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DEVELOPING LOCAL WISDOM BASED SCIENCE LEARNING DESIGN TO ESTABLISH POSITIVE CHARACTER IN ELEMENTARY SCHOOL

PENGEMBANGAN DESAIN PEMBELAJARAN SAINS BERBASIS KEARIFAN LOKAL UNTUK MENGEMBANGKAN KARAKTER POSITIF DI SEKOLAH DASAR

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ABSTRAK

Tujuan dari penelitian ini adalah mengembangkan desain pembelajaran sains berbasis kearifan lokal pada tingkat sekolah dasar. Metode penelitian campuran (mixed method) digunakan untuk melihat signifikasi capaian pengembangan desain. Penelitian ini melibatkan 35 guru dari 16 sekolah dasar yang dipilih secara acak dari sekolah-sekolah yang memenuhi kriteria yang telah ditetapkan. Dari penelitian sebelumnya diperoleh hasil bahwa sekitar 80% dari sampel telah mengenali kearifan lokal di lingkungan sekolah masing-masing. Namun, tidak satupun dari sampel yang memiliki kapasitas untuk mengaplikasikan kearifan lokal tersebut ke dalam kurikulum sains mereka. Untuk mengatasi kendala ini, maka digagaslah desain Review(R), Task(T), Solution(S), Reflection(R), dan Evaluation(E) ini. Dua sekolah dipilih secara purposive sampling sebagai kelas eksperimen. Dengan mengkombinasikan dari kualitatif hasil RnD desain dan data kuantitatif nilai tes, diperoleh informasi bahwa 11 karakter positif terindikasi pada performan siswa. Dari kesebelas karakter tersebut, kejujuran, keingintahuan, jujur, hati-hati, tanggung jawab, dan peduli lingkungan yang paling meningkat secara signifikan.

ABSTRACT

This study aims to design a science learning program based on the local wisdom and apply it in elementary school. Mixed method research was used to gain the significance improvement from the design. There were 35 elementary science teachers from 16 elementary schools chosen by using purposive random sampling. The previous research revealed that there were about 80% of the teachers who were recognized the local wisdoms in their environment, but none of them have a capability to use them as a part of their science program in the classroom. To overcome this constraint, a Review(R), Task(T), Solution(S), Reflection(R), and Evaluation(E) design was proposed in elementary school science learning. By implementing the design in two elementary schools, 11 positive characters expected were indicated from students' performance. But characters of honest, discipline, conscientious, diligent, careful, responsibility, and caring environment, are most significant ones.

Keywords: science learning; local wisdom; positive characters; elementary school

INTRODUCTION

Science is a series of concepts and conceptual schemes interrelated developed from the results of experiment and observation, and in accordance with the experimental observations and subsequent (Jenkins, 1974). To deliver science effectively, it would require proportional interaction among stu-

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dents, teachers, and the learning environment. Various countries in the world give additional hours of instruction to improve science learning effectiveness, including Indonesia. But, this effort was still less effective to raise the Indonesian ranks significantly in PISA and TIMSS. To overcome this reality, in mid-2013 Indonesian government has been starting to implement an official curriculum which developed on the basis of taxonomies which are widely accepted, studies of competences based curriculums and science process skills based curriculums, the challenges of the 21st Century, as well as the preparation of Indonesian Generation in 2045. Article I of the National Education Act of 2003 states that among of the goals of national education is to develop the potential of learners to have intelligence, personality and noble character. Mandate of the national Educational Act of 2003 intended that education does not only establish an intelligent Indonesian people, but also their personality or character, so that the later generations will become a nation that grows with the characters who have the guts to voice the noble values of the nation and religion.

Every country must have a strong desire that every citizen has the positive traits that perform their national identity. In industrialized countries like the United States, Germany, Britain, China, Japan, and others, they put character education for young people as a crucial effort to support the economy and national stability in the future. In this globalization era, a lot of positive and negative also for the mental development of a nation. Mungmachon research results (2012) find that the negative effect on the influx of foreign culture is able to be filtered by strengthening the positive character of the nation. It is mean that the character education take the main role in resulting best generation. The educational curriculum should include character education, particularly insightful local wisdom that is the basis of human development of dignity. Local wisdom possessed by Indonesian people has a role to build the character of a nation, such as mutual assistance, religious, tolerance, and so forth. These local wisdoms are potentially blended in the official curriculum of 2013 due to its regional characteristic in many aspects, such as economic, cultural, information and communications technology, ecology, and others. Suastra (2005, 2006) said that the local advantages are the natural resources, the creation of art, tradition, culture, services, human resources, or others that are the hallmark of a certain region. According to Kongprasertamorn (2007) local knowledge is the knowledge derived from the local residents knowledge which is accumulated as the experience of society. In line with this statement, Talang (2001) and Phongphit (2002) said that local wisdom is a knowledge that is passed down from generation to generation or can be derived from the indigenous elders. Based on such definitions, it can be concluded that the local wisdom or also referred to as a local knowledge (indigenous wisdom) is a process of realization in increasing the valuable local potential so that it becomes a product, a service, or other valuable works, which has a unique and comparative advantage. These advantages were implisitly provide by curriculum of 2013. Thus, curriculum of 2013 launched by governments gives educators the opportunities to develop basic science competencies based on local wisdom.

The terms of character is the hallmark of a society or a nation inherent in each individual. The Indonesian people have ancestors who have a suave character and spirit of mutual cooperation. Schwartz (2005) suggests that character education is often used to refer to how a person becomes a “good people” that is, those who demonstrate personal qualities which is suit to the public need. Indonesian educational paradigm that builds on the curriculum of 2013 is to produce graduates who have good character, skilled, and have good scientific literacy. The character education in Indonesian previous educational system is an educational system aimed to implement the local wisdom in the the students’ learning by developing a variety of positive behaviors such as morals, manners, well behaved, life healthy, critical, successful, and acceptable as a social human being. The concepts of character education applied in this educational system are social and emotional learning, moral reasoning or cognitive development, life skills, health education, violence prevention, critical thinking, ethical reasoning, and conflict resolution as well as mediation. However, after the development of technology and information in Indonesia, the noble characters began to erode in the nation’s youth, for example brawl between teenagers, drugs, violence in education, and so forth. This phenomenon is certainly very alarming and very contrary to the spirit of the curriculum in 2013. Based on the facts about the erosion of the positive character among Indonesian young people, it is necessary to develop further educational system start

from the elementary level of education that is enabling to rebuild the nation's character.

Character education is essentially a moral education that is involves aspects of knowledge, feelings, and actions. According to Lickona in Budimansyah (2012a), without these three aspects, it will not become an effective character education. Formation of character according to Suyanto (2010) is one of the national education goals. To implement the character education, a certain strategy is required to make an effective effort in teaching science toward value transformation including: developing system of value (universal, national, and local); raising effective interaction among learning components; as well as improving students' understanding. Actually, Suastra research results (2010) indicate that there are 11 basic competences in grade 7th and 8th that can be developed by culture-based science learning in junior high school. They are religious, honest, disciplined, meticulous, conscientious, diligent, careful, open, responsibility, curiosity, and caring environment. The methods used in culture-based science learning in developing the competency-based basic science and the value of local knowledge were investigation/experiment, observation, as well as discussion/question and answer which were used proportionally in learning process. This result gives a hope that there is an opportunity to gain an effort in science education to take a part as a nation's character building. The character education that blended in the sciene education should give opportunity for citizens to develop their good character and to improve their personal qualities. These positive characters are very important to be implanted as early as possible in the basic education level, due to the formation of positive characters would be optimal if done through habituation early adulthood. This means it is continuous process, continuous, and longitudinal process, which need to be done and support not only by the gavernment but also by all citizen. Public awareness at the level of families, neighborhoods, and schools should jointly contribute to provide positive support to the education of generations of the nation's character.

METHOD

Mixed method research design was used to develop the local wisdom based science learning program and to gain a data from the implementation of the program. There were about 35 elementary science teachers from 16 elementary schools of population who chosen by purposive random sampling as a sample of the research. The sample selection was based on the area that has a local advantage in agriculture, still has a strong religious nature, solidarity, and mutual aid societies. Gunungpati sub-district is a part of the city of Semarang which is located in the south of the city center. Geographical conditions of Gunungpati mostly mountains, rice fields, and the largest fruit plantations that make it as a barometer of local fruit farm in Semarang. The people in this area are Moslem religious communities that still hold religious nature, solidarity, and mutual aid societies. So, Gunungpati sub-district and its people are fulfill the conditions as the subject of the research. However, the potential held by Gunungpati sub-district did not optimally explored. Fruit packaging and post production management is still poor. This condition is caused by the people who still do not have adequate technology and tend to uphold the tradition of the elders in the management of plantation and agriculture crops.

In this study, the goal is to educate young people of Gunungpati area to be concerned with their potential local advantage and provide knowledge about the use of their local knowledge through science learning in order to recognize the possible explorations of their local advantage. Previously, science learning model used in the area was strict and yet adopt the local advantage. Cognitive domain which is focus on the basic science is still dominant than affective and psycomotoric domain in the science learning. According to the need assessment research results, it can be conclude that 80% of the elementary science teachers have recognized the local advantage in their environment, but none of them have put the local advantage as the main issue in their science classroom. Thus, the main objective of the research is to design the local wisdom based science learning program to raise the positive characters of elementary students in order to cooperate their basic science with their local wisdom and local knowledge. The proposed design set in the research is RTSRE (Review-Task-Solution-Reflection-Evaluation). The design then implemented into two science classes from two different schools as an experiment and a control group. The experiment class and compared by DTD (Demonstration-Talk-Discussion) design which was implemented in control class. Data of the research are collected from obser-

vation, questionnaire, and tests. Analysis of preliminary test results was using quantitative statistical models was conducted to look at the correlation, the influence of the model and N-gain on learning achievement. The application of the model in order to analyze differences of mean scores was calculated using the F test followed by comparison test, the Tuckey HSD Post Hoc test.

RESULT AND DISCUSSION

Design of science learning based on local wisdom which is implemented to form a positive character in the elementary school is presented in Figure 1.

The results of RTSRE design implemented in experiment class compared by DTD design implemented in control class were shown in Figure 2. By using the finding of Suastra (2010) and implementing it in elementary school setting, the positive characters were indicated in students' performance.

In the process of learning, the positive character of religious and discipline are routines inserted in prayer before and at the end

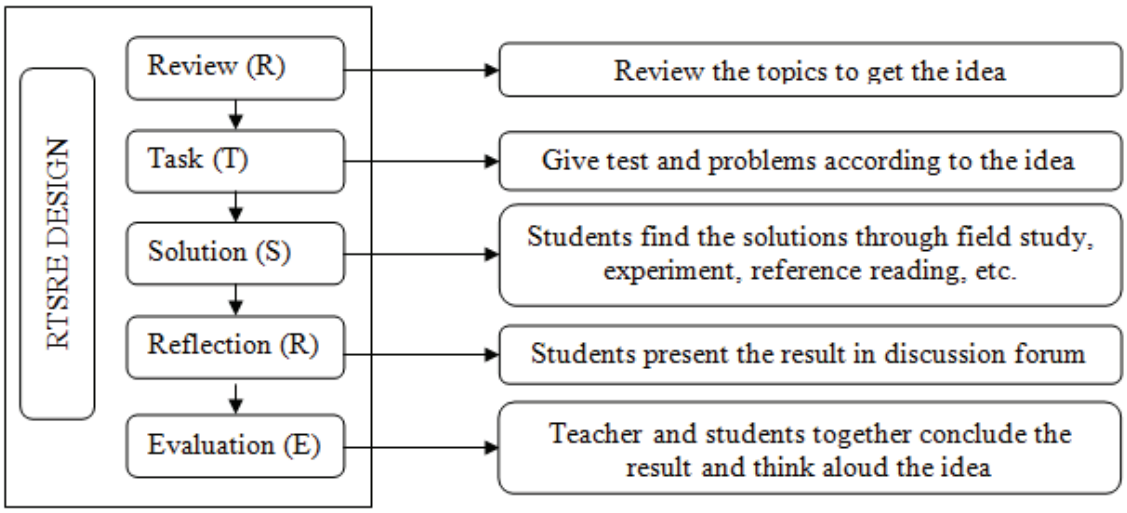

Figure 1. The proposed RTSRE design which provide local wisdom based learning science

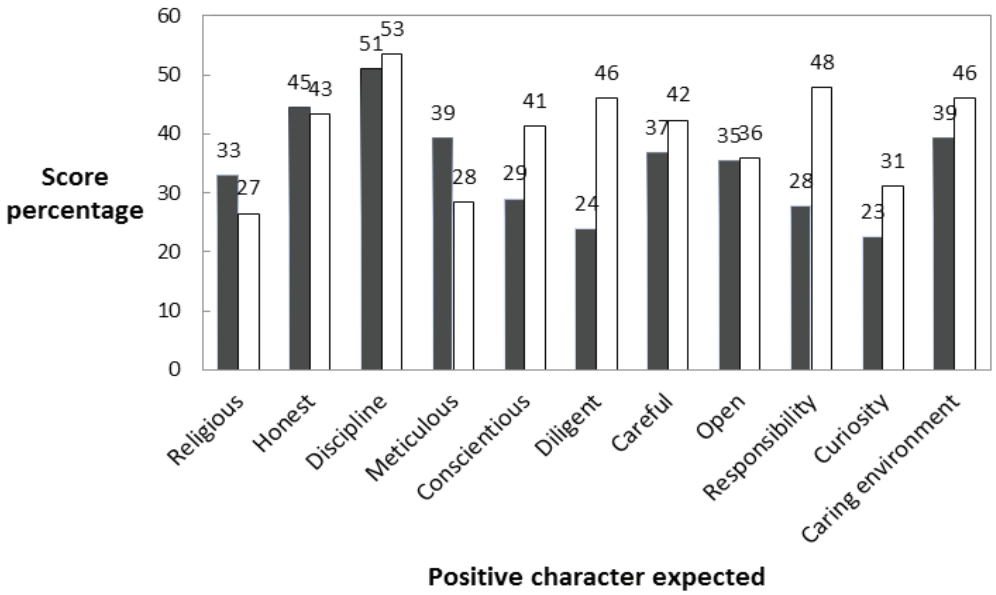

Figure 2. Percentage score of positive characters which were indicated from elementary school students (■ : control class and □ : experiment class)

Table 1. Summary of statistical analysis of the RTSRE science learning design implementation on student achievement

Learning Design	N	df	r	$t_{calculation}$ *)	t_{table}	N-gain
Experiment class (RTSRE)	43	42	0.62	6.40	2.02	0.75
Control class (DTD)	31	30	0.57	4.96	2.04	0.56

*) one tailed test with α = 0.05

of the learning process. This activity seems to things that are not special, but if this is done continuously it will have a positive impact on the students about the meaning of divinity present in all aspects, including in the learning process. Honest character trained in observation data recording and presentation of the results of the group. Sometimes when making observations and recording data unconsciously likely it will be a discussion between groups and very likely occurrence of dishonesty. At the same time through these observations can also be developed attitude of curiosity, diligent, and careful so that the data they get is correct and precise. Instill honesty observations can be helped by the next process, it is the presentation of the session. If the students are able to explain the observations with accurate, clear, and convincing, and no other groups are proving dishonesty then slowly but surely the students will get used to behave honestly. Because they do believes that their actions will be accountable to their classmates. Character discipline, caring environment, and responsible can be familiarized with the process of group work that requires lab equipment. Students are conditioned to always be disciplined and responsible in using lab equipment and discipline of time so that they can work effectively, efficient, and environmentally friendly when taking the observational data. Diligent and careful character can be implanted through a process of debriefing well on apersepsi activities, discussions, group, or class discussion. Diligent and careful attitude can be embedded because students must gather as much information to be able to answer questions carefully and ask questions at a critical moment. All the characters that trained to the students will be able to equip themselves to take on the role as a dignified people early on. So it can be concluded that the education of character can be inserted into the curriculum of science learning. Scientific activity itself essentially contains many positive traits that are also recognized by any country. Coupled with the positive character based on local wisdom in the famous Indonesian polished will enrich the students learning about people's dignity. So that the ideals of the Indonesian people towards an independent nation, advancing, and dignity should start from generations aware of the self potential, the self-esteem, and a high motivation to be a better human being with any profession they do in the future.

Based on the result of the research, statistical analysis of design implementation of science learning based on local wisdom vs students' achievement is shown in Table 1.

Statistical analysis of the first stage of implementation of science learning model based on local wisdom in improving the positive character of primary school students is presented in Table 2. Mean harmonics ñ = 3.64 and studentized range statistics q = 2.83 for the mean harmonics is used to calculate Tuckey HSD for further test and has a result of 5.11. The result is larger then the difference of mean samples (3 < 5.11) which means that there is no difference between both mean samples ($\square_A = \square_B$) or the implementation of RTSRE design improve the students' positive characters.

The constrain faced by the elementary school science teachers in putting the local wisdom as the main issue in their science classroom is estimated caused by their lack of knowledge in designing strategy to present the local wisdom in the learning content. This fact is agreed by Yuenyong & Yuenyong (2012) in their findings that the science learning in Thailand is yet correlating between the concepts taught in classroom and the events in their society. In the other hand, science learning would be more meaningful for the students if the basic science taught in the classroom give a solution to the problems in the society. Thus, the teachers role in connecting science phenomenon with the events in the society becomes very important in their science classroom. Hakam in Budimansyah, D (2012: 101) suggest that to make positive characters become a habit, it can be done by designing curriculum, developing learning materials, organizing classroom and school environment.

Design of RTSRE is based on the analysis of the needs assessment of students and teachers in optimizing the learning process in

the classroom. This design is refers to the principles of constructivism, which put the students as subjects learn to optimize students' ability in mastering the concepts so that the students' mental activities could be function optimally. In this design the teachers play a role as a catalisator who launch the problems and support the students in finding the concepts, principles, and laws in basic science through laboratory activities.

The syntax in Figure 5.1 can be explained that the first step is giving the students an opportunity to review the problem given by the teacher in the form of potential problems based on local events in their environment. Since the issue has been a familiar case and experienced by the students in their daily lives, by doing review activities (R) the students will be more interactive. The second step is giving the task (T) that are closed to the students daily activity. Most students can easily learn science if it is associated with events experienced by the students. The next step is finding the solutions (S) from the problems through kinds of activities such as field study, experiment, demonstration, as well as from reading assignment. In line with the second step, since the problems were recognized by the students in their daily activity, the problems were quite easy to be answered by the students using their own perception. By experiencing science learning based on the socio-culture perspectives (i.e. culture, way of live, the people life style, etc.) around the school yards will influence the science learning process and it become more meaningful (Majid et.al., 2012). The fourth step is doing a reflection activity (R). The tasks which were resolved by each student then discussed within group and then discussed it in class discussion forum. The role of the teacher in this step are to monitor and to straighten the discussions. The fifth step that is evaluation (E) which was conducted by analysing the results gained from these discussions. Teacher together with the students conclude the findings of each group to reinforce concepts which have been found by students . All the learning process is a reflection of constructivism in learning.

Implementation of RTSRE design in learning science based on the local wisdom in Figure 2 shows that both of the design have improve the elementary school students' positive characters. However, in general the significant improvement of positive characters is indicated in the experiment class which implementing RTSRE design. The facts are also supported by Table 2 about the significant influence of the RTSRE design in increasing the positive characters of the elementary students. The result of F-test one tailed with $\alpha = 0.05$ found that F-calculation is larger than F-table. It is mean that there is a significant influence by implementing the RTSRE design in improving the positive characters of elementary school students. The Post Hoc Comparisons Tuckey HSD test inform that there is no difference between RTSRE and DTD implementation mean scores. Based on these statistical analysis it can be concluded that the RTSRE design is more effective than DTD design in improving the positive characters of the elementary students.

Positive characters which are improved by RTSRE design are optimized by discipline, meticulous, diligent, careful, open, responsible, curious and caring environment. While the rest three characters which have not been able to properly optimized are namely religious, honest, and disciplined. Therefore, emphasis of these three characters for the experimental class should be given to optimizing them. The implementation of the RTSRE design is proven better in increasing the student achievement compared to the DTD design as seen in Table 1. Product moment correlation calculation results that the implementation of the RTSRE design is strongly correlated to student achievement than the DTD design. Therefore, based on the findings of this study it can be stated that the design is based on local wisdom RTSRE much better in fostering positive character of the student learning as well as their achievement. N- Gain normalized test results that the implementation of the design to the experimental class reaches the very high category compared to the DTD design. Through the use of local advantages around the school, the student has support the environmental discipline, curiosity, responsibility, and more concerned about the environment. This is also reinforced by Mungmachon, M.R. (2012) that local wisdom and knowledge are integrated in a knowledge culture that is able to solve the problem. Integration of local advantages, history, culture and economy of a region will also strengthen the identity of a nation (Widodo, 2012). Thus, in the era of globalization it is needed for a nation to strengthen them by maintaining the hallmark of the region or nation.

CONCLUSION

Based on the results described above

several points are concluded as follows:

The suitable method in implementing the science learning based on the local wisdom in Gunungpati sub-district is RTSRE design and DTD design.

The science learning design resulted from the research using syntax of Review-Task-Solution-Reflection-Evaluation.

Implementation of science learning based on the local wisdom not only improving the positive characters of the elementary students, but also increasing their learning achievement.

By implementing the design in two elementary schools, 11 positive characters expected were indicated from students' performance. But characters of honest, disciplined, conscientious, diligent, careful, responsibility, and caring environment, are most significant.

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