THE DEVELOPMENT OF INSTRUCTIONAL DESIGN MODEL OF PRODUCTIVE SUBJECT IN THE IMPLEMENTATION OF COMPETENCE-BASED CURRICULUM IN TECHNOLOGY AND ENGINEERING TVET

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Abstract

This research is aimed at producing a competence-based instructional design model, which is in accordance with the demand of productive group subject characteristic in TVET Curriculum. The instructional design model is intended for accommodating every demand of competence aspect according to its level, and explicitly documented. In addition to that, the model is expected to facilitate related teachers in achieving curriculum demand proportionally (competence standard), that is the achievement of minimum completeness criteria (KKM). The approach applied in this dissertation is research and development (R&D). Based on analysis result, a competence-based lesson plan model with following components: (1) clear learning objectives; (2) indicator description uses operational words which are measurable and represents all competence aspects; (3) lesson plan shows student-centered learning; (4) the development of learning assessment tool describes all indicators that need to be achieved, is able to facilitate teachers in learning process. This is proven by students’ learning results (cognitive aspects) which are positive and significant, with high $N_{gain}$ ($N_{gain} > 70$), and their ability in easily keeping up with affective and psychomotor aspects. The finding recommends teachers of TVET, especially they who teach productive group subjects, to be able to develop competence-based lesson plan. This accords with Government Regulation of National Education (Permen Diknas) No 41 Year 2007 about Process Standard. Meanwhile, further research is needed to develop competence-based module model which is based on competence-based lesson plan.

Keywords: Instructional design, Competence-Based

A. Background

The quality of TVET curriculum implementation, especially for automotive mechanic program, can be seen from the students’ achievement, as found in SMK (Vocational School) Negeri 6 Bandung which is a sequential SMK in West Java. The data collected from automotive mechanic program competence test, which was joined by 109 SMKN 6 Bandung trainees in 2006/2007,
shows that there were only 9 (nine) trainees with A qualification, while other 61 trainees got B, 34 got C, and the rest 5 (five) trainees got D (failed). The data reveals that there is only 8.26% trainees who have ability to compete, whereas 91.74% trainees still have inadequate competence. It also refers a fact about the achievement of “AUTO 2000 special class”. In spite of being tutored by ASTRA AUTO 2000 instructors using existing standard, up to 3rd generation, no student has ever got AUTO 2000 certificate. In addition to SMK Negeri 6 Bandung case, there was also evidence from SMK Negeri 8 Bandung. They administered competence tests in academic year 2008/2009 using the standard from the Certification Institution of Automotive Technician Profession (LSPTO). Of 320 students, 42 students passed the test (13.13%). The numbers mean that the outcome of school learning process is still far from LSPTO standard expectation. This is a challenge for that school, especially the teachers, in improving learning process quality. Educators, as stated in the Regulation of National Education System No 20 Year 2003 Chapter XI Section 39 – Article (2), is a professional who has responsibility for planning and administering a learning process, assessing learning outcomes, giving guidance and training, and doing research and social service, especially the teachers in the higher education institute. According to this regulation, the development of instructional design or lesson plan is an early step a teacher should do during his/her professional job. Systematic instructional design is expected to ease learning process, where the learning itself is a system, with instructional planning or lesson plan (RPP) as one of its sub systems. Meanwhile, the lesson plan that should be developed by SMK teachers has a goal to meet the demand of “process standard” is competence-based RPP. SMK teachers who are going to apply the Piloting in International-Level School Standard (RSBI) or even International Level Standard (SBI). One of the prerequisite sites is the school has to apply International Standard Organization (ISO) management, in which all school activities have to implement as what they are written (planned) and planned to do. Therefore, everything the teachers do in the classroom has to apply the instructional design.

The development of the instructional design or lesson plan is teacher’s early step in doing his/her professional tasks. Systematic instructional design is expected to support a learning process, where the learning itself is a system, with instructional planning or lesson plan (RPP) as one of its sub systems. As Gagne said in Atwi Suparman (2001:8), learning system is a set of activities that influence students so that learning process happens. That set of activities can be moved by the teacher, so that it’s called teaching. It can also be moved by the students themselves. Whoever the controller, the activities should be systematically “planned” so that it can be called learning activity. The learning activity is an elaboration from a document curriculum, which is one of components in educational administration. Therefore, it is clear that curriculum is a very central guidance in the entire educational process. It (curriculum) directs learning process. Instructional design has a vital role in supporting learning effectiveness. Dick and Reiser (1989:3) stated: Instructional design, is a process used primarily to develop a wide variety of instructional materials, …Research has shown that this process is an effective means to plan any type of instruction.

B. Aims of the Study

This research is especially intended to highlight the competence-based instructional design model. The development of this instructional design is adjusted to the demand of process standard competence in RPP making, especially for the subjects included in curriculum of TVET. This is an effort to realize the concept of “competence” in form of lesson plan, so that it can support learning process which is directed to the improvement relate to educational outcome and work world.

Operationally, the aim of the study is oriented on the realization of the making steps of competence-based instructional design for subjects listed in TVET curriculum. Here are the steps of arranging the instructional design:
1. Indicator description of all competence aspects (cognitive, psychomotor, affective) from competence standard/basic competence (SK/KD), including the material coverage and its order.
2. Statement of learning goal (general), which shows learning achievement both for basic competence and competence standard, with the achievement level in each competence aspects.
3. Learning scenario which is developed for every indicator of all competence aspects.
4. Assessment tool and process in evaluating the completeness of each competence aspects.

C. Theoretical Framework

The quality of learning process depends on what a teacher has planned on an "lesson plan". Therefore, as an asset for an easy learning process, a representative lesson plan, this becomes guidance for teachers in performing learning activity. A teacher is a curriculum implementor, who is demanded for interpreting curriculum message/content. As Nana Syaodih Sukmadinata said (1988:212), 'some experts state that whatever a good curriculum (official) is, the outcome does really depend on what the teacher and students do in class (actual)'. Saylor, Alexander and Lewis also said (1981:265), 'that an effective curriculum does not assure better classroom teaching or learning. Thus, two teachers with contrasting teaching behaviors may produce different learning effects using the same curriculum'. Therefore, the role of instructional design developed by teacher is very vital in the context of learning as a system.

Instructional design (desain pembelajaran) consists of two words, which are: “instructional (pembelajaran)” and “design (desain)”. According to Dictionary of Bahasa Indonesia (2001:257), design means: a framework, shape, plan; while instructional (2001:17) means: process, way, make people or living things learn. Meanwhile, if we see the two words as a whole, the instructional design means a framework or plan for facilitating students learn. Dick and Reiser (1989 : 3) formulated the definition of instructional design as follows "instructional design is: a systematic process for designing, developing, implementing, and evaluating instruction”. From this definition, we can see that instructional design is a systematic process for designing, developing, implementing, and evaluating an instruction. What is designed, developed, implemented, and evaluated is certainly related to curriculum content that should be mastered by the students. Reece amd Walker (1997 :22) declared that "The lesson plan is intended to help you to proceed logically without being bound to your notes, but, even with detailed planning, cannot be catered for, so the lesson plan is essentially tentative and flexible". This definition implies that the instructional design is intended to help teacher, where the design is rationally processed. Essentially, instructional design is tentative and flexible. Burden and Byrd (1999: 19) added that "Planning for instruction is a critical element in the instructional process. Carefully designed, comprehensive plans will have a positive effect on student learning”. Instructional design is a basic element in an instructional process. A plan which is comprehensively designed will have a positive effect on students learning.

Meanwhile, Stolovitch and Keeps (2003: 168) claim that “A design document for learning program is analogous to the blueprint for a house. It defines and describes the final products. … The design document also gives a brief description of the instructional events and evaluation methods that will be used to present the content”. Instructional design documents can be analogized to blue print for a house. The design defines and represents the final outcome of an instructional program. Besides, instructional design also gives general information about instructional process, method, and evaluation that will be used to present the material. Mulyasa (2007 : 213), in the context of school-based curriculum, suggested that:

Lesson plan is basically a short term planning for estimating or projecting on what will be done in learning process. Therefore, lesson plan is an effort to estimate the learning activities. Lesson plan needs developing in order to organize the components of competence-based learning.

The quality of learning process depends on what a teacher has planned on a "lesson plan". Therefore, as an asset for a smooth learning process, a representative lesson plan, used as guidance for teachers in performing learning activity. A teacher is a curriculum implementor, who is requested for accurately interpreting curriculum message/content. As Nana Syaodih Sukmadinata said (1988:212), 'some experts stated that whatever a good curriculum (official) is, the outcome really depends on what teacher and students do in the class (actual)'. Saylor, Alexander and Lewis also said (1981:265), 'that an effective curriculum does not assure a better classroom teaching or learning. Thus, two teachers with contrasting teaching behaviours may produce different learning effects using the same curriculum’. Therefore, the role of instructional design developed by teacher is very vital in the context of learning as a system. This is similar to what R. Ibrahim and Nana Syaodih (2003 : 55) suggested, that is:

In a situation where instruction is a system, instructional planning has a very important role since it determines the implementation and evaluation stages. As a system, instructional unity is not only between learning process components, but also between one stages and another.
Jerrold E. Kemp (1994) stated that "How should we design an instruction so that the goal of the program can be effectively and efficiently achieved? The answer is by systematically uniting various vital elements". Instructional design is a main vital step a teacher should do. As Burden and Byrd said (1999:19):

Planning for instruction refers to decisions that are made for organizing, implementing, and evaluating instruction. Planning is one of the most important tasks for teachers to undertake. When planning decisions, you also need to consider who is to do what, when and in what under instructional events will be over, where the events will take place, the amount of instructional time to be used, and resources and materials to be used. Planning decisions also deal with the issues such as content to be covered, instructional strategies, lesson delivery behaviours, instructional media, classroom management, classroom climate, and student evaluation. The goal of planning is to ensure student learning. Planning, therefore, helps create, arrange, and organize instructional events to enable learning take a place. Planning helps arrange the appropriate flow and sequence of instructional events and also manage the time and events.

Meanwhile, Reece and Walker (1997: 241) stated that:

The process of specifying learning outcomes, before we consider the details of course planning, it can be helpful for you to consider the totality of the process and the components that are involved in the specification of learning outcomes. ... (a) that the development process is sequential in nature starting with the aims of a course and progressing, through increasing detail, to the more specific outcomes of the learning process; and (b) that there are alternative specifications of learning behaviour that can be written as outcomes. These are: (i) product objectives which concentrate upon what the student will be able to do as a result of learning, (ii) process objectives which specify the use and application of knowledge and skills that are required for work, (iii) statements of competence which specify the knowledge and skills required in the workplace for a particular occupation and, in consequence, what is required by employers.

According to Reiser (1996: 4), there are four principles related to the designing of lesson plan. Those principles are:

1) process of planning starts from identifying general and specific goal; 2) learning activities are designed to help students achieve the goal; 3) developing assessment tools that can measure the defined goal; and 4) revising the learning process if students’ achievement does not conform the expectation. Designing lesson plan for TVET curriculum can refer to these four principles.

The department of Vocational School Developer (2008 :4) define the objectives of designing lesson plan:

1. Giving opportunity to teachers to design interactive learning that can be used to explore all students’ multiple intelligences potential.
2. Giving opportunity to teachers to design learning activities that suit students’ needs, ability and school facilities.
3. Easing the implementation of learning process.
4. Easing the implementation of learning process evaluation, as an input for improving the next lesson plan design.

D. Research Method

This study used "Research and Development (R&D)" method. Borg and Gall (1983 : 773) defined R&D as "a process used to develop and validate educational product", that is a process used to develop and validate product of education. Development here means the development of approach model in learning or learning management. With regard to this, the purpose of using the research and development method is for developing a lesson plan used to implement SMK curriculum, especially for automotive mechanic engineering program.

E. Findings and Discussion

1. Findings

In the development stage of this model, researcher developed instructional design model through "Research of Competing Grant" for two years, which was funded by High Education General Directorate of National Education Department, with Treaty of Research Realization No:
According to Amay Suherman's et.al research finding of (2007: 82-86), the lesson plan model is shown as follows:

![Competence-based Lesson Plan](image)

Figure 1. Competence-based Lesson Plan

Then, the instructional design model was tested through limited experiment, wider experiment, and validation test. The finding of the research is as follows:

<table>
<thead>
<tr>
<th>Experiment Stage</th>
<th>( \sum N_{gain} )</th>
<th>Category ( N_{gain} )</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited</td>
<td>0.55</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Wider</td>
<td>0.51–0.66–0.70</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Validation</td>
<td>0.83</td>
<td>High</td>
<td>Positive Significant</td>
</tr>
</tbody>
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2. Discussion

a. The Elaboration of Basic Competence into Indicators

Indicator is a derivation of basic competence that shows students' expressed signs, activity, or response. Indicator is formulated in measurable and/or observable operational verbs. Indicator is used to underline the creation of assessment instrument. Indicator represents all competence aspects. As stated in Government Regulation (Permen) No 41 (2007: 9) "...Indicator of competence achievement is formulated by using measurable operational verbs, which cover knowledge, attitude, and skill". Thus, indicator description is the representation of related basic competence achievement. In indicator description, the existence of indicator description for cognitive (knowledge), psychomotor (skill), and affective (attitude) aspects should be explicitly presented. The mastery of all these indicator descriptions identifies competent student.

Indicators in competence-based lesson plan which were designed in this research have used measurable operational verbs and represent cognitive, psychomotor, and affective aspects. This is in line with criteria of lesson plan design that refers to instructional principles of competence-based curriculum (Prisma Sanjaya, 2005) point 17, which says that students' performance level is defined by comparing work criterion with targeted competence.

In accordance with that, the Council of National Vocational Education 1999 stated that a competence is an ability that is focused by knowledge, skill, and supported by work attitude and its application in performing work task that conform the required criteria. Thus, students can meet all
the competence indicator demands in SMK curriculum and industrial need, so that they are competent in performing work task as required.

b. The Elaboration of Learning Objectives on Competence-Based Lesson Plan

Learning objectives are the anchor and direction that should be used as teachers’ guidance for achieving a competence in learning implementation, where the achievement of competence standard and basic competence is clearly elaborated in lesson plan. This conforms the criteria of lesson plan making which refers to instructional principles of competence-based curriculum (Prisma Sanjaya, 2005) point one about clear learning objectives. According to Reiser (1996 : 4), there are four important principles related to instructional design making. Those four principles are 1) process of planning starts from identifying general and specific goal; 2) learning activities are designed to help students achieve the goal; 3) developing assessment tools that can measure the defined goal; and 4) revising the learning process if students’ achievement does not meet the expectation. Instructional formula in lesson plan (Government Regulation No 41 Year 2007 about Process Standard: 9) “described process and learning outcome expected to be achieved by students according to basic competence”. Thus, instructional formula written in lesson plan is common, that is basic competence, not specific objective. Meanwhile, the details of basic competence demand are presented in indicator description.

According to competence level of cognitive aspects proposed by Bloom (Anderson and Krathwol, 2001 : 31), application level can meet competence demand in SMK curriculum and industrial needs, since the cognitive application level represents students’ ability in implementing learnt procedure in certain situation. In line with that, according to Simpson (Hamalik, 1993 : 67), complex response level of psychomotor aspects represents students’ complex motoric action which is skillfully and efficiently performed. Krathwol, Bloom dan Masia (Hamalik, 1993: 66) also said that response level of affective aspect represents open attitude to reception, ability to respond, and satisfaction from reception.

c. The Elaboration of Learning Scenario in Competence-Based Lesson Plan

Learning scenario is the representation of teacher’s accomplishment in students’ indicator achievement. The term used for this in Government Regulation No 41 (2007: 10) is “learning activity”. Generally, the learning activity consists of three stages: 1) opening activity; 2) whilst activity; and 3) closing activity. Learning scenario represents student-centered teacher-student communication. Every indicator has included teacher-student communication which focuses more on students. This conforms criteria of lesson plan making which refers to instructional principles of competence-based curriculum (Prisma Sanjaya, 2005) point two, which states that learning should focus on students. The arrangement of three activities (opening, main, closing) in learning scenario pays attention to some regulations, as written in descriptor of lesson plan instrument and performance developed in Guide of Educational Profession Training Program in Indonesia University of Education (2009 : 21-22)

d. Instructional Evaluation Instruments in Competence-Based Lesson Plan

The purpose of learning outcome assessment is to know success level of students’ competence achievement on the previously stated learning objectives, so that teachers can take certain decision. This reflects criteria of lesson plan which refers to instructional principles of competence-based curriculum (Prisma Sanjaya, 2005) point 15, which explains that learning outcome assessment is done to get feedback. The learning outcome is written in numbers or letters. Meanwhile, according to Government Regulation No 41 (2007: 11) “Procedure and assessment instrument of learning process and outcome are adjusted to competence achievement indicator and refer to Assessment Standard”.

Learning assessment instrument in developed competence-based lesson plan should have represented all indicators that need to be achieved, including cognitive, psychomotor, and affective aspects. This is in accordance with Mulyasa’s opinion (2005 : 176), which stated that learning outcome assessment covers all competence aspects, that is 1)cognitive aspects related to knowledge level, 2) psychomotor aspects deals with students’ skill level after learning process, and
3) affective aspects, which relates to value and norm showing students’ behavior. Assessment of students’ basic competence achievement uses indicators as its base. The assessment is done using test and non test both in written and oral forms, work observation, attitude, creation scoring on students’ project or product, portfolio, and self assessment. This is in line with criteria of lesson plan making which refers to instructional principles of competence-based curriculum (Prisma Sanjaya, 2005) point 16, which explains that the assessment is done to achieve demonstrative performance. Thus, the competence-based assessment is comprehensively done, on cognitive, affective, and psychomotor aspects. According to Sukamadinata (2004: 151), mastering all these competencies is the target that should be achieved in learning. Burke (1995: 13) proposed six characteristics of competence-based learning. These six characteristics are the characteristics of competence-based learning with all its related aspects.

F. Closing

In order to support learning process optimally and students’ achievement, the instructional design is a must for a teacher, especially for SMK RSBI or SBI teachers. Instructional design documents are not administrative, but they are guidances for performing task in class. It means what is written in instructional design documents is a concrete representation of what teachers will do and what the students will produce.

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