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Theme:

***"The Challenges and Opportunities of Education
in the Global Era Beliefs, Evidences, Issues and Trends "***



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2. Details of the Paper

Title of the Paper (*up to 120 characters*)

Contextual Teaching Learning For Improving Refrigeration and Air Conditioning Course on The Move To Prepare The Graduates To Be Teachers in Schools of International Level

Abstract (*up to 300 characters*)

Process and output of learning on the Subject of Refrigeration and Air Conditioning during this time has not been fulfilled as expected. Student understanding and mastery of the learning materials is still low. Most students have not been able to connect with the material learned in the application of daily life. There are still many students who had difficulty in understanding the learning material, even if not yet able to understand the depth and quickly forget. Student motivation is also low and passive in the learning process, and a few students to ask questions and respond to questions from the lecturers.

It appears that, strategies and approaches that are applied during the learning process is less according to the characteristics of students and learning materials. The problem is (1) How to find the best way to convey various concepts that are taught so that all students can use and remember the concept longer. (2) How the learning materials can be understood as part of each other and form a single whole. (3) How lecturers can communicate effectively with students who always wondered about the meaning of things, the relationship of what they learned. (4) How the lecturer can open the perspective to think of all the diverse students, so they can learn various concepts and the way of connecting to the real life.

Besides, the lecturer need to prepare the strategy so that students have provisions in preparing to meet the market demands, which are currently being encouraged by the government, namely stub international school —Rintisan Sekolah Bertaraf Internasional, RSBI— and school of international level —Sekolah Bertaraf Internasional, SBI—. Strategies which can be used to increase the motivation and the active role of students in the learning process. Therefore, it need to search for strategies and approaches of learning in order to match students with appropriate standards of competency that has been set.

In this paper will be discussed about the implementation of a strategy that can be used to overcome the problems above. The strategy is competency based Contextual Teaching Learning (CTL). From the results of the implementation of which appears to have been made that this strategy had a positive impact on the quality of the lectures and also on the results of students to study subject of Refrigeration and Air Conditioning.

Keyword: Contextual Teaching and Learning, Competency Based Education, Refrigeration and Air Conditioning

Background

Student achievement on the Subject of Refrigeration and Air Conditioning is not satisfactory, as the picture subjects of Refrigeration and Air Conditioning for odd semester 2007/2008 is as follows: from 31 students who take the course of Refrigeration and Air Conditioning only as much as 3 students get the score of A (9.6%), the score of B and B- for 5 students (16.12%), the score of C + and C as many as 12 students (38.70%), and D score of 11 students (32.25%). The achievement of such concern to researchers as well as teacher, subject Refrigeration and Air Conditioning.

Predicted factors affecting achievement of the students and the low quality of the learning process are: teaching materials, media, student ability, motivation and spirit of student learning, teacher ability, and learning strategies used by lecturer. During this time, the process of learning subjects of Refrigeration and Air Conditioning is to use methods of discourse, frequently asked questions and tasks. Delivery learning

materials have been using computer-based media in the form of power point and internet. The material for this study was taken from the various sources of learning such as reference books, materials taken from the internet, training materials, and so forth.

It appears that, strategies and approaches that are applied during the learning process is less according to the characteristics of students and learning materials. The problem is how to find the best way to convey various concepts that are taught so that all students can use and remember the concept longer. Learning how each material is understood as part of each other and forms a single whole. How lecturers can communicate effectively with students who always wondered about the reason and meaning of things, the relationship of what they learned. How can a faculty perspective to think of all the diverse students, so they can learn various concepts and the way to the real life. How do strategies to increase motivation and the role of active students in the learning process. Therefore, the need to search for a strategy and approach to learning is the best and appropriate in order to overcome the obstacles the process of learning and improve achievement of student learning or achievement of competency standards have been defined.

To overcome the obstacle of learning and improve student's achievement of competency need to apply the model of contextual learning. Through contextual learning are expected the concepts of course material can be integrated in the context of real life in the hope that students can understand what he learned better and easier.

Review of Theory

CONTEXTUAL TEACHING LEARNING (CTL)

Contextual learning, according to Blanchard, is a conception of learning that helps teachers / lecturers in the course link the material with real life, and motivate students' to create relationships between student knowledge learned with their lives (Edy Supriyadi, 2007). Through contextual learning are expected the concepts of course material can be integrated in the context of real life in the hope that students can understand what he learned better and easier. In contextual learning, lecturer associate in the context of the framework that he teach in order to improve student learning of meaning (Ome'ara, 2002). Context is very important for all learning situations.

According Nurhadi (2003), there are seven main components of learning that underlie the application of contextual learning in the classroom, including the subject of Refrigeration and Air Conditioning: constructivism, asking (*questioning*), find (*inquiry*), learning community, model (*model*), reflection (*reflection*), and the actual assessment (authentic assessment). Contextual learning in the curriculum can be applied to any subject whatever, and that in any classroom situation.

a. Constructivism

Constructivism is learning theory stated that the people construct or build up their understanding of new experiences based on their early knowledge and believes.

Learning was done well when the lecturers to give students the opportunity to construct new knowledge or understanding.

b. Questioning

Use questions to lead students to think better, than just giving students' information to deepen students' understanding. Students learn to ask questions about the phenomenon, to learn how to prepare questions that can be tested, and learned to ask each other about evidence, interpretation, and explanation. Questions used to encourage lecturers, guide, and assess students ability to think.

c. Inquiry

Inquiry is the art and science to ask and answer questions, through a systematic series of activities. Answer these questions are obtained through the cycle up allegations, preparing the hypothetical, how to develop a hypothetical test, making further observations, and preparing the concept and theory based on data and knowledge.

d. Learning Community

Learning community is a group of students who are bound in the learning activities that occur in the process of learning more deep. Learning Community closely related with the study group (Cooperative learning). Through study groups, students can convey specifics thought, discussion, and exchange ideas that can eventually accommodate the new knowledge. All students must have opportunities to talk and share ideas, listen to other students' ideas carefully, and work to build the knowledge with friends in the group. This concept is based on idea that learning together is better than learning individually.

e. Modeling

Modeling is performance process an example in order to other people think, work, and learn. Modeling does not make students rarely need to think with give hard voice and demonstrate what the students will be done. At the time of learning, teachers often make the model so that students learn how. Lecturers show how to do something to learn something new. Lecturers are not the only model. Model can be designed to involve student

f. Reflection

Reflection allows the way of thinking about what students have learned and to help students describe the personal meaning of their own students. The realization of the reflection can be applied, for example, at the end of the learning lecturers while leaving time so students do reflection. This can be: direct statements about what students today, notes or journal in the student book, student impressions and suggestions about learning today, discussion, the works.

g. Authentic assessment

Authentic assessment is a term/terminology that created to explain the various strategies or methods of alternative assessment (Nurhadi, 2001). Various methods allow students to demonstrate ability to complete tasks, solve problems, or the knowledge of how to simulate a situation that can be found in the real world outside the school environment. Assessment strategies that match the criteria, is meant a combination of several techniques that are tailored to the assessment of the competency claim.

COMPETENCY-BASED EDUCATION

Competency-based education —Kurikulum Berbasis Kompetensi, KBK— applied for the complete lack of conventional education at this time that reality tends to focus on the control subjects without touching the application for real life and just educate the students to just know something, not to the core, all the more to the charity in daily life. Conventional educational practices tend to be abstract, textual, verbal, artificial, and virtual. Meanwhile, the PBK tend to be more real, actual, concrete, real, and touching reality.

According to Slamet PH (2006) Competency-Based Education —Pendidikan berbasis kompetensi, PBK— is an education that is based on competency standards to be achieved, and is required by the students. After the PBK students will be able to do something. PBK so do not just educate students to recognize the value (logos), but also educate them to fathom the values in the conscience (ethics), and more than that the students are expected to apply the values learned in life days (patos).

The definition of competency is the ability to do something different with just the ability to know things. Competence in which (a merger) of the three main elements: knowledge, skills, and attitudes. Thus, people who are competent people who have the knowledge, skills, and attitudes to perform/do something.

PBK has the following characteristics: (1) competency to be achieved by students are identified based on what students should be able to have and do, (2) criteria used to assess each competency that have been formulated, (3) curriculum (teaching materials) developed competency-based standards have been defined, (4) assessment of competency based standards, and (5) learning progress based on achievement of competencies.

PBK as a system composed of a series of components that are related hierarchical as follows: (a) standards of competence, (b) curriculum was developed based on competency standards and competency-based curriculum called / KBK, (c) organizing learning referring to the KBK, (d) evaluation based on standards of competence, and (e) certification of competence to express the mastery level on a particular.

SUBJECT OF REFRIGERATION AND AIR CONDITIONING (RAC)

Subject of Refrigeration and Air Conditioning is a course option for students of Electrical Education Faculty of Engineering State University of Yogyakarta (FT UNY) with a weight of 2 SKS Theory. Competencies that are required in the course of Refrigeration and Air Conditioning is cover the concept of control and the working principles of cooling engines, components of refrigerator, types of engines cooling, such as refrigerator, freezer, types of AC (window, split, package, car, central),

cooling load estimation, designing and installation of the Split AC, and the conservation of energy in the engine cooling (Curriculum FT UNY 2002, 2002).

SCHOOLS OF INTERNATIONAL LEVEL

In the book "Guidelines of Quality Assurance of School/Madrasah on international stages of Primary and Secondary Education in 2007" stated that the International Level School (SBI) is the school/madrasah have fulfilled all education national standards (SNP) and expanded with the standard of education to the one member of the State Organization for Economic Co-operation and Development (OECD) and/or other developed countries that have particular advantages in the areas of education, so have the competitiveness in international circles. From this, SBI is a school that already meet the standards and implementing national education which include: content standards, standard processes, standard graduate competencies, standards and staff's educators, the standard of facilities and infrastructure, standards management, standard costs, and assessment standards. Further aspects of the SNP is strengthened, developed, expanded through the adaptation or adoption of a standard education one of the OECD members and/or other countries that have developed a certain superiority in the field of education and believed to have a reputation of quality has been recognized internationally, and graduates have the ability international competitiveness. Thus, SBI is expected to be able to give assurance that it and the results of education higher than the SNP by default. Guarantee can be shown to national and international communities through various strategies that can be (Kir Haryana, 2009).

Further Kir Haryana (2009) stated that according to the SBI on the draft, then in an effort to facilitate the school in understanding and explaining the operation in education that is capable of ensuring international quality, the SBI can be formulated that are primarily the implementation and fulfilment, of the eight elements of SNP as a key indicator of performance and added at least - in the developed or added or expanded - with a case (termed the element X) is the addition of the contents or be strengthening/ expansion of the eight elements of the education system and other key performance indicators as additional international standards from one of the OECD members and/or other advanced countries. This is also in accordance with the policy described in the Education Ministry that is in the framework of achieving the international quality standard, then each school who has been a stub SBI independent or must meet a minimum of key performance indicators (eight elements of SNP) and additional key performance indicator (consisting of various X). Eight elements of SNP is comprised of: standard of content, the standard of process, a graduate competency standards, standards of teachers and staff's, the standard of facilities and infrastructure, management standards, financial standards, and assessment standards.

To be able to meet the characteristics of the concept of SBI, the school has been implementing and fulfilling the characteristics of the concept of SBI, the school has

implemented and meet the eight SNP elements as key performance indicators of achievement with a minimum of (X) as an additional key performance indicator, then the school can perform at least two ways, namely: (1) adaptation, the adjustment certain elements are already present in the SNP with the standard of education to one of the OECD members and / or other developed countries that have a certain advantage in the education field, believed to have a reputation quality that is recognized internationally, and graduates have international competitiveness, and (2) the adoption, or the addition/enrichment/deepening/strengthening/expansion of certain elements that have not yet present in eight element of the SNP still refer to the standard of education one of the members OECD and / or other developed countries that have a certain advantage in the education field, believed to have a reputation of quality has been recognized internationally, and graduates have international competitiveness (Kir Haryana, 2009).

Thus, schools and madrasah will be doing option or adaptation, need to find partners with the schools that are in countries that are members of OECD are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, the United States and other developed countries such as Chile, Estonia, Israel, Russia, Slovenia, Singapore and Hong Kong that quality has been recognized internationally. The school can also partner with the centre of training, industry, institutions test / international certification such as Cambridge, IB, TOEFL / TOEIC, ISO, centre of study and multilateral organizations such as UNESCO, UNICEF, SEAMEO, and so forth.

Methodology

Learning strategy that is applied in the subject of Refrigeration and Air Conditioning is competency based contextual learning. Contextual learning is a conception of learning that help teachers link the material in lectures with real life, and motivate students to make connections between the knowledge learned with their life. Through contextual learning concepts are expected to study the material can be integrated in the context of real life in the hope that students can understand what is learned well and easily. In contextual learning, link the lecturers in the context of the framework to enhance the meaning of student learning.

Some of the activities that have been made include: 1) develop a competency based contextual learning model of the subject of Refrigeration and Air Conditioning, 2) create a scenario of using the competency-based contextual learning, 3) make the observation, 4) prepare equipment learning, and 5) plan evaluation instrument.

Instruments and data collection techniques are using: 1) the questionnaire, 2) the observation, 3) interview, and 4) tests and tasks. Questionnaire where used to express opinions in the implementation of student learning. Observations used for the lecturers and students in the learning process. Interviews were used to reveal students'

opinions and responses in the learning process. Tests and tasks used to reveal the material control and achievement in student learning achievement of competency standards have been defined. Analysis of data use descriptive analysis in percentage.

Results of Implementation and Discussion

Before the competency-based contextual learning model applied in the learning, first carried out the plan of making learn in the implementation of the learning process so that it can run with smooth and in accordance with the goals. The plan of the outline contains about: competence and learning goals, scenario learning, learning tools and resources needed, and assessment. Scenario learning is focused on learning that is based on the student, learning an interesting, contextually, and refers to the competencies that are required. Planned learning activities based on seven components of effective contextual learning, namely: constructivism, find or inquiry, question, learning community, modelling, and authentic assessment.

a. Cycle I

Implementation of the learning process begins with the submission topic "Introduction to Refrigeration and Air Conditioning and its application" and these competencies demanded on topic. Proceed with the preliminary question to the student's ability to reveal the beginning student. Then students are asked to answer the question by brainstorming and written on the blackboard.

At the core of learning students are asked to discuss the topic given. Then representatives of each group to show the results of the discussion group in front of the class. Lecturer act as a facilitator and verifying results of the discussion. Next lecturer explains learning materials in a manner with the power point presentation and student handouts distributed. During the presentation lecturers always associate the material with the student context. Besides, the lecturer always provokes students to think that students are able focus to knowledge that is associated with the initial student knowledge. Lecturer also provides the solution of the problems with how to find (Inquiry). Next session is carried out frequently asked questions. Lecturer give questions to students to encourage, guide, and assess students' ability to think. Students are given the opportunity to ask to dig up the information and confirm what is already known and directing, aspects of the unknown, and as a means to perform Inquiry. Next students are shown pictures of engines cooling used in various applications. In addition lecturer shows one type of engine cooling, equipment, namely Air Conditioner (AC) that is inserted in the classroom as examples or models. This is so much easier for students to understand the material presented.

Then students are given quizzes or questions to be answered. In addition, lecturer also provide assignment to answer the questions of exercise on the handout that are collected at the meeting which for dating. Lecturer assesses the students with authentic assessment that includes the actual assessment, activeness of students,

quizzes and tasks. Further feedback to be a task has been given. Finally, students are asked to submit suggestions for the improvement of the next.

Evaluation of the success of actions carried out against the process and output learning. Monitored the implementation of learning through observation of the implementation of the learning process conducted by the Observer has to understand the principles of contextual learning. Implementation of the observations focused on whether the seven components of contextual learning, has been effective or not in learning. Results observation of the learning process is shown in table 1 below.

Table 1. Results Observed Learning Process

No.	Effective Implementation of Learning	Components
1.	Constructivism	Yes
2.	Find	Yes
3.	Ask	Yes
4.	Learning community	Yes
5.	Modeling	Yes
6.	Reflection	Yes
7.	Authentic Assessment	Yes

The seven components of effective learning have been applied then it also indicates that learning was running well, running with interesting and please, active students, and meaningful.

Evaluation of learning output can be seen from the score of students' achievement. Assessment conducted with the fact that is in many ways adapted to the characteristics of competence demanded. Assessment carried out on quiz answers, tasks, and student work related to the topic or material on the cycle I. Distribution of scores obtained by 13 students to be as follows: A- (4); B (3), C + (3), C (3 people). The score showed that all students have been successfully, meet the minimum criteria. However, the results still need to be improved so that students who still have C score can be enhanced.

To make a reflection on the learning that has been in progress, students are asked to fill out the questionnaire and proposals for further optimizing the process and output learning. Results reflection can be seen in Table 2 below.

Table 2. Student Results Reflecting On Cycle I

No	Description	Percentage Students
1.	Feel actively involved in learning	100%
2.	Be pleased to learning	100%
3.	Experience difficulty understanding the material	25%
4.	Previous knowledge to help in understanding the material	87,5%

5.	Explanation and examples easy to understand	87,5%
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Proposals to improve student learning is the following: (1) students need to do a presentation in front of the class using a computer media, (2) need to see actual equipment/practice module in the workshop, (3) need to have the task of observation, (4) needs to be done demonstration, (5) media learning need to be enhanced. To improve the process and output of learning is still needed so the cycle or the next round, especially on aspects of the proposed student as mentioned above.

b. Cycle II

In accordance with the results of the monitoring, evaluation, and reflection of the action that has been done in the cycle so I need some more intensive action which was done. This is done in the workshop of electricity utilization there are many of the modules or the equipment of various kinds of engine cooling. This is meant to be; (1) students can view a variety of engine cooling, (2) a lecturer can show or demonstrate how working of engine cooling, and (3) students do a presentation. With this activity is expected to facilitate students in understanding the material in accordance with the competencies that are required. Results monitoring, evaluation and reflection of the implementation of the action on the cycle II were presented as follows.

From the results of the monitoring by the Observer show that the implementation of the learning process has involved all the components for effective learning, namely: constructivism, find, ask, community learning, modeling, reflection, and authentic assessment.

Evaluation of the results shows that the students' achievement is significantly increased. The distribution of acquisition score is as follows: score A- (6 students), B + (2 students), and B- (1 student). Score is the average score of the score of individual tasks, group work, and quizzes.

Result of student reflection on the learning cycle II is done through a simple questionnaire is as follows in Table 3.

Table 3. Student Results Reflecting on Cycle I

No.	Description	Percentage Students
1.	Satisfied of the learning	87,5%
2.	Benefit in learning	75%
3.	Feeling happy in learning	100%
4.	Increased motivation	87,5%
5.	Feeling impressive	100%
6.	Increased understanding	100%
7.	Contextually appropriate learning applied	87,5%
8.	Feel actively involved	100%

Based on the observation, evaluation and reflection on the learning cycle II show that the indicators of success both the indicator of process and output of learning have

been achieved. This shows that learning of the subject of Refrigeration and Air conditioning use the competency-based contextual learning model is effective. Thus the application of competency-based contextual learning model of the subject of Refrigeration and Air Conditioning needs to be continued in the next courses.

Based on the above description to be clear that the implementation of competency-based contextual learning by doing activities in accordance with seven components of effective contextual learning can produce a positive impact, the learning becomes more interesting and please, students more active, students will understand the material in accordance with the competency demand becomes easier. This is in accordance with the results of the reflection made by the students.

On the other hand, when seen from the results of students have shown that indicators of success from the results that have been achieved. This can be seen from the acquisition score of the students. On the cycle I, all students who have reached the minimum score is declared passed (score C) and many of the students exceeded the minimum score. Even in cycle II, acquisition score has increased. No more students who get the score of C, students obtain a minimum score (B-). In addition, it was increasing the number of students who get the score (A-).

Conclusion and Recommendation

Implementation of contextual teaching learning based competencies at Subject of Refrigeration and Air Conditioning appears to have been made that this strategy had a positive impact on both the quality of the process and output/result learning.

From process side, the implementation has successfully increases student motivation, active involvement of student. In addition, it increases situation of learning to be conducive, interesting and making happy. Besides, it makes student easier in comprehending and mastering the competencies that stated on lecture plan. So that teaching learning processes become more has a meaning

From side of result of study, the implementation of contextual teaching learning has successfully go beyond minimum criterion of success. All of student get score above minimum criterion (C). This is shown by achievement of score as follows. In cycle I: A (4 students); B (3 students), C+ (3 students), C (3 students), whereas of cycle II: Score A (6 students), B+ (2 students), B (4 students), and B (1 student). It also showed that there was significantly improvement between cycles II and I.

Based on results of implementation that described above, showed that strategy of contextual teaching learning based competencies is effective, hence it is suggested that in execution of other theoretical lecturing can apply this model. As for practical lecturing that available its equipments has applied this model. The core of contextual teaching learning based competencies is in the lecturing attempting connected subject matter with real life and pushing student for always making relation between knowledge with their surroundings. Moreover, teaching learning processes must refer

to attainment of competencies matching with public demand

Based on the explanation above, it needs for applying of the same lecturing model, that is competencies based contextual teaching learning, for other lectures, either different characteristic of subject matter or different characteristic of student, and in other condition or setting.

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