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PRACTICAL MODEL-BASED DEVELOPMENT CHEMISTRY GREEN CHEMISTRY WITH GUIDED INQUIRY METHOD IN MADRASAH ALIYAH

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ABSTRACT

The existence of schools that were quite far from the city center and industry area such as private Madrasah Aliyah. Generally, these schools did not have lab facility and its learning process is only by delivering materials without any practicum. Researcherdid a research developmentPracticum Model of Chemistry based Green Chemistry withguided inquiry methodinMAAnnurSetupatok. The results of the researchshowedthatthere wasa rising students's concept understanding showed85.7% After practicum was done, the average of n-gain score was 0,48.It was showed by the average of pre-test and post-test scores.The average of observation result during the practicum was 90.51%, the average of questionnaire sheet result about students' attitude and responses was 82,3%, the average result of practicality of practicum instrument was 82.3%, and the effectiveness of lab instrument was 65%.Meanwhile, to test the effectiveness of the lab facility, the researcher used comparative test with practicum that used main lab facilities in MA Nusantara.The result of paired-t test calculation showed that t score was -0,67. It was smaller than t-table score is4,516

Key Word: model,Guide Inquiry, Green Chemistry

INTRODUCTION

Science education is not a science, especially chemistry just to broaden learners, but also science are always in touch with the surrounding nature (natural). Therefore, in studying the chemistry of learners expected to associate with everyday occurrence, so that from there arises the curiosity about the phenomena that occur in the surrounding environment.

The process oflearning science, especially chemistrythat islessassociatedwithdaily life, then it willresult inthe studentnot knowthe usefulness ofchemistryin life, evenas iflessonswereseparatedfrom their lives, as a result,students are lessinterested, do not understandthe use ofchemistryinlife, eventhe studentscan feelthesubjectis difficultandtedious

A practical activities in general can be done well, if all lab facilities and infrastructure available, but if it be an indicator of practical implementation, then what about the school -school who do not have a lab, because according to research conducted Amy, J. & Cherin , L (2003: 829-832) were carried out from the year 1990 to 2000 for new teachers who taught chemistry (a branch of IPA) showed that all of the teachers agreed that teaching chemistry can not be done without laboratory.

There is a question to ponder shared by educators, "What if the school does not have a laboratory?" Should not do lab work or remain berpraktikum. This has become an afterthought educators must overcome. An educator would have to have a desire to improve the ability of learners. Therefore, how to seek berpraktikum activities can be done. Even far there has been no developed a virtual laboratory methods. Of course it would also be an obstacle if the school does not have the means of Information Technology (IT).

Now not a day longer blame government policies, about the demands of the curriculum should be in the finish to the students, or the problem means not fulfilled either laboratory equipment or materials laborotorium expensive, so that it could make the excuse educators for not doing lab work, because in essence, the presence or absence of a laboratory already implicit in the process of learning science that includes, "observe, ask, collect data, associate and communicate,".

If you look at the learning path that is at the core of the scientific process, moreover, particularly chemical science lesson will be more meaningful when students can bring about benefits to the environment and its relationship to the subject matter chemistry.

There have been many studies conducted by researchers and educational actors to overcome the limitations of practical tools and laborotorium, as is done by Hadi, A (2008: 17-20) or research done Derr et.al (2000: 171-172), which proves the existence of gas in baking soda or baking, and probably much more research -Research like which at its core innovation should be from a teacher through creativity.

The process of creativity can be realized, if an educator trying to overcome the limitations and unavailability of supporting facilities. Efforts to overcome the limited means can also be overcome by utilizing state of the environment, utilizing the goods everyday unused as a substitute means of dam infrastructure to berpraktikum, as long as the replacement appliance or lab materials used that has a value function and practicality are the same as the tool or The main lab materials.

A teacher can lead students to do practical work with materials or tools that meet everyday. Therefore, educators must pay attention to the surrounding environment where teaching.

The existence of schools are far from the city center and industrial as well as private Madrasah Aliyah (MAS) generally do not have adequate laboratory facilities. These circumstances can be a challenge educators to utilize a material or tool that is in the neighborhood with the principle that the material or the device easily accessible, environmentally friendly and renewable. The activity can be done as an effort to implementation pattern learning approach by utilizing unused or used goods to reduce pollution in order to realize the basic principles of Green Chemistry.

Utilization of thrift or natural materials can be used as the basis of an educator's ability to improve the ability to think and innovate as a form of professionalism an educator. Because according to Sylvia & Olaf (2005: 231-239) a teacher should always strive to improve the quality profresionalismenya. Professionalism quality can be obtained if an educator has a provision how to teach good science, educators also need to have laboratory skills as supporting the implementation of tasks in the field as well as problem-solving abilities, so that is not easy to give up when faced with various problems related to teaching duties.

The ability of laboratory skills and problem-solving skills can be obtained, if a teacher can always be done and creative designing practical activities for learners even in conditions of facilities and infrastructure of deprivation. Challenges and obstacles that arise when designing the lab can be overcome, if a teacher keeps practicing and thinking to solve the problems encountered, so that the absence of the laboratory is not used as an excuse for not holding practicum.

Practical activities can be done even if the school does not have a laboratory provided that an educator can innovate and creativity. An educator can direct learners to search for materials or tools that have the same principles and functions of the equipment or materials used in the lab.

Guided inquiry process can be used as an option in the practical implementation methods. These activities can be designed by an educator to guide the student from the start the planning process lab, the search for materials and equipment by utilizing thrift or natural materials, designing the procedure, until the conclusions about whether or not the lab can be effective, if the process of interaction and guidance of a the teacher continues to the stage to performan independent student practicum.

Various problems can arise from private schools from the start does not have a lab, the teacher pengampu not linear, learning only the theory of continuous delivery and so on so that all lead to less child enjoys learning science, especially private kimia.Sekolah may organize practical even though the means are insufficient. The limitation means can be a challenge if the teacher would think to create and innovate one terbimbimbing dengran inquiry method. All stages of the process of guided inquiry can be planned by a teacher from planning (planning), information (retrieving), processing and creating information (processing),communicate information (sharing), evaluation (evaluating) (Alberta, 2004: 20).

METHODS

The method used in this research is the method development (R & D), which refers to 1997 in Hobri Plomp (2009: 76) that includes development model; initial investigation (preliminary investigation); the design phase (design); phase of realization / construction (realization / construction); phase test, evaluation, and revision (test, evaluation, and revision); and an implementation phase (implementation).

In the initial investigation phase observational study conducted studies in MA Annur Setupatok Cirebon

district of the constraints to implementation is not practical science, especially chemistry. The findings of the researchers in the field eventually offered the idea for the school to implement practical by utilizing the environment and materials that are not too expensive in order to apply the principles of Green Chemistry. Discussing the design phase is done by the teachers on the drafting, preparation practicum to use the environment and the surrounding material. The draft will be tested in the lab is a qualitative test of synthetic dyes or textiles, qualitative test content of Borax and acid-base titrations.

Phase realization of the results obtained in the form of practical guidance based products Green Chemistry with guided inquiry method as a first draft.Phase test, evaluation, and revision of the researchers involved three validation material consisting of two experts and one expert lab devices. Then performed limited testing done on a class XII Science MA archipelago by taking a group of students above 7 and 8 students under a group of 23 students. At this stage only be simulated on the availability of lab time, materials and tools used and the possibilities that could be an obstacle when the lab carried out. These constraints are discussed with teachers and student teachers to be used as a revision to the wide-scale test phase.

The implementation phase was tested in grade XI MA Annur totaling 28 students, whereas to determine the effectiveness of the tool titration used in the lab, then tested the comparison of data, where data practicum XI MA An Nur who use the model of practicum Green Chemistry with guided inquiry method compared with the data with the data lab practicum MA archipelago that use the main tool practicum with the provisions of the amount of material and the same practical matter, namely acid-base titration, resulting from the comparison data can be known whether the range of differences in outcome whether too much or just a little difference.

Instruments and data analysis techniques used in this study include: understanding the concept of assessment instruments conducted pre-post evaluation questions regarding the content of acid-base titration, practical observation sheet using inter raters realiability (Mardapi, 2012: 34). Data analysis technique and attitude assessment form student responses, questionnaire sheet practicality lab, as well as the practical effectiveness of the questionnaire sheet using Cronbach α (Arikunto, 2002: 239).

RESULT AND EXPLANATION

Assessment improvement can also be seen from the increase in achievement indicators and increasing the understanding about the average student scores between pretest and posttest -rata value. At the time of the pre-test average value was still below the 35.79 of KKM. KKM is set for mapel chemistry in grade XI MA Annur is 60, while the average post-test score 67.43. Based on data recapitulation postes also that the value-in-class classical completeness is 85.7% which is in line with the opinion of Mulyasa (2004: 99) that the success of the class obtained when seen from the number of learners who are able to resolve, or at least 65%, at least 85% of the existing number of students who are in class. Changes in the pretest and posttest values can be seen from the acquisition value following pretest and posttest.

Results of the third calculation observer at the time of assessment obrvasi sheet shows the value of inter-raters Reability r11 assessment was 0.81 and the reliability reratanya of three raters 0.95. It means that the aspect that is reliable observer observed in this case in accordance with Mardapi (2012: 34) that r11≥ 70 is reliable. In the calculation of the reliability questionnaire attitude and response of the students after a practicum with Cronbach α 0.72 shows the results, because the value r11≥ 70 is reliable for the instruments used.

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Practicum practicality questionnaire sheet distributed to students after the students do lab work, it turns out from the calculation of Cronbach α indicates the value of 0.71 (Annex 25, p 172). This is in accordance with the opinion of Arikunto (2002: 240) that the questionnaires to the value of α = 70 indicates the instrument is reliable means that the instrument can be used. As a percentage of every aspect of practicality practicum in Figure 1.

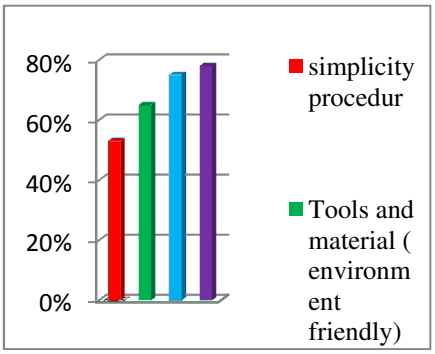

Figure 1. Percentage of each aspect of practicality lab

The results obtained from the questionnaire giving practical effectiveness can be seen in Figure 2..

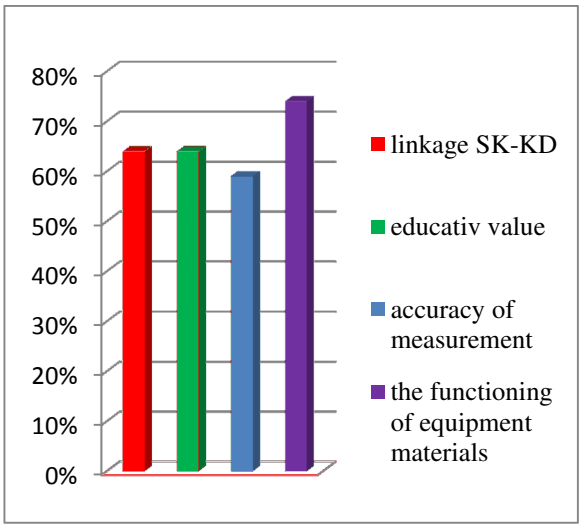

Figure 2. Practical effectiveness from the questionnaire

In the qualitative test of synthetic dyes, the results are not so obvious, because the materials-materials suspected to contain synthetic dyes or dye movement of the media flow filter paper is not so clear straight ahead and some even sideways, but in general of the sample used from start sauce, tofu, colored chips and syrup ABC terindikasikan not use synthetic dyes or Textiles, because of all these samples the color fades.

The color fading researchers concluded that the material is soluble in water. Because of research done by Babu & Indushekhar, S 1990 dyes that do not contain organic solvents will dissolve in water (Wikispace.com/ food aditive/ identification of Rhodamine).

In the practical implementation qualitative test borax in general students are very enthusiastic, because the results of lab is obvious that the materials allegedly containing borax tested by indicator-made filter paper with turmeric will look brown and purple, while the materials do not contain borax does not brown.

In the qualitative test only students borax conducted Wet Noodle samples suspected to contain borax, because of the color that looks purplish brown on Paper Test Kit is made of students. This is according to research conducted Nuraeni, et.al (2013) that the materials allegedly containing borax on Paper Test Kits are made to be brown. The brown color due to the reaction between borax and curcumin on filter paper.

In the practical implementation of titration students were delighted when the indicator is used for color changes are obvious, such as indicators of turmeric and paper flowers, while the indicator leaves rhodiscolor provide a range difference is not noticeable because of the color range indicator leaves rhodiscolor with alcohol solvent 70% of purple cloudy to clear green in contrast to other indicators either saffron or paper flowers have a clear color change. Rhoediscolor leaf color change indicator is strongly influenced by the composition of the leaf mass, volume of solvent used and the soaking time. From the results of practicum students who use indicator 10 grams of leaves rhoediscolor by soaking 25 ml of alcohol for a while then filtered and then added water to 100 ml giving a color change from purple clear to clear green or yellowish green, while for menghasilkana discoloration clear example of red to green needs to be soaking in the refrigerator 3-4 weeks (Prihatin, 2005: 2). Results of lab-based green chemistry titration compared with the lab using the main tool that buret and erlenmeyer give the difference is not too big just 0.22 mL. This value is still included within tolerable limits of reasonableness.

In the calculation of statistical tests using paired t-test of the difference between the difference measurement lab, both titration with Green Chemistry or lab-based titration with the main tool providing value t = -0.67, while t table for n = 4 and a significance level of 0.025 was 4.541 (see annex 30, p 201) can thus be concluded tidaka which means there is a difference between the measurement tool based titration Green Chemistry with a major tool not so significant or reasonable so that the device can replace the main tools for practical activities. (Miller & Miller 1991: 53)

CONCLUSION

Based on the results of research and discussion, conclusions obtained on product development model based Green Chemistry chemistry lab with guided inquiry method in Madrasah Aliyah. In detail, the conclusions of this study are as follows:

1. Process Chemistry Practical Model-based development of Green Chemistry with guided inquiry method in MA Annur can run well on the attitude assessment instruments and student response, practicality and effectiveness lab practicum.
2. The model developed can be used as a practical product development.
3. Model-based Green Chemistry chemistry lab with guided inquiry method can be applied to the identification of borax and synthetic colors in foods.

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