Unnes.J.Biol.Educ. 9 (2) (2020)

Journal of Biology Education

http://journal.unnes.ac.id/sju/index.php/ujbe

The Effectiveness of Bioedutainment Strategies by Biofun Card's Support on Learning Outcomes and Caring Attitudes for Invertebrate Diversity

Penny Wahyuningsih[1]✉, Bambang Priyono[1], Sri Ngabekti[1]

[1]Biology Department, Faculty of Mathematics and Sciences, Universitas Negeri Semarang, Indonesia

Article Info

Article History:
Accepted: 2018
Approved: 2018
Published: August 2020

Keywords:
Effectiveness, Bioedutainment, Biofun Card, Invertebrate diversity caring attitude

Abstract

This study aims to determine the effectiveness of Bioedutainment strategy with Biofun Card's Support on learning outcomes and caring attitude for invertebrate diversity. This research is a Quasi-Experiment with Nonequivalent Control Group Design. The population of this study is all students of class X MIPA of Sint Louis Semarang High School in academic year 2017/2018 which is consisting of two classes. The sample is class X MIPA 1 as the experimental class and class X MIPA 2 as the control class which is determined by the saturated sample technique. The results show that the experimental class student learning outcomes are better than the control class. The experimental class has an average learning outcome of 84.37 with classical completeness of ≥ 85% which reached 93.10%, while the control class is 82.76%. The results of the t-test show t_{count} 0,000 <0.05,. This indicates that there are significant differences between the control and the experimental classes. N-Gain for the experimental class is ≥ 0.3 with an average of 0.70, while the control class is 0.51. The effectiveness level of the application of Bioedutainment strategy with Biofun Card's support shows students' caring scores of 82.76% (very caring). Students give positive responses to the application of Bioedutainment strategy with Biofun Card's support with an average of 88.95%. Based on the results of the research and discussion, it can be concluded that learning uses the Bioedutainment strategy with Biofun Card's support in invertebrate material to be effective in improving learning outcomes and caring for invertebrate diversity.

✉Correspondence Address:
D6 Building 1st Floor Jl. Raya Sekaran Gunungpati Semarang
E-mail: pennywahyuningsih@gmail.com

p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

The current development makes Indonesia needs high-quality human resources. The high-quality of human resources is influenced by the quality of education. Various efforts have been made to create quality education including renewal in the curriculum, changes in the education system, the application of varied learning models, and fulfilling educational facilities and infrastructure to support the quality of students. The first thing in efficient learning activities is identifying student needs (Akilli 2015). In addition, the role of educators is also very important in the success of learning activities. Educators are people who determine quality and quantity, participation and achievement, and also the key elements in preventing education failure at school (Fernandez-Rio et al. 2017).

Sint Louis Semarang High School teachers have tried to create learning with various strategies and methods so that students are more active, including laboratory work, class discussions, working on LKS (students' worksheet), and question and answer. However, the results have not been able to increase student passion and activity maximally. When the discussion activities took place, only a few students are actively involved, while the other students are busy with other activities outside the discussion. This is an example of a learning obstacle. Simanjorang (2018), states that teacher-centered learning will create teacher-dominated learning. Therefore, choosing the right learning strategy will determine the success of the teacher in creating a student-centered learning environment, so that learning is not monotonous.

Based on the results of interviews and observations, Invertebrate material is the material with an average mastery that is less than optimal in Biology learning activities of class X in Sint Louis Semarang High School. In the previous semester, the learning outcomes show that in one class as many as 20% of students completed and 80% of students did not complete Invertebrate learning with minimum completeness criteria (KKM) of 70. Students consider Invertebrate material to be one of the hard to pin down material. Most students are still confused and difficult to understand the characteristics of 8 Invertebrate phyla.

Learning strategies must be effectively applied in the learning process. Carr (2013) states that the teacher has to design effective learning so that students more easily handle problems of learning difficulties that will affect their learning outcomes. Effectiveness in learning means achieving learning goals in the teaching and learning process (Anggraeni 2015). One of the effective learning strategies is the Bioedutainment strategy. Pleasant conditions are one of the factors that cause students to be interested in participating in learning activities, so students are better prepared and more understand in receiving subject matter. An interesting learning process, such as designing a game that is applied in a learning process is expected to increase students' interest in learning.

Bioedutainment is a learning strategy that is designed in such a way with educational and entertainment content that is combined harmoniously so that learning feels more enjoyable. Fun learning is an atmosphere of teaching and learning that can focus students' attention in full while learning so that time on task is high (Trinova 2012). The Bioedutainment strategy contains elements of science learning, scientific processes, work skills, collaboration, educational games, competence, challenges, and sportsmanship (Marianti 2006).

Learning with Bioedutainment strategy is more fun compared to other learning because in Bioedutainment strategy learning there are elements of the game. The game in the Bioedutainment strategy learning in this study is a game using Biofun Card media. Biofun Card media is a card game innovation by playing which is aided by clues or instructions.

Biofun Card helps students build and review their knowledge of invertebrate material, explore and communicate ideas to find a lot of information contained in the Biofun Card, engage students in searching, finding, guessing, grouping cards to make them active, and enthusiastic. This is proven by Mahmudah (2013) in her research which the use of biodomino can improve student learning activities and outcomes in Biology learning.

The learning outcomes which are obtained in Invertebrate material using Bioedutainment strategy with Biofun Card's support, besides developing students' cognitive abilities can also develop affective abilities. One of the affective abilities that can be developed in learning invertebrate material using Bioedutainment strategy with Biofun Card's support is the attitude of caring for the diversity of invertebrates in the surrounding environment.

The attitude of caring about the diversity of invertebrate must be owned by students, especially Sint Louis Semarang high school students. Based on the results of observations, the level of student awareness to care about invertebrate diversity is still low. This can be seen from the lack of awareness of students to utilize invertebrate animals in the school environment as a source of learning. According to Uno (2008) one of the causes of children is not aroused to care because the only source of education is text.

One of the efforts that can be made to instill a caring attitude towards the diversity of invertebrates is through learning activities. Learning activities by instilling a caring attitude towards invertebrate diversity in this study are assessed from the students' attitudes in an effort to preserve invertebrate animals in the surrounding environment, and to make invertebrate animals in the surrounding environment as learning resources properly and correctly. In this study, the application of Bioedutainment strategy with Biofun Card's support is expected to improve learning outcomes and care for invertebrate diversity.

RESEARCH METHOD

This research is conducted at Sint Louis High School Semarang in the even semester of the 2017/2018 academic year. This study uses the Quasi-Experiment method with Nonequivalent Control Group Design. The population in this study are all students of class X MIPA consisting of 2 classes. The research sample includes two classes, namely class X MIPA 1 and X MIPA 2 which are taken by saturated sampling technique, namely sampling technique if all members of the population are used as samples. The type of data is cognitive learning outcomes data, data analysis results in caring about invertebrate diversity, data from students' psychomotor analysis, data on the analysis of student responses and teacher responses.

The implementation of this study consists of the preparation, implementation of learning, assessment, data analysis, and conclusion drawing. Data collection techniques are test, observation, interview, and questionnaire methods. Data analysis in this study included homogeneity test, normality test, t-test, classical completeness test, N-Gain test, descriptive analysis of caring for invertebrate diversity, descriptive psychomotor analysis of students, and descriptive analysis of student and teacher responses.

RESULTS AND DISCUSSION

The preliminary data of this study is that the pretest results in both classes show that the initial conditions in both classes are the same. This is evidenced by the results of homogeneity where t_{count} is 0.763> 0.05. Furthermore, the learning outcomes of students' cognitive aspects are obtained from the posttest values which is performed at the end of learning. The results of the posttest values are presented in Table 1.

Table 1. Learning outcomes of cognitive aspect of students in the experimental and control classes

Criteria	Classes	
	Experimental	Control
Number of Students	29	29
Highest Score	96,70	90,00
Lowest Score	66,70	60,00
Average	84,37	73,91
Complete	27	24

Incomplete	2	5
Classical Completeness	93,10%	82,76%

Based on the data in Table 1, the classical learning completeness in the experimental class and control class is different. The experimental class has classical completeness which reaches a value ≥ 85% which is 90.10%, while the control class is 82.76%. Analysis of student learning outcomes shows that students who take part in learning using biofun card-assisted bioedutainment strategies get better results.

The difference in the average learning outcomes between the experimental and the control classes can be seen from the t-test on the posttest results of each class which is conducted after treatment given. Before the t-test is carried out, the normality test is done first. The results of the normality test show that the data is normally distributed. The value of t_{count} in the experimental class is 0.158> 0.05, while in the control class is 0.187> 0.05. After the distribution of both classes is normally distributed, a t-test can be carried out. The results of the t-test analysis of the posttest values are presented in Table 2.

Table 2. Results of the t-test calculation of the posttest value

Group	N	Mean	Sig.	Information
Experiment	29	84,3724	0,000	Sig<0,05 there is significant difference
Control	29	73,9069		

Based on the data in Table 2, it can be concluded that Ho is accepted (t_{count} 0,000 <0.05) means that there is a significant difference in the average posttest value between the experimental and the control classes. Furthermore, to find out the improvement in student learning outcomes, the N-Gain test is conducted. The results of the N-Gain test are shown in Figure 1.

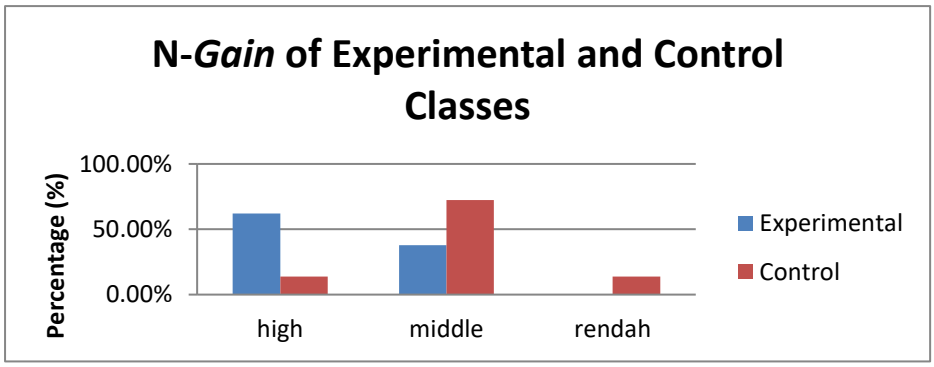

Figure 1. The Result of N-Gain Calculation

Based on the data in figure 1, the students who get the medium to the high category are more in the experimental class than the control class. This supports that the increase in learning outcomes of the experimental class is higher than the control class.

Based on the results of this study, the learning using Bioedutainment strategy with Biofun Card's support is effective in improving student learning outcomes. This can be proven by achieving optimal learning outcomes in the experimental class. In the learning process by applying Bioedutainment strategy with Biofun Card's support, it provides a pleasant experience such as observing specimens and invertebrate animal species.

In the experimental class, students can observe objects directly while in the control class, students only observe through images in the LDS (students' discussion sheet). The opportunity to observe and experience directly that is obtained by students in this experimental class that affects the better learning outcomes than the control class. These activities make students in the experimental class better at

describing objects that are carefully and correctly observed so as to improve students' understanding. In addition to observing specimens and invertebrate animal species, in the experimental class students also practiced making invertebrate animal preservation, then the observation sheet and LDS work in groups are one of the lessons that could encourage students to actively participate in learning. According to Ngabekti et.al (2006), learning carried out in groups requires students to work on joint tasks and foster student learning motivation, so students are active in learning. In addition, with playing using Biofun Card there is an element of competition, where each student must be prepared looking for answers from the clue Biofun Card when getting the ball when the ball is rotating which later if the student's answer is correct it will be given an additional value, and if the student's answer is wrong then he/she will be sanctioned as agreed before playing the Biofun Card. This can increase the motivation and enthusiasm of students to pay more attention to the learning process.

Through playing activities, students will find it easier to remember the material concepts learned because students do it themselves so that student learning outcomes can achieve minimal completeness indicators. This is consistent with the statement of Cai et al. (2006), that Bioedutainment learning that is applied through games can increase students' knowledge and skills. The characteristic of Bioedutainment strategy application is students will learn biology happily through fun activities so that mentally students will be ready and willing to accept biological concepts. This is in accordance with Alotaibi's statement (2014) that pleasant conditions are one of the factors that can improve student learning outcomes.

From the results of the analysis, there are still some students who have not completed KKM, especially in the experimental class even though they have been given treatment. Students have different abilities. Although the same treatment has been given, namely learning by applying the Bioedutainment strategy with Biofun Card's support, not all students in the experimental class can receive learning material well. The factors in student responses to learning also affect the completeness of student learning, because the success of learning is not only seen from the results of learning but also supported by student responses after participating in learning. The responses given by students who are not complete KKM have a lower score compared to the scores of other students who complete KKM. This proves that students are not interested in participating in learning by applying Bioedutainment strategy with Biofun Card's support in Invertebrate material learning. Aunurrahman (2009) states that students who have the motivation to learn will appear through seriousness to be involved in the learning process, among others, appearing to be active in asking questions, expressing opinions and so on.

The result of the t-test is there is a significant difference between the average learning outcomes of the experimental and the control classes. This is because the experimental class has learned by applying a Bioedutainment strategy with Biofun Card's support, while the control class is given conventional learning as usual. In addition to improving student learning outcomes, the N-Gain value in the experimental class was also higher than the control class.

Based on the calculation of N-Gain, the average increase in students' understanding of the experimental class is 0.70 with high criteria. The increase in the average learning outcomes of the control class is 0.51 with the medium criteria. Based on these data it can be seen that learning by applying Bioedutainment strategy with Biofun Card's support is effective for increasing learning outcomes in invertebrate material. These results are reinforced by the research of Tiastuti (2015) that Bioedutainment strategy can increase the value of N-Gain in the experimental class compared to the control class using conventional learning model. The increased understanding of students in the experimental class that is higher than the control class is influenced by several factors, one of them is a pleasant learning atmosphere by observing real objects. During the learning and discussion process takes place, students look very enthusiastic about learning and discussion activities. Learning by using appropriate and interesting strategies with real learning resources will make it easier for students to capture the content of learning material.

The level of student awareness of invertebrate diversity in the experimental class has a higher percentage of students with very caring criteria than the control class. This shows that the level of student care for the environment in the experimental class is better than the control class (Figure 2).

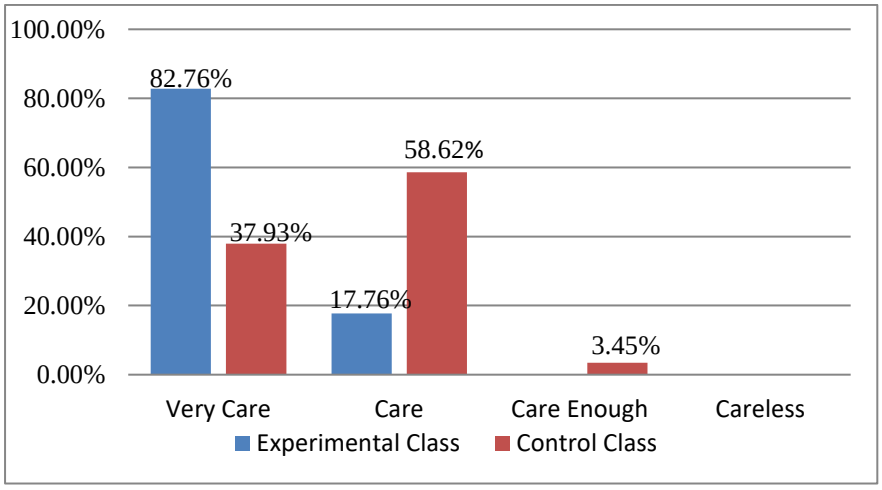

Figure 2. Recapitulation of Assessment Results of Caring Attitude for Invertebrate Diversity

During the learning in the experimental class, students are given experience by observing specimens and invertebrate species that they take from the environment around them. Then, it is used as a source of learning directly. Learning by observing invertebrate specimens and species directly will make it easier for students to understand the material, provide more experience, and can inspire students to act more concerned with the diversity of invertebrates in the surrounding environment. In the control class, the level of student care for invertebrate diversity is lower than the experimental class. This happens because the control class students only learn from what is explained by the teacher and the LDS which is limited in nature. Students cannot observe directly. Uno (2008) states that one of the causes of students is not stimulated to foster a caring attitude because the only source of education is text.

Based on the results of the observer's assessment of students' psychomotor, the experimental class has a greater percentage of students with good and very good criteria than the control class. This shows that the experimental class students have higher psychomotor levels than the control class (Figure 3).

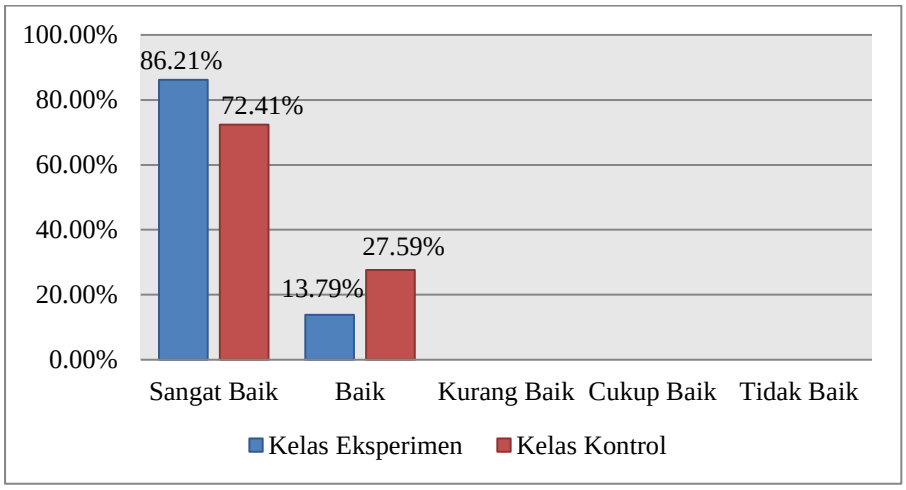

Figure 3. Recapitulation of Student Psychomotor Assessment Results

Assessment of student attitudes is obtained from observations of students' (psychomotor) skills during the presentation. It is consists of four aspects including explaining the material clearly and loudly, the ability to answer questions from the teacher, the ability to answer questions from the audience and the ability to complete and discuss the results completely. Based on the results of the analysis of student psychomotor value recapitulation observations, it can be concluded that the experimental class with learning using Bioedutainment strategy with Biofun Card's support is obtained a higher percentage of psychomotor values.

The success of learning is not only seen from the level of success shown by learning outcomes but also seen from the responses of student responses after the learning has been followed. The results of the questionnaire given to students showed that learning by applying Bioedutainment strategy with Biofun Card's support made the learning atmosphere pleasant and students more easily understood invertebrate material. The lowest score from student responses is that students find it easier to remember invertebrate material. This is because students are still having difficulty remembering the scientific names of species representing 8 invertebrate phyla. For students, scientific names are foreign terms they hear, so students do not understand what the scientific name means.

The teacher also believes that learning by applying a Bioedutainment strategy with Biofun Card's support helps students understanding improve. It is because of pleasant learning stimulates students who are usually passive in class to become active. This is in accordance with the statement of Sitepu (2016) that edutainment-based learning makes the learning atmosphere more alive and more passionate so that it will create an active and enjoyable learning process. Although there are many advantages of learning by applying Bioedutainment strategy with Biofun Card's support, there are also disadvantages of this learning activity that is applied to invertebrate material. Learning by implementing Bioedutainment strategy with Biofun Card's support requires careful planning to make the learning activities do not consume much time. Another difficulty in this learning is classroom management so that students stay focused on learning.

CONCLUSION

Based on the research result and discussion, it can be assumed that the Bioedutainment strategy with Biofun Card's support in Invertebrate material learning is effective in increasing the learning outcomes and caring attitude for Invertebrate diversity.

REFERENCES

Akilli, M. 2015. Regression Levels of Selected Affective Factors on Science Achievement: A Structural Equation Model with TIMSS 2011 Data. *Online Submission*, 19(1): 1-16.

Alotaibu MB. 2014. Multimodal Metaphors for Edutainment in Elearning Interfaces: A Usability Evaluation of Learnability and Experienced User Performance. *Journal Of Software* 9(6): 1412-142.

Anggraeni, L, F. Putut Martin, & W. Isnaeni. 2015. Efektivitas metode *role playimg* berbantuan *medispro* untuk meningkatkan hasil belajar sistem reproduksi manusia. *Unnes Journal of Biology Education*. 3(4): 311-316.

Aunurrahman. 2009. *Belajar dan Pembelajaran.* Bandung: Alfabeta.

Cai Y, B Lu, Z Kan, C Indumathi, KT Lim, CW Chan, Y Jiang, & L Li. 2006. Bio-edutainment:Learning life science through x gaming. *Journal of Computers* 30 (1): 3-9.

Carr, N. S. 2013. Increasing the effectiveness of homework for all learners in the inclusive classroom. *School Community Journal*. 23(1): 169-182.

Fernandez-Rio, J., Cecchini, J.A., Méndez-Gimenez, A., Mendez-Alonso, D. and Prieto, J.A. 2017. Self-regulation, cooperative learning, and academic self-efficacy: Interactions to prevent school failure. *Frontiers in psychology*. 8.

Mahmudah Y. 2013. "Efektivitas Strategi Bioedutainment Berbantuan Spesimen dan Bioedomino pada Materi Invertebrata di SMA". *Skripsi*. FMIPA UNNES.

Marianti A. 2006. *Bioedutainment* strategi dalam pembelajaran biologi. Makalah. Dipresentasikan pada pelatihan eduwisata biologi guru SMP se kota Semarang, di Jurusan Biologi FMIPA UNNES di Semarang tanggal 25-26 November 2006.

Ngabekti S, K Santosa, B Priyono, & SM Endang. 2006. Penerapan Model Investigasi Kelompok dengan Pendekatan Jelajah Alam Sekitar pada Materi Makhluk Hidup dan Lingkungannya. *Jurnal Penelitian Pendidikan* 22 (1): 4863.

Simanjorang, E. 2018. Meningkatkan Hasil Belajar dan Keaktifan Belajar IPA Melalui Metode Simulasi Berbasis Bioedutainment Pada Siswa SMP Negeri 1 Selesai Tahun Ajaran 2016/2018. *Jurnal Tabularasa PPS Unimed*, 15(1):32-42.

Sitepu, J.M. 2016. Pembelajaran Berbasis Edutainment Untuk Meningkatkan Keaktifan Belajar Siswa. *The Progressive an d Fun Education Seminar*.

Sudjana, N. 2009. *Penilaian Hasil Proses Belajar Mengajar*. Bandung: PT. Remaja Rosdakarya.

Tiastuti, S.C. 2015. "Efektivitas Strategi Bioedutainment Berbantuan Spesimen dan Biocard terhadap hasil belajar siswa pada materi Klasifikasi Makhluk Hidup di SMP N 2 Boja". *Skripsi*. FMIPA UNNES.

Trinova, Z. 2012. Hakikat Belajar Dan Bermain Menyenangkan Bagi Peserta Didik. *Jurnal Al-Ta'lim*, 1(3): 209-215.

Uno HB. 2008. *Profesi Kependidikan (Problema, Solusi, dan Reformasi Pendidikan di Indonesia)*. Jakarta: Bumi Aksara.