



DEVELOPING THE CHEMISTRY LEARNING THROUGH PROJECT-BASED LEARNING MODEL INTEGRATED WITH INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND CHARACTER EDUCATION

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ABSTRACT

The observation at the beginning at SMK-SPMA H. Moenadi gained several problems such as the students have low interest in studying chemistry because it was difficult to understand and unpleasant subject, they do not know the application of solution concept in the subject of expertise major, chemistry learning is not maximized in using ICT, and the values of character education has not appeared in the learning process yet. Based on these problems, the researcher developed the chemistry project-based learning (PjBL) model by making hydroponic nutrient solution integrated with ICT, Edmodo, and character education. Edmodo is an e-learning program social network-based dedicated to teachers, students and parents. The purpose of this study is to determine the Science Process Skills and characters in chemistry learning by using PjBL integrated with ICT. This study is a developmental research with the 4D model (Define, Design, Develop and Disseminate). The subjects were the students of class X of SMK SPMA H. Moenadi Ungaran consisting of four parallel classes in the academic year 2014/2015 with competence expertise of Food Crops Agribusiness and Horticulture. The data were obtained by questionnaire, observation and tests. The data analysis used validation, feasibility test, effectiveness test, and student responses. Results of this study had valid criteria. It obtained an average value of 92 in validation by the experts. Moreover, a statistical validation gained $r_{11} = 0.516$ which was bigger than $r_{table} = 0.381$. Based on the result of t-test, this model was effective to be implemented. In the posttest of experimental and control class had significance of 0.000 which means that there was a significant difference between them. In addition, this developed model is feasible to be implemented. It is based on the response of learners, 68% (responded well) and 32% (responded very well). The Science Process Skills in this learning was well-qualified with an average score of 75.44. Responsible, discipline and religious characters of students scored 73, 77, and 85 with good and excellent qualifications

Key Word: Project-based learning, ICT, character, science process skills

INTRODUCTION

Learning is a process of interaction between teachers and students as well as the elements contained therein. Teachers is the most dominant factor that determines the quality of learning. The quality of teaching is good, it will produce good learning outcomes as well. Based Permendikbud No 70 of 2013, the learning process is a good start of the improvement mindset include learning patterns centered on the teacher be learning centered on learners, learning patterns in one direction (the interaction of teacher-learners) into interactive learning (interactive teacher-participants learner-society-natural environment, source / other means).

Based on the needs analysis and observations made in vocational-SPMA H. Moenadi, obtained information that the average learners are from the middle class economy and chose vocational schools with the aim of going to work after they graduate. Learners have the ability medium seen from the average value of SMP and the test results of selection of new admissions.

Learners have the interest is low on chemical subjects, according learners, chemical subjects are subjects that are very difficult, results of interviews and questionnaires, showed 90% of students prefer learning outside the classroom are not only thinking, but the practice or lab work, other than that books or

teaching materials used are books still stressing the concepts of chemistry alone is not directed learners to undertake learning that enable learners, utilization of information technology for example the use of the internet in learning activities both teachers and learners is not maximized.

Chemistry learning that teachers do during the many teaching concepts in class and rarely carry out learning outside the classroom and lab work, but this does not fit with the character of students in vocational school, the teacher is not much to enable learners to engage in learning, and this makes the learners are not active and sleepy in the following study, in addition to the teacher just talked about the application of chemicals in agriculture so that the students have not been so understand learning relationship with the agricultural chemical in accordance with competency skills they choose.

Sourced preliminary study will develop project-based learning with hydroponic plant nutrition products manufacture integrated Information and Communication Technology (ICT) using Edmodo to improve the science process skills and character of responsibility, discipline and religious students in vocational-SPMA H. Moenadi Ungaran. Because with authentic learning and contextual able to produce valuable and meaningful to learners, in addition to the PjBL emphasizes education that gives an opportunity to the learning system centered on the learner collaboratively, and integrate real problems and practical, teaching effective in building knowledge and creativity (Rais, 2010).

Products developed this research is to study chemical solution project of hydroponic nutrient solution integrates Information and Communication Technology which utilizes Edmodo and character education program consists of syllabi, lesson plans, teaching materials, work sheets, assessment science process skills, and questionnaire characters.

The purpose of this study was to determine the validity, effectiveness and feasibility of project-based learning model integrates ICT chemistry, knowing Science Process Skills on chemistry-based learning model poyek integrated ICT. Character learners know the learning model poyek integrated ICT-based chemistry.

Project-based learning (PjBL) is a model or an innovative learning approach, which emphasizes learning through activities contextually complex (Cord, 2001). PPA focuses on the concepts and principles of the main (central) of a discipline,

involving students in problem-solving activities and tasks meaningful others, provide opportunities learners to work autonomously construct their own learning, and ultimately produce works of participants students valuable, realistic (Okudan. Gul E. and Sarah E. Rzasa, 2004).

Active learning methods Project-based learning (PjBL) integrated Information and Communication Technology (ICT) that use the Internet through Edmodo that program e-learning-based social network that is intended for teachers, pupils at the same time parents, which apply a learning system that is easy, efficient and more fun, so as to make the communication between teachers and learners during the learning process becomes more memorable, the activity will run well and successfully mastered the learning material well too (Darmawan, 2012).

PjBL active learning methods, not only serves as a medium to develop skills alone, but also serves to form the character and civilization that dignity. From this, the actual character education (character) can not be left in the functioning of education. Therefore, as a function inherent in the existence of national education to shape the character and civilization, character education is a manifestation of the role. To that end, character education is the duty of all those involved in education efforts (Haryanto, 2012).

According Dahar (1996), science process skills is the ability of students to apply scientific methods to understand, develop and discover science. Science process skills is very important for every learner in preparation to use scientific methods in developing science and are expected to acquire new knowledge or develop the knowledge that has been owned.

METHODS

This research included in this type of research and development (R and D). using the 4D model (Define, Design, Develop and Disseminate). Subjects tested in this study were students of class X SMK SPMA H. Moenadi with competency skills Agribusiness Food Crops and Horticulture consisting of four parallel classes in the academic year 2014/2015. two classes as an experimental class with a class that is learning with the PjBL manufacture of

plant nutrients in hydroponic cropping patterns, two classes as the control class learning classes that do not use the PjBL.

Research results collection techniques by questionnaire, observation, interview and test. Istrumen data collection with the learning method validation sheet, sheet questionnaires, observation sheets, sheets of interviews and tests the ability of the concept. The data analysis technique is a learning model analysis, validity analysis and feasibility and effectiveness analysis..

RESULT AND EXPLANATION

Based on the results of the questionnaire responses of students, learners feel that learning chemistry with mengaplikaskan directly into the activities of learners do in everyday life, making them feel learning more fun, not boring, it becomes understand why in agricultural chemical to be studied, but it makes the chemical is not the material is difficult because students have a high curiosity, and studied chemistry makes a necessity not a necessity forced. The research result is in line with the results Moerdiyanto (2012)

Chemical research development project-based learning model of integrated information and communications technology with the Character Education effectively performed by t test.

The research is stated that there is a difference between the pretest and posttest experimental class, having given project learning students better understand the material solution than prior to obtaining project learning, for the control class t-test, there is also a difference between the pretest and posttest, this is because the class control also got chemistry learning solution, although not using the project, but the results are better experimental class as evidenced by the average value posttest experimental class is higher than the control class.

However, the results of this study, the average gain value is still less than satisfactory which gained an average of 60, This is in contrast with the results of the research that has been Subuh Jailani (2014) which produces an average value of 80.47. according to the analysis researchers this happens because the subject of research is the students of SMK, they are naturally inclined to use his skills and less to optimize the ability to think, time spent in the study long enough so that the planting concept that

usually must be repeated can not be done, other than that of researchers factors that need development models and a more complete instrument to increase creativity and proficiency in organizing learning activities. So the need for further research how the methods and the right tools for vocational students for subjects that are considered difficult as well as chemistry.

This study shows that the chemistry learning using projects more effective, evidenced by the t-test post-test experimental class and control class stating the difference in learning outcomes between classes using a learning project with a class that does not use a project, results are also consistent with studies Miswanto (2011)

This study, a project learning integrated Information and Communication Technology, the study researchers used Edmodo is a platform of social learning to use the Internet for teachers, students and for parents / guardians as a means of learning between teachers and students outside the classroom face to face, with upload teaching materials, giving additional duties, and the media question and answer between teachers and students outside of instructional hours, from the student questionnaire responses Edmodo very effectively used as a medium of learning.

ICT in the classroom is also used by learners to find some literature on the Internet related to the project they planned and they write in a work sheet, except that when learners communicate the results of their project using the LCD and a lap top that utilize ICT. This is in accordance with the opinion of Darmawan (2012) that the development of Information Technology is able to package the conditions and realities of prior learning becomes more attractive and provide conditioning adaptively on the learners wherever they are.

Science Process Skills

Research project learning, one dependent variable is the science process skills, learning the material solution chemistry, by administering the project of making a nutrient solution hydroponic make learners have the science process skills are good and even somevery good, from the data obtained as shown in Figure 1.

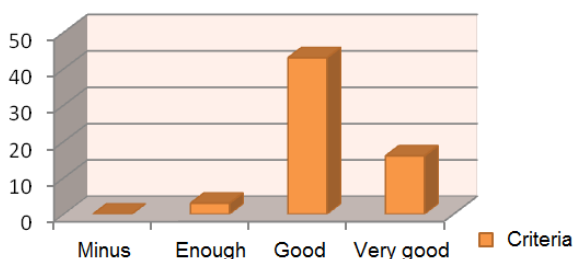


Figure 1. Science Process Skills

The result is the average value of the five KPS owned learners is 75, 44 with good criteria other than that of total respondents amounted to 62, 43 learners acquire good criteria and 16 berriteria very good learners look enthusiastic in carrying out learning activities, some of learners who are usually passive in following classroom learning, seemed to enjoy, participate actively and show their skills including observation of obtaining an average value of 66 with good criteria, use of tools and materials gained an average of 87.2 with the criteria very well, planned trial average gained 68 with good criteria, carrying out experiments on average gained 84.2 mengkomunikasika criteria very well and gained an average of 71.8 with both criteria.

The value of the character seen in this study is the responsibility, discipline and religious, with the project of the hydroponic solution is expected that learners can practice and develop the character. With the creation of hydroponic nutrient solution which is directly used for growing hydroponic plants, making these characters must be owned by students, without responsibility, discipline and religious project of making the nutrients used to grow vegetables is not optimal.

In the implementation of the project every day learners have to take care of the plants they have planted, for example to check the pH, TDS content and temperature, so the plants are planted uncontrolled growth, if no day terleweatkan and uninterrupted growth misalakan pH to go down, and did not restore optimal pH, the plants can not survive, it is what makes these characters are needed in the implementation of this project,

Based on the results obtained that the learners in the learning solution chemistry with the project of making the hydroponic nutrient solution has the responsibility, discipline and religious good as shown in Table 1.

Table 1. Character Data Discipline, Responsibility And Religious

No	Caracter	Average	Criteria
1	Responsibility	73	Good
2	Discipline	77	Good
3	Religious	85	Very good

Learners show high discipline seen from the daily care of the plants, almost all of the plants in their care grow well, because it is never too late to monitor of the things that interfere with growth ranging from always control the temperature, pH and the amount of nutrients in the solution as food for plants.

Based on the results of the religious character of 55% of students have a religious character is very good, it is based on the results of the questionnaire, they are by studying the chemical solution, through a project of the nutrient solution hydroponics, be reminded that the water used for the planting medium is the gift of God untold, so with the teachers of learners are always reminded to always be grateful, in addition to calculating the levels of plant nutrients and plant crops with nutrient solution hydroponic, arising out of gratitude and the spirit that God already provide anything for all creatures including plants and humans as creatures the most perfect to always learn about nature, because God already provides for prosperity manusia. Adanya any good character values shown in this study, according to the research results Sovhi Rintowati (2014).

Research "Development of Instructional Model Chemistry Project-Based Integrated Information and Communication Technology and Character Education" generate valid instrument based on the results of the validation results of experts who obtain an average value of 92 and a validation statistik generated r₁₁ of 0.516 exceeds r_{table} 0.381 were declared valid and reliable.

Learning model development project is effectively based on the results of t-test to post-test class experimental and control that produces signification 0,000 means that there are differences in learning outcomes between classes using model project with a class that does not use the learning project, in addition to the value of Skills Process Science learners average -rata 75.44 with good criteria, for the character of responsibility learners

obtain 73 ber kriteria good value, character and religious disciplines respectively scored 77 and 85 with the criteria of good and very good.

Based on the above data that the research development project integrated learning model is valid and effective and supported by the response data 68% 32% responded well and respond very well terhadap project learning, so that the development of this learning model is feasible.

Learners respond very well to learning projects, they feel happy with pembelajaran that have been implemented, although in practice the students are more likely concentrated on projects hydroponics, chemistry learning that they should be prioritized even just as a supporter, this is seen when the learners pengkomunikasikan results their project through powerpoint, most learners discuss about hydroponics, and few chemicals they discussed, however this study has made learners know why chemistry lesson they have to learn, in agriculture, and based observasi peserta students enjoy learning chemistry larutan this, compared to the previous chemistry learning.

CONCLUSION

Chemical Learning ICT-based integrated project developed, valid criteria of the results of the validation experts who obtain an average of 92 and a statistical validation of generated r_{11} exceed 0.516 0.381 r_{tabel} stating valid and reliable. In addition learners, 68% responded well and 32% responded very well so it deserves to be used. Also effective this study, based on results of t-test to post-test experimental and control class that produces significance 0,000 which means there is a difference in the results pembelajaran between control and experimental classes.

Science Process Skills in learning poyek integrated ICT-based chemistry, well qualified with an average value of 75.44. Character learners in learning poyek integrated ICT-based chemicals, and very well qualified based on the responsibilities of learners 73, discipline and religious character each scored 77 and 85.

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