Giving Task Designing and Presenting Environmental Problem Solving through Environmental Chemistry Course to Improve Character Values i and Knowledge of the Students

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Murbangun Nuswowati
Chemistry Departement of FMIPA UNNES
nuswowati@gmail.com

Environmental chemistry problem based learning model has been done in this research is to give the task to designing and presenting in groups to solve real problems. Students are invited to learn and care about the issue of free (open) problems that are all around us, especially with regard to hazardous chemicals. By analyzing the problem solving that has been done in the previous researchers to solve the problem, it will be easier for students to spark ideas in solving problems. The study was conducted on undergraduate students taking chemistry education courses at the mathematics and natural sciences faculty of Unnes in the second semester of 2013-2014. Class A as experiments class of the lectures performed with the stages of a problem-based approach. Class B as controls class of lectures performed by the usual stages that have been used. The average pre-test scores of the values character marker of the control class is 36 while his 40 for the post-test, thats obtain n-22% of its gain is low. The average pre-test scores of the values character marker of the experimental class is 35 while his 45 for the post-test, thats obtain n-48% of its gain is medium. The average pre-test scores of the knowledge of the control class is 50 while his 65 for the post-test, thats obtain n-48% of its gain is medium. The average pre-test scores of the knowledge of the experimental class is 55 while his 77 for the post-test, thats obtain n-40% of its gain is medium. By giving task designing and presenting environmental problem solving through environmental chemistry course able to increase the values of character and knowledge of students.

Keywords: Environmental Chemistry; Problem Based Learning, Character values, open-ended problems, Knowledge.

Introduction

Prospective chemistry teachers must master chemistry both in terms of concepts, context and application context. In addition, the chemistry teacher candidates must be able to see the important role chemistry/ chemical concepts in the environment, be it benefits, environmental impact, as well as the wise solution to solve the environmental problems caused by chemicals. Therefore, the chemistry student teachers need to be equipped with environmental chemistry lecture.

Students of chemistry education courses need to be told that another reason why this subject is very important for granted, because Indonesia is one country that ratified the Kyoto Agreement relating to the governance of the Earth and the clean environment. In connection with that, the world of education, as well as the executive, who pursue the field of chemistry in particular, need to anticipate this. Thus, if the need to be involved in it, Indonesia is ready to participate with a full understanding of the concept of green chemistry, as well as the implications associated with the implementation in the field, particularly in the field of education. Given the population of Indonesia is very large and diverse community of education background so that all citizens can be fully involved in the implementation of green chemistry, it is necessary preparation underway towards green chemistry, at least for the sake of their own according to their ability to capture the aspirations of environmentally friendly chemicals the.

Until now, the government, employers, and the general public are not aware of the environmental crisis that threatens the collapse of the country even the world. Environment is still regarded as a marginal issue and underestimated. Because it is a business first and foremost thing to do is raise awareness and change the development environment into sustainable development and the environment (Anonymous, 1997).

Teachers are the main tool in the propaganda to students, friends, parents, society as a steering values / attitudes towards human behavioral clean and healthy living environment. Current character education is and has become a trend and important issues in our educational system. Efforts to revive (reinventing)

character education is certainly is not making it up, but it is a mandate that has been outlined in Law No. 20 Year 2003 on National Education System in Article 3, which states that the national education and working to develop the ability to form character and dignified civilization in order to achieve the life of the nation. Environmental education is also one important factor in achieving success in environmental management, becoming a very important tool in producing human resources that can implement the principles of sustainable development.

Character (in the form of logical thought, attitude and action of a person) are inherently more easily built with real action, in critical pedagogy is a social engagement, not merely a way of learning in the classroom, let alone indoctrination. If the back to the front, this is referred to as the hidden curriculum, which is to raise awareness through the praxis of critical pedagogy outside the formal curriculum. Practically, in the social engagement, students and students, for example, to be critical of the school environment and the campus itself, as well as the surrounding communities. One tenet of Freire's critical pedagogy, Ki Hajar and Tan Malaka to be used is: do not deprive the student of the lives of its people, the community.

According to Lickona et al (2007) there are 11 principles of character education in order to be effective: (1) develop core ethical values and performance values as the foundation supporting good character, (2) define 'character' in a comprehensive manner that includes the mind, feelings, and behaviors, (3) use a comprehensive approach, intentional, and proactive in character development, (4) creating a caring school community, (5) give students the opportunity to perform a moral action, (6) create meaningful academic curriculum and challenges that respects all learners, develops character, and helps students to succeed, (7) try to encourage self-motivated students, (8) involve the school staff as a learning and moral community that shares responsibility for character education and attempt to adhere to value-the same core values that guide the education of students, (9) grow together in moral leadership and long-term support for character education initiatives, (10) involve family and community members as partners in the character-building efforts, (11) the evaluation of the character of the school, staff

functions school as character educators, and the extent to which students manifest good character.

Support and attention as intended, at this time still felt inadequate. It is possible to integrate the principle that effective character education. If these issues raised in the study of learning chemistry would be very interesting and meaningful to learners, because the benefits are perceived directly. Learning is intended to solve the actual problems are designed through a problem-based approach or PBL (problem based learning) (Liliasari, 2009). Teaching strategies with the manufacture of paper each with examples of teaching materials dominated enrichment material base learninng problems increase the likelihood of students see the reality what is done, so that students feel kontens and context (Eliane B Johnson, 2002).

The advantages of PBL, designed primarily to help students develop thinking, problem-solving skills, intellectual skills: learn adult roles with experience through a variety of simulated situations; and become independent and autonomous learners (Arends, 2008). PBL learning is organized around real-life situations that avoids simple answers authentic and inviting various competing solutions. Environmental chemistry including science education, currently has three major problems (Rukman, 2006), namely: 1) learning science education adheres to the old paradigm, 2) many teachers still focus on science by mathematics approach; 3) lack of appreciation of the public in science.

Experience of guiding research chemistry lab physics, basic chemistry, chemical foodstuff from 1984 to 2000 most of the students just waste chemicals that are less meaningful (Nuswowati, 2005). Sinaradi (2005) states that science lessons include products, processes and attitudes. Teaching science in Indonesia tend to emphasize the product alone. Australian embassy staff Milawati said Claudia education learning method for making science as something alien from everyday life (Mada, 2006). Many students in Indonesia is not able to link the scientific knowledge he learned with phenomena that occur in Indonesia, because they do not gain the experience to relate it (Word 2007). Learning science in a packaged integrated themes or contexts were able to increase the scientific literacy

of students as a whole in all dimensions of concepts, applications, processes and values contained therein (Permanasari 2010). Binadja (2005) has discussed the development of interactive multimedia learning life skills-based green chemistry SETS relation to the educational vision.

Of the background that has been written, it can be formulated problem: How Environmental Chemistry lecture-based issues that can improve the character of the student? The purpose of this research is to develop the character of students through problem-based environmental chemistry classes to participate menyesaikan environmental problems. Benefits of the research is to produce a model of problem-based environmental chemistry lectures that can improve the character of the students in solving environmental problems.

Research Methods

The study was conducted at the Department of Chemistry Science Faculty UNNES education. Subjects were students of the education department of the contracting semester chemistry courses environmental chemistry. In this study taken two classes, namely class A (23 students) to the experiment, while class B class (23 students) for control. This research includes the study of learning innovation with Non-equivalent designs (pretest and posttest) Control Group Design Nonequivalent Control Group Design (Fraenkel, 1993). In this design the experimental group and the control group was not randomly selected. In this design, both the experimental group and control group were compared, although the group is selected and placed without random. There are two groups were given pretest, then given the treatment, and the latter was given post-test, can be seen in Table 1.

Table 1: Design of Non -equivalent (pretest and posttest) in the Control Group Design Effectiveness Testing Lectures

Group	Pretest	Treatment	Postest
Experiment	O	X1	O
Control	O	X2	O

Remarks:

X1 = Applying Model Class Environmental Chemistry berpendekatan problem-based learning.

X2 = Applying Environmental Chemistry Class Model that has been done so far.

Several types of instruments used for collecting data in this research are tests of character Bookmarks students, test mastery of the material, student questionnaire, student observation sheet. The data collected in this study include qualitative and quantitative data. Qualitative data was carried out on the open observation (field notes) and interviews about the characteristics and student responses to the model and the implementation of problem-based environmental chemistry lecture visionary green chemistry developed at this stage of the field study and implementation of the model. Quantitative data obtained from: 1) the pre-test and post-test, 2) the student questionnaire responses, 3) close observation of the activity of the students in carrying out / collecting tasks in the study of environmental chemistry at the stage of field validation.

Pretest and posttest scores were analyzed with test-Normalized gain (N-gain). Normalized gain scores of Hake (2002) served as the data to measure the effect of the implementation of the course developed. The data analysis was conducted simultaneously between quantitative and qualitative data that Creswell (2008) called triangulation mixed-methods design. The rationale of the design of this data analysis is a shortage of one type of data will be supplemented by other types of data. The quantitative data provides a way to generalize the results of the research, while qualitative data provides information about the context and setting. Qualitative analysis was conducted on the results of open-air observation (field notes) and interviews with students about the characteristics and student responses

to the implementation of the development of problem-based environmental chemistry lecture.

Results and Discussion

Increasing marker revealed the character values of the response marker tests of character values. Problem test consists of 14 questions, each got scoring between 1 to 4 The mean pre-test marker character for the experimental and control classes were 35.00 and 36.04, before the lecture either experimental or control class class values character belongs to the category began to emerge. It is based on grouping: Total score of 14-24 = The values of character has not appeared; 25- 35 = character values began to emerge; 32-45 = The values of the character has appeared; 46-56 = The values of very good character. The post-tests were performed after the application of the model as usual for classes and lecture-based control problem for a class experiment to get the results of the mean values of 40.04 and 45.04 characters, all belong to the category values and the character has appeared for almost experimental class entry very good category.
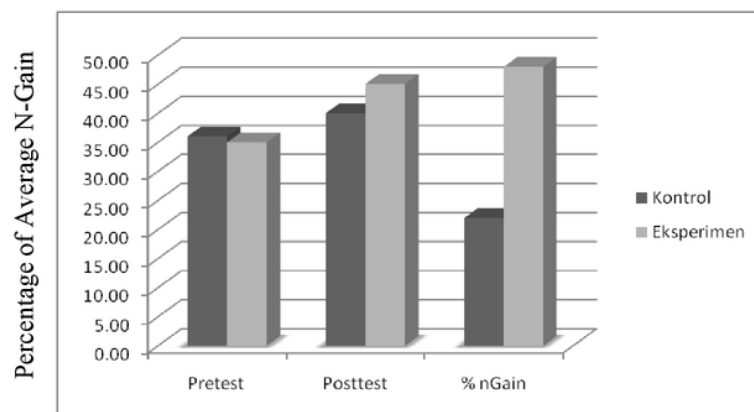

Figure 1 Increased values of Character Student In Class and Class Control Experiment

Through written test marker character values, either experimental or control class class has increased. Pre-test mean score marker values character control class is 36.04, while its 40.04 post-test, to obtain N-22.00% of its gain is low. As for the

experimental class mean score of pre-test and post-test marker-Nili character values are 35.00 and 45.04 to obtain its N-gain 48.00% classified as moderate.

The results showed the application of the model-based Environmental Chemistry lectures problems can increase the values of the characters behave in a student participating in solving environmental problems. Figure 1 shows an increase in markers of character values of the experimental class students better (N-gain = 48%) than the control class students (N-gain = 22%). This is due to the students in the experimental class were actively involved in the process of expressing ideas lecturing want to participate solve problems mainly related to environmental pollutants. The provision of open-ended problems are also demanding to use the data in drawing conclusions (Cooper et al., 2008). Open-ended problems is an activity that can encourage and challenge students to determine the essential environmental issues of interest to be able to resolve the issue. This is in line with the opinions Lickona (2007), about the character of these components when combined as a unity which is the continuous dynamics of the formation of the child in the development of moral virtue.

Increased knowledge drawn from the results of tests of knowledge of all the topics of environmental chemistry lectures that consists of air chemistry, air pollution and how to overcome them; soil chemistry, soil contamination and how to overcome them; water chemistry, water pollution and how to overcome them; chemical problems for public health. The test consists of 20 multiple choice questions with the results shown in Figure 2.
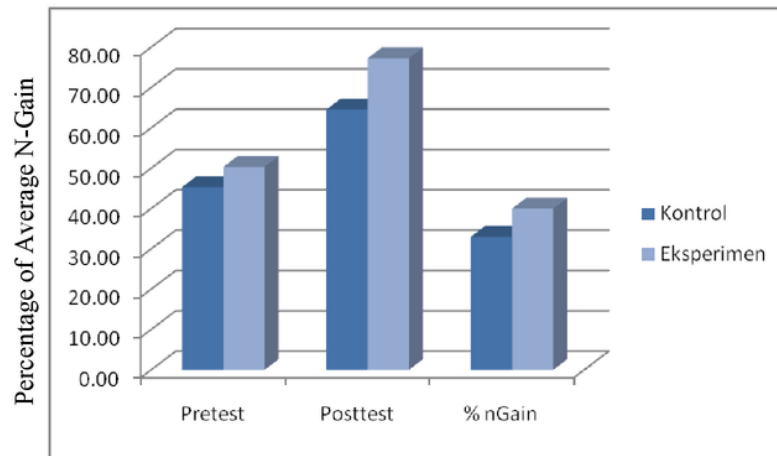
Figure 2 Mean N-gain Knowledge Acquisition Value Class and Class Control Experiment

Pre-test mean score of knowledge was 50.33 while the control group post-test its 64.57, to obtain N-gain its 33% classified as moderate. As for the experimental class mean score of pre-test and post-test knowledge was 55, 33 and 77.28 to obtain its N-gain 40.00% classified as moderate.

Increased knowledge of the value of the control classes were categorized as (N-gain = 33%). Experimental class also includes an increase in the value category are (N-gain = 40%). Piaget explained that the development of cognitive structures is influenced by the interaction of learners with learning and social environment (Solaz-Portoles & SanJose, 2008). Vigotsky also suggested that the learning activities and the development of a person's intelligence is influenced by interactions with others and the social environment (Reigosa & Jimenez-Aeixandre, 2007). Support the environment and adequate facilities to the investigative group activities, field studies, literature, discussion, consultation, presentation, evaluation will give better results. Therefore, it is necessary to arrange models that facilitate problem-based lectures as possible, ranging from identification of the problem, determine the source of the problem, learn to consider the settlement of existing problems, improve problem solving continuously.

Conclusion

Model-Based Environmental Chemistry lecture Problems can improve knowledge of environmental chemistry, but no significant relevance to the increase in the values of the character. Implementation of Environmental Chemistry Class models based problems in the lecture received a positive response from students. This positive response was also reflected a positive attitude when students attend lectures, which indicated, among other tasks, the investigation group, the most hard-working, responsible, enthusiastic, diligent, discipline, cooperation, respect other people's opinions, critical, and creative. The problem faced in this research is the facility equipment and materials that must be taken when investigating problems in the field. Selection of environmental problems are related pollutants. We can resolve the problem must be passed: the identification of the problem, looking for the source of the problem, consider the settlement of the problem by the government / previous investigators, communicate ideas and evaluation.

Suggestion

Model-based Environmental Chemistry lecture with open-ended problems can be developed further problems in other subjects, but not all are suitable for development. Chemical education courses should not only equip students with the content knowledge and pedagogical ability, but also equip students with high-level thinking skills and a number of other skills.

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