



Implementation of the *Problem Based-Fishbone* Model on Reproductive System Concept

Arum Subekti^{1✉}, Nugrahaningsih¹, Lisdiana²

Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

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Abstract

Low students' achievement indicates that their thinking skills are not maximally trained. To improve students thinking skills can be done in several ways such as by deepening the concept by themselves, providing further explanation and alternative solutions to problems, so that students in the future are expected to solve problems around them. One learning model that can improve students thinking skills is problem-based learning. The model can encourage students' ability to conduct investigations and be able to provide alternative solutions to problems. This study aims to analyze the effect of problem-based-fishbone on reproductive system on learning outcomes and the health care attitude of high school students. This study employed a quasi-experimental design with a pretest-posttest control group design. The sample of this study was students of class XI MIPA 2 and XI MIPA 6 in SMA N 1 Dempet which were determined by purposive sampling technique. Data were collected by test and observation sheet. The data analysis showed that student learning outcomes could increase after learning activities were completed with completeness for both classes are respectively 79.54% and 90.48%, and students had good health care attitudes. Based on the results, it can be concluded that the application of the model problem-based-fishbone influences learning outcomes and health care attitudes of high school students.

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[✉] Correspondence:

Building D6 Lt.1 Jl Raya Sekaran Gunungpati Semarang

E-mail: arumsubekti@gmail.com

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INTRODUCTION

Science is the key of Science and Technology development, so it has become a very important aspect in various aspects of human life. The 21st century challenges, require individuals to have high-quality resilience and ability in analyzing, evaluating, and looking for alternative solutions. The low quality of thinking of students is the result of science education that is not concerned with the students' socio-cultural environment. Most students are not able to apply scientific concepts in real life, and teaching does not focus on the principle that science includes understanding concepts, and connecting them with everyday life.

Learning with the PBL model is based on the principle that problems can be used as a starting point for acquiring new knowledge. The PBL model can change students from receiving passive information to be active (student centered). Problem-based learning is an approach in learning that helps students to find problems from a real event, gather information through a self-determined strategy to take one problem-solving decision which will then be presented in their performances (Afcariono, 2008). Hadi et al. (2010) states that PBL has a positive influence on critical thinking skills and understanding of biology concepts of public high school students in Malang.

Based on observations at SMA N 1 Dempet, students tend to be passive when the learning process, the ability of students in deepening material is lacking because most students learn how to memorize, this can be seen from the average daily test scores where most students have not reached the criteria value minimal completeness (KKM). Learning that is done has not provided an experience where students can apply material in daily life which causes students to find it difficult to develop critical thinking skills, for that requires a learning model that can improve students' critical thinking skills, namely problem based learning (PBL).

Problem Based Learning is a set of teaching models that use problems as a focus for developing problem-solving skills, material, and self-regulation. PBL is a learning approach that uses real-world problems as a context for students to learn about critical thinking and problem solving skills, and to acquire essential knowledge and concepts from subject matter. Learning that does not involve students actively can hamper students' critical thinking skills and problem solving skills so students need learning that presents phenomena that occur around students and provides real problems that challenge students to solve them, namely models problem based learning. The model of problem based learning is characterized by the use of contextual problems, with PBL students are trained to develop their own knowledge, develop problem solving skills and increase self-confidence, by giving problems students can better understand the concept so that it is not just memorizing concepts (Husnidar, 2014). According to Arends (2001) the syntax of the model problem based learning is: 1) orienting students to the problem, 2) organizing students to learn, 3) guiding individual or group investigations, 4) developing and presenting the work and 5) analyzing and evaluating problem solving processes. Fishbone Diagram is an analytical tool that provides a systematic view of the causes and consequences that arise, contributes to an effect, thus facilitating the way to overcome it or describing the relationship between the results provided with all factors that influence the results (Bigbee et al, 2010). Named fishbone diagrams because the shape of this diagram is like a fish bone with problems as its head and causes that exist as thorns.

In addition to the right learning model suitable media is also very important. Problem based learning is one of the innovative learning models that can be used to improve student

learning outcomes. The teaching materials used in schools besides not integrating character education, most have not had interactivity (Sholekah et al, 2014). Reproductive system material in the 2013 curriculum syllabus requires students to understand the physiological processes in the body that are related to the relationship between structure, function, and processes that include the reproductive organs. Reproductive system material learns about the processes that occur in the human body and cannot be seen directly, so as to facilitate students in understanding the concept, a learning system is needed that involves students directly to find out how the phenomena that occur in the surrounding community.

Semarang State University as a conservation-minded university that has a vision of becoming a conservation-oriented and internationally reputable university. The character values of conservation include inspirational, humanitarian, caring, innovative, creative, sporty, honest and fair values. Conservation is meant to maintain and implement conservation values in life, through the application of models problem-based fishbone to reproductive system material, one of the conservation values that must be instilled in students is the caring value shown by the health care attitude they have. The purpose of this study was to analyze the model problem-based fishbone on reproductive system material in high school influencing student learning outcomes and reproductive health care attitudes in students.

METHODS

This study was a quasi-experimental with pretest-posttest control group design, where both classes were given different treatments, and each was given a pre-test before treatment and post-test after treatment. The population in this study were all students of class XI MIPA SMA N 1 attached. The sample in this study was class XI MIPA 2 and XI MIPA 6 students as the experimental class, and the control class was taken by purposive sampling technique. The independent variable in this study is the model problem based-fishbone on reproductive system material while the dependent variables are student learning outcomes and student health care attitudes. There are two types of data in this study, namely the primary data in both classes and supporting data for the experimental class. The main data in the form of student learning outcomes seen from the analysis of the score of the pre-test, post-test, and discussion sheet, as well as data on the attitudes of health care students in the experimental class. Supporting data involve student responses to learning models problems based-fishbone are applied.

RESULTS AND DISCUSSION

Student Learning Outcomes

Learning outcomes are seen through evaluation activities that aim to obtain evidence data that show the level of students' ability to achieve learning goals. Students' learning outcomes data collected from the average scores of posttest and discussion sheet. The percentage of students that reach minimum completeness criteria can be seen in Tables 1 & 2.

Table 1. Results of student learning after the application of the model *problem based-fishbone* on the reproductive system concept in SMA N 1 Dempet

Aspects	XI MIPA 2
Number of students	42
Highest score	97

Lowest score	50
Average the score	74
Students completed	38
Students did not complete	4
Completeness in each class (%)	90,48%

Table 2. Results of student learning after the application of the model *problem based learning* on the reproductive system concept in SMA N 1 Dempet

Aspects	XI MIPA 6
Number of students	44
Highest score	83
Lowest score	50
Average the score	69
Students completed	35
Students did not complete	9
Completeness in each class (%)	79,54%

Percentage of both classes for completeness of learning outcomes after the application of the *problem based-fishbone* and model *problem based learning* in reproductive system material in high school is that students have the completeness that has met minimum completeness in school, defined ≥ 70 . This means that the application of models *problem-based fishbone* in reproductive system material in high school is effectively applied because it reaches indicator 75% of students who get the score of ≥ 70 . The high achievement of students' final grades can be triggered by several factors, among others because of the learning atmosphere that allows students to be free in their opinions, thereby increasing student motivation and participation in learning.

The results of this study are by the opinion of Fariroh & Anggraito, (2015), improvement in learning outcomes is a result of students discussing problem-solving using PBL learning which is reflected in discussion sheet so students can construct their knowledge and learning experienced by students will be more meaningful. The statement is supported by Kinaseh *et al.*, (2015) which states that the meaningfulness of the material learned by students using the PBL model has a better effect on student learning outcomes. This is in line with the research conducted by Lisdiana *et al.*, (2017) which states that the higher the student's knowledge, the higher the learning outcomes obtained. Based on research by Kurniatuhnnisa *et al.*, (2016) with PBL model learning students are trained to uncover problems, formulate solutions, determine actions, use arguments to improve students' critical thinking skills.

Students can be motivated to learn concepts and ideas through the use of problems in PBL. Highly motivated students will be more interested in exploring knowledge and want to know something new to solve problems related to the real world (Wulandari & Surjono, 2013). This is supported by research by Fatonah *et al.* (2017) which states that increasing interest and motivation of students to learn makes students better understand the material taught by the teacher. Yew *et al.* (2010) stated that the problems presented in PBL have a variety of alternative problem solving so that they can help students to optimize their problem-solving abilities, in line with the opinion of Baden (2016) which states that problems usually start from everyday problems and are adjusted based on educational goals and criteria.

By the discussion, the concept would be easily delivered by students, if they experience difficulties students can ask friends for discussion. Students' involvement in problem-solving can increase activities while developing students' critical thinking skills in their

groups so that in the learning activities the teacher only acts as a facilitator when students experience difficulties. Students assume that they enjoy learning more, because it is not as usual that merely listening to the teacher, students also look cheerful, interested, and motivated in this learning activity, so students are more attentive and enthusiastic in learning. This is because in previous learning the teacher has not provided many variations in learning media (Erlianti *et al.*, 2017).

The use of media can be used as a tool in the activities of the teaching and learning process, with the help of the media being able to enhance student learning activities in a considerable period, which means that the media produce good learning processes and results rather than without media assistance. The media used to facilitate learning is by video because the video is an audio-visual media that displays images and sounds that make students more interested in learning so they can support the success of learning goals. The need for videos to be applied in SMA N 1 Dempet is attached because videos are rarely used in learning. If the teacher only explains the material, most students feel bored; students need video media to be more motivated to learn, which makes it easier for students to understand the content. This can be seen in Table 3 improvement in student learning outcomes after the application of the *problem-based fishbone* model to the material of the reproductive system.

Table 3. Improved student learning outcomes (N-gain) after the learning process.

Class	Average <i>pretest</i> score	Average <i>posttest</i> score	N-gain	Criteria
XI MIPA 2	64,2	74,3	0,28	Low
XI MIPA 6	57,3	68,5	0,26	Low

Analysis of improvement in student learning outcomes (N- gain) shows that students of class XI MIPA 2 and XI MIPA 6 are included in the low N-gain category, but both classes have very little difference in results. The research conducted by Hamidah *et al.* (2017) shows that the results of the calculation of N-gain values indicate the level of understanding after learning. This is because the teaching materials used come from the real environment, so students are more interested in reading and student learning outcomes increase. The results showed that basically, the SMA N 1 Dempet students had the potential to think critically in solving a problem, this potential is very unfortunate if it cannot be appropriately developed. Through the application of models *problem, based-fishbone* students can develop critical thinking skills and problem-solving abilities.

The learning design developed has shown the positive attitude of students that appears and can be observed when learning activities done. The data from the analysis shows that during learning, almost all students paid attention to the teacher's explanation well and demonstrate an attitude of responsibility and can work well together. Classical student mastery learning is calculated based on the final score obtained by students which can be known from the results of classical completeness of the two classes which show good results, where there is a difference between class XI MIPA 2 and class XI MIPA 6.

This shows that using model *Problem Based-Fishbone* applied, most students have been able to achieve the competencies specified in Basic Competence (KD), so the model of learning *Problem Based-Fishbone* on reproductive system material has a positive influence on student learning outcomes and can be used to apply to material learning next. The high level of classical completeness of the two classes studied was inseparable from the design of the applied learning. Learning design developed can optimize student learning activities.

In addition to the cognitive learning outcomes studied, the attitude of student activities in learning activities is also considered. The observation results of student activities in the two classes studied showed that all students both in the control class and the experimental class had attitudes in good categories during the learning process. This can be known through several measured aspects, namely discipline, cooperation, active, answering and deliberation during the discussion. Based on these results it can be shown that the application of the learning model *Problem Based-Fishbone* on reproductive system material at SMA N 1 Dempet has reached a predetermined indicator. This indicates that the design of learning that is applied can make students better in learning activities from several aspects that have not existed before that have a positive impact on students' learning motivation so that their learning outcomes are better.

Health Care Attitude

The score of a caring character is a concern that is not only self-oriented but in a system. Based on the Regulation of the Chancellor of the State University of Semarang, Unnes residents are obliged to actively participate in applying conservation values in their daily lives. Health care attitude is one of the applications of conservation character values that must be instilled in students. The growing attitude of caring for student's health can be indicated based on the answers to the student's questionnaire responses about. Data on self-care attitude in maintaining students 'reproductive health can be seen in Figure 1.

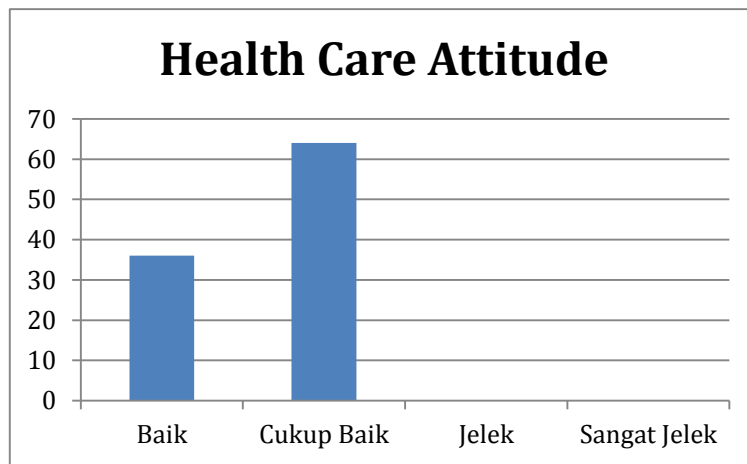


Figure 1. Distribution diagram of students' health care attitude during learning models *problem based- fishbone* on reproductive system material

Based on Figure 1, it can be seen that the assessment score of students' reproductive health care attitude after the application of the model *problem based-fishbone* to reproductive system material in high schools is in quite good criteria. This shows that the implementation of the model *problem based-fishbone* to reproductive system material in high school is influential in improving students' health care attitudes. Reproductive health education in schools is an effort to improve the health of students. For students to avoid reproductive health problems, students should be given an understanding and various skills, including problem-solving skills in the field of reproductive health.

CONCLUSION

Model *problem based-fishbone* learning on reproductive system material applied to high school students influences student learning outcomes. And the model *problem based-fishbone* influences students health care attitudes where they have an awareness to maintain their reproductive health.

REFERENCES

- Afcariono, M. 2008. Penerapan Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Siswa pada Mata Pelajaran Biologi. *Jurnal Pendidikan Inovatif*. 3(2): 65–68
- Baden, M. S. 2016. The Impact of Transdisciplinary Threshold Conceptson Student Engagement in Problem- Based Learning: A Conceptual Synthesis. *Interdisciplinary Journal of Problem-Based Learning*. 10(2) : 3-6
- Bigbee, J., et al. 2010. Models in Multi-Agency C2 Experiments Lifecycles: The Collaborative Experimentation Environment as a Case Study. *The International C2 Journal*. 4(3): 13
- Erlianti, S., Priyantini W., & Lisdiana. 2017. The Development Of Contextual Teaching and Learning Based-Video on Reproductive System Concept for SMA. *Unnes Journal of Biology Education*. 6(2): 169-171
- Fariroh, A & Yustinus, U. A. 2015. Pengembangan Perangkat Pembelajaran Berbasis Problem Based Learning pada Materi Virus Kelas X. *Unnes Journal of Biology Education* .4 (2) :149-155
- Fatonah, A., Lisdiana, & Supriyanto. 2017. Penerapan Biomagz sebagai Suplemen dalam Pembelajaran Sistem Reproduksi di SMA. *Unnes Journal of Biology Education*. 6(1): 104-109
- Hadi A. M., Corebima D. A., & Saptasari M. 2010. Pengaruh Pembelajaran Problem Based Learning (PBL) terhadap Kemampuan Berpikir Kritis dan Pemahaman Konsep Biologi Siswa SMA Negeri di Kota Malang. *Jurnal Penelitian Pendidikan*, 11(2): 1-11.
- Hamidah, I., D. R. Indriyanti, & Nugrahaningsih.W. H. 2017. Pengembangan Bahan Ajar Sub Bab Antioksidan Berbasis Kajian Pola Konsumsi Masyarakat Pesisir Indramayu. *Journal of Innovative Science Education*. 6 (1)
- Husnidar. 2014. Penerapan Model Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Kritis Siswa dan Disposisi Matematis Siswa. *Jurnal Didaktik Matematika* 1 (1): 71-82
- Kinaseh, Niken, S. & Tyas, A, P. 2015. Pengaruh Model Problem Based Learning dengan Media Animasi Flash terhadap Hasil Belajar dan Aktivitas Siswa. *Unnes Journal of Biology Education*. 4(3) : 317-321
- Kurniahtunnisa, Nur, K. D. & N. R. Utami. 2016. Pengaruh Model Problem Based Learning terhadap Kemampuan Berpikir Kritis Siswa Materi Sistem Ekskresi. *Journal of Biology Education*. 5(3): 310-318
- Lisdiana, S. Saptono., & Ismarlini. 2017. Analisis Hasil Belajar dan Sikap terhadap Penyalahgunaan Psikotropika dan Zat Adiktif Pada Pembelajaran Sistem Saraf dengan Bioedutainment Role Play pada Siswa SMA. *Indonesia Journal Conservation*. 6(1): 8-14
- Sholekah. S., Nugrahaningsih W. H. 2014. Pengembangan Multimedia Interaktif Berbasis Pendidikan Karakter Materi Sistem Reproduksi. *Unnes Journal of Biology Education*. 3 (3):345-354
- Wulandari, B & H. D. Surjono. 2013. Pengaruh Problem-Based Learning terhadap Hasil Belajar Ditinjau dari Motivasi Belajar PLC di SMK. *Jurnal Pendidikan Vokasi*. 3(2) : 178 – 191
- Yew, E.H.J., E. Chang & H. G. Schmidt. 2010. Effect of Tutor Related Behaviors on the Process of Problem Based Learning. *Advances in Health Science Education*.16(4):491