Program, Students’ Metacognition, Vocational High School

1. INTRODUCTION
Development of science and technology in the current globalization era, requires qualified human resources and able to compete with other nations. In addition, the education required responding more quickly and accurately to changes that are taking place in society. Therefore, education becomes increasingly important in accordance with the demands of globalization, improving the quality of human life, and ensuring social, technology, and economics development.

Efforts to deal with these changes, actually requires educational institutions to produce graduates who can compete, adaptive, and anticipatory of the various changes. Pardjono (2003:25) states that for educational institutions still exist in the face of change, especially the structure of employment, the graduates are required to have communication skills, interpersonal, leadership, team working, analysis, academic discipline, understanding about globalization, well trained and ethics, as well as having foreign language proficiency. On the other hand, in the globalization era that characterized by a tendency of increasing complexity of technology equipment, and the emergence of corporate restructuring movement that emphasizes a combination of technology and human qualities. It causing the world of work will require the humans who can take the initiative, critical thinking, creative, and proficient in solve the problem (Waras Kamdi, 2008:4). Therefore, the relations “man-machine” is not longer a mechanistic relationship, but of a communicative interaction that require higher order thinking skills.

This trend began to respond to the world of education in Indonesia. It is characterized by the implementation of four educational approaches, namely: (1) life skills-oriented education, (2) curriculum and competency-based learning, (3) production-based learning, and (4) broad-based education. The new orientation of education, making educational institutions as life skills educational institutions that aimed at achieving competence. In addition, authentic and contextual learning processes to produce products that are valuable and meaningful, as well as a broad-based education service delivery through various channels and levels of education that are flexible multi-entry multi-exit (Depdiknas, 2002-2003).

Qiuye, et al. (2008) suggested that graduate education does not only need to learn, but also need to
know how to learn that effective and efficient, especially in learning lab. Therefore, the concept of metacognition is revised for use in electric power system experiment. As a result metacognition will accelerate the efficiency of learning, especially in learning lab. The combination of improvements and innovations based on the use of metacognition learning practices is one solution to solve the problem. The results of Qiuye, et al.’s study found that metacognitive strategy in experimental units and how strategies can be adopted to improve the effectiveness of learning. The study was carried out repeatedly about the metacognitive aspects in lab learning of electrical engineering. Thus, meta-cognitive learning is very important in practice in electrical engineering in producing graduates who are able to learn independently to improve the ability (competency standards that must be mastered).

The results of Billett’s (1994:29) study show that the frequency of various categories of knowledge needed by workers in various types of broad and consistent work. In addition, the nature of the learning experience is provided in the workplace were reported as consistent. Furthermore, it was found that procedural knowledge, the most frequently used (59%, 62%), followed by propositional knowledge (18%, 8%), and dispositional knowledge (conditional) (23%, 30%) is quite interesting. These results demonstrate the importance of metacognitive knowledge in carrying out the work in the world of business and industry. Thus, the learning activities of expertise field on vocational education need metacognitive knowledge in carrying out good employment practices.

Based on the background and problem identification, the problem formulated in this study, namely: “How to develop students’ metacognition through the learning of industrial electronics vocational program in Vocational High Schools (VHS) that meet the criteria of validity, practicality, and effectiveness?”

2. RESEARCH METHOD

Procedure development of metacognition students through the learning consists of two main stages, namely pre-development phase (research phase) and the development stage (development stage). Phases of pre-development stage include: the initial investigation, design, and realization/construction. Initial investigation phase is the phase of the investigation and information gathering, particularly relating to the field of industrial electronics expertise. Based on the results of initial investigation, then set/selected the methods of learning, design the development of students’ metacognition, guidelines for students’ metacognition development uses the instrument of assessment criteria (rubric), and guidelines for development and its instructional package (design phase). Furthermore, in the realization phase, the researcher arranged the development of students’ metacognition through instructional package, validation about the feasibility of prototype of students’ metacognition development that has been prepared.

The main activities at development stage are related to test, evaluation and revision phase. This phase focused on the activities of field trials (empirical validation) of the prototype development of students’ metacognition, as a follow-up of the conceptual validation by experts and education practitioners. In this stage, it is expected to obtain empirical evidence that the development of student’s metacognition have met the criteria developed by a valid, practical, and effective. To this end, it will be pursued the steps at this stage include individual trials and small group trials.

The subject of the trials is consists of: (1) vocational students and (2) teachers’ in industrial electronics vocational program. While, the data that obtained in this study is quantitative and qualitative data. The data are obtained based on the results of the test: validity, practicality, and effectiveness of students’ metacognition for IEVP through instructional package.

Instruments as a data-gathering tool are intended to measure the validity, practicality, and effectiveness of the development of students’ metacognition in the instructional package. The validity of the students’ metacognition development uses the instrument of validation sheet. The practicality of of the students’ metacognition development uses the instrument of observation sheet. Observation sheet in question is the observation sheet about feasibility of students’ metacognition through the instructional package. The effectiveness of students’ metacognition through the
instructional package use the instruments: (1) observation sheet of students’ activities in learning, (2) observation sheet of teacher’s ability in managing learning, (3) questionnaire of students’ response to the components and learning activities. Before use, these instruments are assessed/validated by the 6 (six) validator experts & practitioners of electronic engineering education, which consists of: 3 (three) lectures and 3 (three) practitioner (teachers).

3. RESULTS AND DISCUSSION

3.1 Results that obtained in this study

3.1.1 Investigation Phase

First, the instructional packages that are used in the IEVP today are prepared on KTSP 2006 curriculum that outlined in the syllabus. This system is passive. It is shown by the dependence of students on the material/jobsheet from teacher, so that there will be stagnation in scientific development.

Second, the teachers have not made innovations in learning by including some important additional components, such as question-answer and discussion or test the initial capability of students on jobsheet that will be practiced. Teachers are less well monitored the learning process, so that the feedback between teacher-student less conducting.

Third, the results of discussions with some industrial electronics teachers at some vocational high school in the Makassar city about learning lab conditions, obtained the results: (1) schools have been using KTSP 2006 and the spectrum of secondary vocational education skills, but the process is still teacher-centered learning and occasional use of cooperative learning (adapted to the material). All information about the learning concepts are described by the teacher, except for some problems that prompted the teacher to be done by students, (2) there is no instructional package that used by teachers to develop students’ metacognition skills. Learning is still using a conventional yet well structured. As a result, the learning is done without good planning, (3) students’ handbook that is used is a book on the market, according to the wishes of teachers. Thus, teachers and students just follow the sequence of materials (teaching materials) and measures such as the author desires, (4) tasks in general continues to be routine, that is only in the form of working on the problem, so the lack of training students to use knowledge and skills metacognitive in solving problems and constructing; (5) giving feedback is rarely done by the teachers so that students are less motivated to learn themselves and do exercises when not assigned by the teacher, (6) the ways to evaluate learning outcomes dominant emphasis on the mastery of the material substance.

3.1.2 Design Phase

First, the design of the development of students’ metacognition through the instructional package (DSMIP) is to establish format guidelines. The format guidelines DSMIP are contained steps and guide the implementation of the development of students’ metacognition through the instructional package. Introduction contains things that become the main consideration DSMIP. DSMIP contains 5 (five) main components: syntax, social system, principles of reaction, support system, and the instructional & accompaniment impact. While, DSMIP guidelines contain things such as: the tasks of planning, organizing classes, helping students’ activities, handle the situation individually/group learning.

Second, the design of instructional package, namely: lesson plan, lab guides, teaching materials microprocessor, and jobsheet. While, design of instruments: validation sheet, observation sheets of teacher’s ability in managing learning, observation sheet of students’ activities, and questionnaire of students’ responses towards learning to use DSMIP.

3.1.3 Realization Phase

Based on the results of the investigation phase and design phase, and then reflected and examined again to be directed to the development/realization of a prototype, namely: (1) the guidelines of development of students’ metacognition through the instructional package, and (2) instruments.

3.1.4 Test/Evaluation/Revision Phase

Test/evaluation/revision phase is obtained: (1) the validation results, (2) the result of experts & practitioners assessment toward feasibility and effectiveness of the development of students’ metacognition through the instructional package, and (3) the results of field trials.

a. Validation results of the development of students’ metacognition through the instructional package, and Instruments. DSMIP validity, and the instrument was rated by 6 (six) validators. Generally, the validator gives value or directly notes on DSMIP, and instruments. Based on the results of data analysis found DSMIP guidelines and its instruments declared valid with minor revisions.

b. Feasibility and effectiveness DSMIP

One way to determine feasibility and effectiveness is through the assessment of experts & practitioners who state that DSMIP can be used in the learning process. Assessment results feasibility and effectiveness DSMIP, are: (1) Feasibility DSMIP, assessment results of feasibility concluded that DSMIP can be carried out in the learning process. Therefore, in theory DSMIP meet the criteria of practicality, and (2) effectiveness DSMIP, assessment results of feasibility DSMIP is
effective to implement. Therefore, in theory DSMIP meet effectiveness criteria.
c. Field trials
Field trials aim to know that the real DSMIP field meets the criteria of practicality and effectiveness. But the test in this study is limited in individual trials and testing a small group on SMK Negeri 5 Makassar. Description of data analysis based on the implementation of the trial is as follows.
(1) Description of practicality DSMIP
Practicality (Feasibility) is shown by the ability of teachers to manage learning. The ability of teachers to manage learning for every aspect that is observed is as follows.
Components of the syntax, the first five meetings there are several stages in the syntax is not performing well, because the teacher is less good or less than perfect in its execution. The observation of feasibility DSMIP syntax component to each meeting, are: Stage I performing well; stage II performing well; stage III at the first meeting and the second less than perfect implementation; stage IV at the first meeting, second, third and less than perfect implementation; stage V performing well; and stage VI of performing well.
Components of the social system, the first five meetings there are aspects in the social system is not performing well, because the teacher is less good or less than perfect in its execution. The observation of feasibility DSMIP social system, are: cooperation among the members of the group at the first meeting until the fifth performing well; cooperation of teachers and students at the first meeting less than perfect execution; freedom of expression well done; relationship between the individual and group performing well.
Components of the reaction principle, the first five meetings there are aspects of the reaction principle is not performing well, because the teacher is less good or less than perfect in its execution. The observation of feasibility reaction principle, are: the teacher creates a learning atmosphere execution group performing well; teachers provide adequate learning resources and the second at the first meeting less than perfect implementation; teachers lead students to stay in a job well done implementation; teachers donated scaffolding to the individual/group practice performing well, the teacher gives feedback implementation done well.
At first five meeting there are five aspects of the support system is not performing well, because the teacher is less good or less than perfect in its execution. Observation result of feasibility support system, are: learning implementation plan at the first meeting less than perfect execution; practical guide its implementation performing well; teaching materials practices-performing well; job sheet practices-performing well; achievement test implemented well. Based on the results mentioned above, it was concluded that for not all the aspects observed in the study by using DSMIP meet the criteria of practicality.
(2) Description of DSMIP effectiveness in the implementation of trial
The effectiveness demonstrated by activities students in learning, student response to learning that uses DSMIP. The effectiveness of learning using DSMIP is as follows. Percentage of time used for each student activity indicators at each meeting, namely: the percentage of activity obtained that students apply the skills predictions for first and second meeting has not met the criteria of an ideal percentage of time interval specified. In addition, for the first meeting of students do not perform the skills in planning and classroom learning a bit noisy. Therefore, it was concluded that for the first and second meeting of the effectiveness of learning has not been fulfilled in terms of student activities. But for the third meeting, fourth, and fifth-learning effectiveness are met.

Student response to learning that uses DSMIP
Result analysis of student responses to learning that uses DSMIP are as follows.
1. Students gave a positive response (feel good) to: (1) learning activities that use DSMIP, (2) jobsheet used, (3) the learning atmosphere in class, and (4) the way teachers teach. However, students felt the learning activities that use DSMIP not a new thing.
2. Students gave a positive response (interested in following the next lesson) on learning activities that use DSMIP. In addition, students gave positive responses (understand clearly): (1) the language used on jobsheet; and (2) how teachers teach in the classroom.
3. Students gave positive responses are: (1) interested in the appearance (text, illustrations/pictures and location images) contained on jobsheet; and (2) interested in the performance of teachers teaching.

Based on the results of the trial, found that DSMIP not meet the criteria of practicality and effectiveness, thus requiring revisions before the next trial. Revised DSMIP taken as follows.
1. Component syntax
Stage III: Organize students into groups.
Stage IV: Hands-guided.
Based on the results of an observer monitoring the two stages are not performing well, so that the second phase of join.
2. Components of the social system
Components of the social system performing well, except for teacher and student relationships at the first meeting less than perfect implementation.
3. Principle component reaction
Components of the social system performing well, except for the provision of adequate learning resources by teachers at the first meeting and both less than perfect implementation.

4. Component support system
Support system components performing well, except for learning the implementation plan at the first meeting less than perfect implementation.

3.2 Discussion of Research Results

In this section presented a discussion of research results, specific findings, and limitations of the study. The results relating to the conclusions from the results of data analysis, in order to obtain good quality DSMIP, it means that meet the criteria of validity, practicality, and effectiveness. Specific findings are the findings obtained during the research process related to the condition of students as research subjects. While the limitations of the study in question is DSMIP development strategy, particularly in the trial process.

3.3 Discussion of Results DSMIP

Products in this research are of good quality DSMIP. Therefore, through the development phases of learning, acquired DSMIP good quality that meets criteria validity, practicality, and effectiveness. The result of the development process of learning is as follows.

First, the development DSMIP tailored to the principles and characteristics of learning in Vocational High School then enter the aspects metacognition (metacognitive knowledge and metacognitive skills) into instructional package. Based on the results validity, obtained DSMIP valid criteria. These results, in accordance with the opinion Neeven (1999) which states that a learning material (in this case DSMIP) is said to be valid, if satisfied: (1) learning material that was developed based on a strong theoretical rationale, and (2) there is internal consistency between the components of the learning materials developed. Therefore, DSMIP developed, meet the criteria for valid, and there is internal consistency DSMIP developed.

Second, theoretically DSMIP meet the criteria of practicality. Theoretically, the results of expert appraisal & DSMIP practitioner states that can be applied in the classroom/laboratory. Being empirically, the results of field trials showed that DSMIP not meet the criteria of practicality in terms of indicators of the ability of teachers in managing learning. However, indicators of the ability of teachers in managing learning interesting for discussion. Given the teacher in SMK Negeri in Makassar had never perform learning using DSMIP. Learning undertaken by teachers so far using conventional learning approach more dominated by the teachers, so students just listen and record what is delivered by teachers. Students are not given the opportunity to develop their own abilities. This learning process, resulting in students being passive; not used to construct their own knowledge or the solution; less to ask questions if there are not students understand the material, and less express his thoughts or his own opinion on the content being student learning. To overcome these factors, the researchers held discussions with teachers about DSMIP, then ask the teacher of learning activities using DSMIP in parallel classes that are not class-test. Consequently DSMIP practicality criteria based on indicators of the ability of teachers to manage learning for the last three meetings, including the category of at least good enough. These results, in accordance with the opinion Neeven (1999) which states that the practicality is associated with two things, namely: (1) Do the experts & practitioners claim that the learning materials developed can be applied, and (2) In fact in the field, learning materials developed can be applied. In addition, this result also undermines the assumption that states that "the ability of teachers to teach, especially in vocational education in Indonesia is very limited", so the assumption is not massive.

Third, the effectiveness of DSMIP determined by 2 (two) indicators, are: students in learning activities and student responses to DSMIP. In the trial implementation, the indicators of student responses to DSMIP meet the criteria of effectiveness, while students in the learning activity indicators have not met the criteria of effectiveness.

Basically, learning is said to be effective, if the learning objectives achieved. According to the constructivist view learning goal will be achieved, if the students actively construct knowledge in learning. Therefore, the effectiveness is also influenced by the activities of students in learning. This is in line with the opinion of Eggen & Kauchak (2006) which states that learning is said to be effective, if students are actively involved in organizing and finding information (knowledge) and the relevance of the information provided. Students are not just passively receiving knowledge given by the teacher. Learning outcomes like these not only enhance students’ understanding and absorption, but also enhance their thinking skills. Thus, in learning to note how students' involvement in the organization of lessons and knowledge. Because of the more active students, the achievement of competence the greater the learning outcomes, then the learning are effective. In addition, the learning is said to be effective if it reaches the desired goals, both in terms of learning objectives and student-learning outcomes are maximized.
4. Conclusion

The results of development shows the following. First, the development of student’ metacognition in IEVP can be conducted by training the students’ skills through: (1) Self-regulation learner, (2) the ability to think, and (3) self study. The results of individual and small groups produced that the development of students' metacognition in IEVP not satisfy the practicality and effectiveness criteria. Therefore, the development of student metacognition IEVP requires revision in the components of syntax (combining phase III and phase IV).

5. Suggestions

Based on the conclusion of the study, researchers gave the following advices to practitioners who are interested to apply DSMIP in the implementation of learning in the classroom.

1. DSMIP that is produced, expanded testing has not been made and implemented widely in schools, especially at the Vocational High School (VHS). Therefore, to determine the effectiveness DSMIP, it is recommended to teachers and other researchers to conduct testing and implement DSMIP expanded on a wider scope in schools, especially in VHS. Thus, the results of research related to DSMIP can be used as a reference for developing students' metacognition.

2. For vocational high school teachers who wish to apply DSMIP on other materials, can develop their own instructional package that needed by considering the relationship of metacognition aspect and the characteristics of the subject matter that will be developed.

3. Teachers who seek to improve the mastery concepts and students ability to solve problems, and increase student interest in learning, the implementation of DSMIP can be used as an alternative answer to these problems.

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