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The Effectiveness of Teams Games Tournament with Biodomino on Ecosystem Material to Enhance Student's Activity and Learning Outcomes in SMAN 2 Salatiga

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Info Article	Abstract
	The Ecosystem is considered as a notional topic due to lack of material visualization. An effective learning media is needed to help student in learning ecosystem. There are some factors that make some schools are unable to conduct an outdoor learning, that can be overcome through the model of Team Games Tournament (TGT) as a learning method with Biodomino as a supporting learning media. This study was aimed to determine the effectiveness of TGT with Biodomino on student activity and learning outcomes in ecosystem. The method used was quasi experiment with Nonequivalent Control Group Design. The result of this study showed that 100 percent of students participated in the experiment were in active category, with 81.25% of students got score of ≥77. It is concluded that learning the ecosystem unit by using TGT method with the help of Biodomino is an effective way to increase the student activity and learning outcomes.

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INTRODUCTION

Improving the quality of education in schools is closely related to the quality of teaching and learning process. Teaching and learning activities in schools can affect students so they can gain ease in learning. One of the factors that determine the success of learning is motivation. Motivation in learning acts as a guide and activator of action in the learning process (Hamalik, 2013).

The Ecosystem is one of the units in even semester of class X -in high school. Based on the interview, the study of the ecosystem unit was done several times outside the classroom with the utilization of nature and the surrounding natural environment. According to Alimah & Marianti (2016), learning objects from the nature and environment of students help them more easily understand biology and provide a real picture of daily life. There are several factors that make it difficult or even impossible for some schools to do outdoor learning for this unit i.e. condition of the school environment, the topic of learning and school location. In addition, when students do outdoor learning, it is feared that they could not get a picture of ecosystem learning materials but just play around and joke. As a teacher, the determination of a student's teaching and learning area is very important. Learning runs more effectively and motivates students to learn if the place of learning in accordance with the learning materials and school location. In addition, when students do outdoor learning, it is feared that they could not get a picture of ecosystem learning materials but just play around and joke. As a teacher, the determination of a student's teaching and learning area is very important. Learning runs more effectively and motivates students to learn if the place of learning in accordance with the learning materials.

According to teachers of SMA Negeri 2 Salatiga, the difficulty experienced by students on learning the ecosystem is the lack of material visualization so that, it is considered as a national topic. In addition, learning process is constrained by school facilities which make the teacher prefer to use a conventional teaching and learning method. Conventional learning without a supporting learning media causes the low of student's learning enthusiasm resulting in an impact on learning outcomes.

Combining learning process with a game is a strategy that teachers can do in facilitating the learning process in the classroom. Students feel fun learning, adding knowledge and skills when using game methods in the learning process (Rigas & Ayad, 2010). In addition, the game can be used to improve the character of students such as an ability to cooperate and communicate with friends.

One of the learning strategies that combine games and learning is Teams Games Tournament (TGT). TGT is one of cooperative learning that uses games, academic tournaments, quizzes, and an individual progress scoring system (Slavin, 2005). The game used in this TGT learning is a Biodomino card. Biodomino card adapt from Domino cards. The Biodomino card here is not a card used by people to gamble, but a biology learning card with modified shape and rules.

The advantages of using Biodomino cards include easy-to-find paper cards, easy to carry anywhere, easy to learn because the game principle is no different from the classical/original domino. This card also does not require much time in its use. It can control and attract the attention of students and the visualization from Biodomino cards can guide students to learn the concepts and principles of an appropriate notional material in overcoming the difficulties of learning ecosystem material.

Biodomino card media that is creatively packaged with TGT model is expected to (1) increase student's enthusiasm in learning because it is presented in the form of game and academic tournaments, (2) The interesting and unique display of Biodomino cards can give an overview of the concepts and the principles of ecosystem and attract students' attention in learning as well as to grow their motivation to learn, and (3) The procurement of Biodomino cards can support the availability of instructional media so that the learning process is unconventional and the learning is centered on

the students. Based on the description above, it is important to conduct a study in SMA Negeri 2 Salatiga, entitled: The Effectiveness of Teams Games Tournament with Biodomino on Ecosystem Material to Enhance Student's Activity and Learning Outcomes in SMAN 2 Salatiga.

RESEARCH METHOD

The research was conducted at SMA Negeri 2 Salatiga in April-May 2017. The method used was a Quasi Experimental research method with Nonequivalent Control Group Design. Subjects were placed in the experimental and the control group selected by purposive sampling. The experimental group got TGT learning model with Biodomino while the control group was not given any treatment (the lesson conducted by discussion and lecture method).

Data were taken in the form of student activities and affective learning results with the observation sheet and students' cognitive learning outcomes with the test. Student responses were also measured by questionnaires as well as teacher responses through the interviews. Learning TGT with Biodomino card was said to be effective with the following indicators, (1) each measured aspect of student activity includes in active or very active category, (2) student activity level:$\geq$ 80% of students include in active and very active category, (3) student learning outcomes: $\geq$ 80% of students achieving minimum completion criteria i.e. 77, (4) improvement of learning outcomes (N_gain) includes in medium to high category, (5) each student attitude includes in good or very good category, (6) percentage of classical completeness of student attitude is $\geq$ 80%.

RESULT AND DISCUSSION

Percentage of each student activity aspect showed that TGT learning with Biodomino achieved success indicator that is active and very active category. This is because students feel comfortable in learning so that students are more daring and active in the learning process. In addition, students also feel happy and challenged with Biodomino tournaments that motivate students to compete in a healthy manner so as to encourage them to study harder. Learning models presented in the form of games and tournaments make students not feel bored (Suryadi et al., 2015). Learning TGT with Biodomino in which there are tournaments can encourage students to be actively involved in the learning process. They are actively ask, answer, and discuss in groups to solve problems (Nopiyanita et al., 2013). The complete data are presented in Table 1.

Table 1 Analysis Result of Each Aspect of Student Learning Activity in TGT with Biodomino Learning Method

Aspect	Percentage (%)	Criteria
Ask question during the learning	76,04	Active
Answer question	70,31	Active
Present the result of discussion	79,82	Active
Sprean an opinion	73,44	Active
Discuss in group	83,72	Very Active
Listen to the information conveyed	84,77	Very Active
Pay attention to the explanation	86,59	Very Active
Interest in learning	84,38	Very Active
Make the topic summary	95,96	Very Active

The data above shows that TGT with Biodomino can increase students' activity by 100% (active + very active category). This result is obtained because the method is able to improve students' learning motivation. Motivation plays an important role in student life and has a great impact on attitudes and behaviors in learning. Motivation to learn can support the success of students in achieving minimum completion criteria. High motivation tends to make students eager to be actively involved in learning both physically, emotionally and mentally (Putri et al., 2013). This results can be seen in Table 2.

Table 2 Result of Student Activeness Criteria in TGT with Biodomino Learning Method

Activeness	Number of Student	Percentage (%)
Very active+active	64	100
Very active	36	56,25
Active	28	43,75
Low	-	-
Very low	-	-

Student activity in TGT learning with Biodomino is also effective because the learning process that was initially centered on the teacher become student-centered learning. The teacher only acts as a facilitator in charge of providing guidance to create a conducive atmosphere and learning environment. The student-centered learning process provides opportunities and facilities to construct their own knowledge, so that students will gain a deep understanding (Yudiasmini et al., 2014).

Biodomino cards give different images compared to those contained in textbooks on ecosystem unit. Learning using images on Biodomino cards stimulates students' attention in learning activities. Presentation of material in the form of images can arouse students and make the material more concise and easy to understand (Riyono & Retnoningsih, 2015). The use of images on Biodomino cards can overcome the limitations of direct observation in the natural environment. Presence of the image on the card is able to help students in finding the concept of a subject matter. In line with Musfiqon (2012), the main purpose of presenting the image is to visualize the concept to be conveyed to the students.

Student attitude in learning TGT with Biodomino achieve a good result (good and very good criteria). This is because the application of TGT model with Biodomino card can improve students' attitude in the learning process. TGT learning provides positive results for the improvement of students 'attitudes in learning (Wyk, 2011).The existence of individual and group responsibilities allows for improvement of students' positive attitude such as tolerance, honesty, responsibility, cooperation, and curiosity as seen in Table 3.

Table 3 Analysis Result of Every Student Attitude during the TGT with Biodomino Learning Process

Attitude	Percentage (%)	Criteria
Tolerance	86	Very Good
Honesty	83	Good
Responsibility	83	Good
Team Work	92	Very Good
Curiosity	84	Good

Table 4 Analysis Result of Student Attitude during the TGT with Biodomino Learning Process

Average in Each Meeting			Average	Classical Completeness	Category
I	II	III			
82	85	88	85	92,19%	Very Good

The average score of affective students learning outcomes in TGT with Biodomino learning is 85 with 92.19% classical completeness (Table 4). This shows that the application of TGT with Biodomino can give a positive influence on students' attitude. This is because the focus of TGT with Biodomino is the collaborative learning of the group. Students are required to develop and practice interpersonal skills and problem-solving within the study groups (Burford, 2013). Learning

in groups can increase the social interaction so as to improve the attitude of students among others, sense of cooperation, responsibility, activeness, and desire to express their opinions (Andriyani et al., 2016).

The classical completeness of TGT learning with Biodomino card is 81.25%. It means that 81.25% of students get a posttest score of ≥ 77 as minimum completion criteria for Biology in SMA Negeri 2 Salatiga. These data show that TGT with Biodomino gives students a good understanding of ecosystem unit. This is due to a social interaction and involvement in learning TGT with Biodomino that make the student better in memorizing the materials. The complete data are presented in Table 5.

Table 5 Analysis Result of Student Cognitive Learning Outcomes in TGT with Biodomino Learning Process

Data	TGT with Biodomino
Average score of Pre-test	52,29
Average score of Post-test	80,26
Number of students with score of ≥ 77	52
Number of students with score of < 77	12
N_gain	0,586
Criteria	Sedang
Classical Completeness	81,25%

Increased learning outcomes were analyzed using N-Gain test. The result showed that N-Gain of TGT learning with Biodomino was 0.586 (Table 5). From the data, it is known that the average of students' knowledgeability improvement is in the medium category. Improved learning outcomes of TGT learning with Biodomino influenced social interaction and active student involvement. Social interaction and student involvement actively contribute to the psychological readiness and appreciation of students so that it affects students' cognitive intelligence. The cognitive intelligence of the ability to accept the material remember and solve problems related to the studied subject (Wilke, 2003).

Group discussions with Biodomino cards help students to better understand the topic. Each member gets their own topics to be solved with an expert team and then submitted to the initial team members to serve as Biodomino tournament materials. The presence of tournaments leads to a high student learning motivation, students are more serious in understanding the whole topic so that students can answer the right questions and become the winners of the tournament. Tournaments make students enthusiastic and motivate them to learn (Salam et al., 2015). Motivation to learn is a mental force that encourages the learning process. Weakening or lack of motivation can weaken learning activities resulting in a low student learning outcomes (Dimyati & Mudjiono, 2006).

However, there are 12 students with the score of less than 77. It can happen due to the influence of many factors. According to Purwanto (2011), student learning outcomes are influenced by external and internal factors. Internal factors include the physical condition, the condition of the five senses, talents, interests, intelligence, motivation, and cognitive abilities. External factors include the natural environment, social environment, curriculum—/—learning materials, teachers, facilities, and administration/management.

The use of Biodomino cards has a positive effect on learning outcomes due to the learning method that requires students to be active. Biodomino cards contain pictures that motivate students to learn. It also provides visual images for students so that students do not need to imagine the material of the ecosystem but they can immediately know the forms and examples that have not been seen before. In addition, Biodomino cards include the descriptions and explanations of material and questions that help them to better understand ecosystem unit.

The presence of Biodomino cards as a learning media gives a positive influence on student learning outcomes. This media is able to generate interest and make the learning atmosphere become more fun. Interest in instructional media encourages students to pay attention to lessons given by teachers and be more active in learning so that students can understanding the material deeper.

The successful implementation of TGT with Biodomino in improving student learning outcomes occurs because TGT learning is able to make students work together in discussions, compete in tournaments, ask questions and opinions during the lesson. These activities guide the students to be able to build their own knowledge. In line with Adnyana et al. (2014), TGT is a form of cooperative learning that is developed based on constructivism learning theory, where knowledge is constructed by students gradually through their own experience.

The advantages of TGT learning with Biodomino cards can already be felt by students. It successfully makes the students more interested in following the learning, helps to ease the learning of ecosystem material, increases cooperation, and increases activity in learning activities.

Based on the results of interviews with teachers, they give a good impression on the learning process with TGT with Biodomino card. The teacher's response shows that the advantages of the TGT with Biodomino cards are that students are more enthusiastic in learning, students are more enthusiastic about learning to win the tournaments, student-centered learning, training the students to work together, and the cards can provide an overview and information of ecosystem unit.

CONCLUSSION

Based on the results of the study, it can be concluded that the learning by applying the Teams Games Tournament model with Biodomino is effective to enhance student activity and learning outcomes in ecosystem unit.

REFRENCES

Adnyana, M. E., N.P. Ristiati, & I.G.A.N. Setiawan. 2014. Pengaruh Model Pembelajaran Teams Games Tournament (MPTGT) terhadap Hasil Belajar Biologi dan Kecerdasan Emosional Siswa. *E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi IPA* 4, 4(1): 1-12.

Andriyani, G., T. Istianti, & M. H. Ismail. 2016. Penerapan Model Pembelajaran Team Games Tournament (TGT) untuk Meningkatkan Hasil Belajar Siswa pada Pembelajaran IPS di SD. *Jurnal Antologi*, 4(4): 1-8.

Alimah, S & A. Marianti. 2016. *Jelajah Alam Sekitar.* Semarang: FMIPA Universitas Negeri Semarang.

Burford, M. L. 2013. *Is There a Relationship between Teams Games Tournamens and Changes in Communication and Attitude about Substance Abuse?.* Disertasi. Knoxville: The University of Tennessee.

Darmansyah. 2011. *Strategi Pembelajaran Menyenangkan dengan Humor.* Jakarta: Bumi Aksara.

Dimyati & Mudjiono. 2006. *Belajar dan Pembelajaran.* Jakarta: PT Rineka Cipta.

Hamalik, O. 2013. *Proses Belajar Mengajar.* Bandung: Bumi Aksara.

Musfiqon, H. M. 2012. *Pengembangan Media dan Sumber Pembelajaran.* Jakarta: Prestasi Pustakarya.

Nopiyanita, T., Haryono, & Ashadi. 2013. Penerapan Model Pembelajaran Kooperatif Tipe Teams Games Tournament (TGT) untuk Meningkatkan Prestasi Belajar Kimia dan Kreativitas Siswa pada Materi Reaksi Redoks Kelas X Semester Genap SMA Negeri 3 Sukoharjo Tahun Pelajaran 2012/2013. *Jurnal Pendidikan Kimia (JPK)*, 2(4): 135-141.

Purwanto. 2011. *Evaluasi Hasil Belajar.* Yogyakarta: Pustaka Pelajar.

Putri, I. P., K. S. Martini, & N. D. Nurhayati. 2013. Penerapan Metode Pembelajara Teams Games Tournament (TGT) dilengkapi Kartu Destinasi untuk Meningkatkan Minat dan Prestasi Belajar pada Materi Minyak Bumi Siswa Kelas X5 SMA Negeri Gondangrejo Tahun Pelaksanaan 2012/2013. *Jurnal pendidikan kimia (jpk)*, 2(4): 90-95.

Rigas, D. & K Ayad. 2010. Using Edutainment in e-Learning Application: an Ampirical Study. *International Journal of Computers*, 4(1): 36-43.

Riyono, B. & A. Retnoningsih. 2015. Efektivitas Model Pembelajaran Picture and Picture dengan Strategi Inkuiri terhadap Motivasi dan Hasil Belajar Siswa. *Unnes Journal of Biology Education*, 4(2): 166-172.

Salam, A., A. Hossain, & S. Rahman. 2015. Effects of Using Teams Games Tournaments (TGT) Cooperative Technique for Learning Mathematics in Secondary Schools of Bangladesh. *MOJET (Malaysian Online Journal of Educational Technology)*, 3(3):1-11.

Slavin, E. R. 2005. *Cooperative Learning: Theory, Research and Practice.* Translate by Narulit Yusron. 2010. Bandung: Penerbit Nusa Media.

Suryadi, I., N. Sundari, N. Ineu. 2015. Penerapan Model Cooperative Learning Tipe TGT untuk Meningkatkan Hasil Belajar Siswa SD dalam Pembelajaran IPS Materi Teknologi. *Jurnal Antologi*, 3(2): 1-12.

Wilke, R. R. 2003. The Effect of Active Learning on Student Characteristics in A Human Physiology Course for Nonmajors. *Advances in Physiology Education*, 27(4): 207-223.

Wyk, M., M. V., 2011. The Effects of Teams-Games-Turnamens on Achievement, Retention, and Attitudes of Economics Education Students. *Journal of Social Science,* 26(3): 183-193.

Yudiasmini, N.K.E., A.A.G. Agung, & P.R. Ujianti. 2014. Penerapan Model Pembelajaran Kooperatif Tipe Teams Games Tournament (TGT) dalam Meningkatkan Perkembangan Kognitif. *e-Journal PG-PAUD Universitas Pendidikan Ganesha*, 2(1): 11-20.