Implementation of the student facilitator and explaining model assisted by media game on the students' explaining skills

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Abstract: The students' explaining skill is interrelated with their conceptual understanding. This study aimed to determine the effect of the implementation of the student facilitator and explaining model assisted by the media game on the students' explaining skills related to environmental pollution. This quasi-experimental research was using a pre-test post-test control group design. The population was 120 seventh graders of state junior high schools in West Java, Indonesia. The simple random sampling technique has resulted in two groups (control and experiment) samples, consisting of 32 students for each group. The data were analyzed using the paired sample t-test. This study found that the student facilitator and explaining model assisted by the media game can significantly improve students' explaining skills (*p*-value 0.001 < 0.05). The students in the experimental group had a better understanding of the concept of environmental pollution. This study concludes that the student facilitator and explaining model assisted by the media games can improve students' explaining skills and understanding of environmental pollution.

Keywords: explaining skills; media game; student facilitator and explaining model

Introduction

The development of science and technology affected various fields of human life, including education. Education requires a more innovative and creative way of delivering materials in the in-class learning process (Corkin et al., 2017; Mora et al., 2020; Sanchez-Muñoz et al., 2020; Smyrnaiou et al., 2020). Technological developments push teachers to become creators and facilitators in the learning process (Afandi et al., 2019; Bond, 2020; Casanoves et al., 2017; Criollo-C & Luján-Mora, 2019; Iftene & Trandabăţ, 2018; Samsudin et al., 2019). The learning process must create a situation in that students can improve their abilities. Teachers must understand the student's characteristics and conditions related to their readiness. Students' success in mastering the subject in class depends on the student's ability to understand, as in biology subject.

In biology, students learn with hands-on and minds-on activities, in which students must carry out activities that hone their practical and thinking skills (Husna et al., 2017; Sirajudin et al., 2021; Watkins & Elby, 2013; Wyner & Blatt, 2019). With these two activities, students can be active in thinking activities, allowing them to find new concepts from learning activities. In some cases, in state junior high schools in West Java, Indonesia, biology learning only aims to improve the cognitive or knowledge domain. As a result, the affective or attitude aspects of the students, especially psychomotor aspects or skills, are still poor. The observation results show that student needs to improve clarity in their explanation. Students are poor at using examples and illustrations in their demonstration. The previous study also discovered an average score of 2.20 concerning the skill to explain during the learning process. Based on the preliminary survey conducted at SMPN 2 Lebakwangi (*Sekolah Menengah Pertama Negeri* – state junior high school) on the subject of Biology, seventh graders students' understanding of concepts was still poor. Students have difficulty restating a concept that has been taught. They have

difficulty in explaining while making presentations, as well as difficulty in classifying objects and giving examples related to the concepts. One way to overcome the problems above is to use the "student facilitator and explaining" model assisted by games as media. In line with Masjudin and Arini (2014), the cooperative learning model, like the student facilitator and explaining model based on interactive multimedia can improve student learning outcomes. It also enhances the students' critical thinking skills (Hajar & Sukma, 2020; Isnaini & Sari, 2022). Rahayu (2020) explain that the student facilitator and explaining model can increase student involvement in class. Students become active in explaining the subject matter, discussing and gaining knowledge, and generating self-confidence (Hajar & Sukma, 2020; Ikram et al., 2022; Masjudin & Arini, 2014; Mawarsih et al., 2016; Rahayu, 2020). Students can act as assistants to help other students in a group. The learning model can increase students' cooperation and communication. Students can develop the ability to ask questions and express opinions related to the subject matter (Hajar & Sukma, 2020; Isnaini & Sari, 2022; Masjudin & Arini, 2014; Rahayu, 2020).

Games in the learning process generate students' motivation to explain the concept. The use of games can keep students motivated and make learning more fun (Criollo-C & Luján-Mora, 2019; Liao et al., 2019; Nanang et al., 2017; Vitianingsih, 2016). One of the advantages of learning games over conventional media is the depiction of an existing problem. The results of a study conducted by Nanang et al. (2017) showed that using games in teaching and learning activities can improve student learning outcomes. Media games in learning are also closely related to the context of the material (Arifah et al., 2021; Firdausi et al., 2017; Liao et al., 2019; Vitianingsih, 2016). Materials related to problems around students will be more attractive, such as environmental pollution.

Media games related to environmental pollution make abstract concepts become concrete. In addition, the presentation of information can be more attractive to students so that their enthusiasm for learning is high, and the quality of receiving information becomes more effective and allows individual learning processes to occur. As a result, students try to observe the polluted environment in games. They can classify the types of pollution based on the games seen. They can make estimate pollution that occurs in the surrounding environment and applicate the concepts obtained to prevent it.

Method

This study was carried out at SMPN 2 Lebakwangi, Kuningan Regency, West Java, Indonesia in December 2020. The sample of this study was class seventh graders. The simple random sampling technique has resulted in two groups (control and experiment) samples, consisting of 30 students for each group. This study used a quasi-experimental design with a pre-test and post-test control group design. The research design is presented in Table 1. In this study, data collection was carried out using several data collection techniques, namely observation techniques, tasks and rubrics, essay tests, and questionnaires. The treatment in the control group used the TGT (Team Games Tournament) model, while the experimental group used a student facilitator and explaining model assisted by the media games.

Table 1. The quasi-experimental design

Group	Pre-test and post-test control group design		
	Pre-test	Treatment	Post-test
A (Control)	O1	X1	O2
B (Experimental)	O1	X2	O2

where: A = Control group with TGT model; B = Experimental group with student facilitator and explaining model assisted by the media games; O1 = Pre-test given to the experimental and control groups; O2 = Post-test given to the experimental and control groups; X1 = Treatment of TGT model; and X2 = The treatment of student facilitator and explaining model assisted by the media games.

The learning syntax consists of six steps (Hajar & Sukma, 2020; Isnaini & Sari, 2022; Masjudin & Arini, 2014; Rahayu, 2020). In the first (1) stage, the teacher conveys the achieved competencies to students. In the second (2) stage, the teacher demonstrates or presents outlines of learning material. Next, in the third (3) stage, the teacher allows students to explain to others by using charts or concept maps. In the fourth (4) stage, the teacher concludes with students' ideas or opinions. In the fifth (5) stage, the teacher explains all the material presented at that time. The last (6) stage is closing. In the third syntax, there is game integration by students. The research variable measured in both groups was students' explaining skills. The observed explaining skills include showing clarity, stating emphasis, and using examples. The data were analyzed using the paired sample t-test.

Results and Discussion

The results shows that there were differences in explaining skills between the control class and the experimental class, which can be seen in Figure 1. The average score showing clarity in the experimental group is 2.90, which was better than the control class (2.20). It proves that students in the experimental group were more actively involved in learning and understanding the topic they read. According to Hajar and Sukma (2020) student tend to be more focused on studying the material assigned by the teacher to improve their understanding of the subject matter. Furthermore, the average score for using examples in the experimental group (2.63) was also higher than the control group (1.76). The students in the experimental group can express their opinions and discuss to get the most appropriate argument to improve their ability to provide examples and illustrations. The average score of the last indicator, stating emphasis, also shows the same result. The experimental group can reach 2.75, while the control group only has a 1.83 score (Figure 1). It reveals that students in the experimental group were actively involved in their group to discuss and present their best understanding to increase their ability to emphasize the topics discussed. Likewise, the students who took turns explaining to others will increase their concept understanding related to ecosystem material.
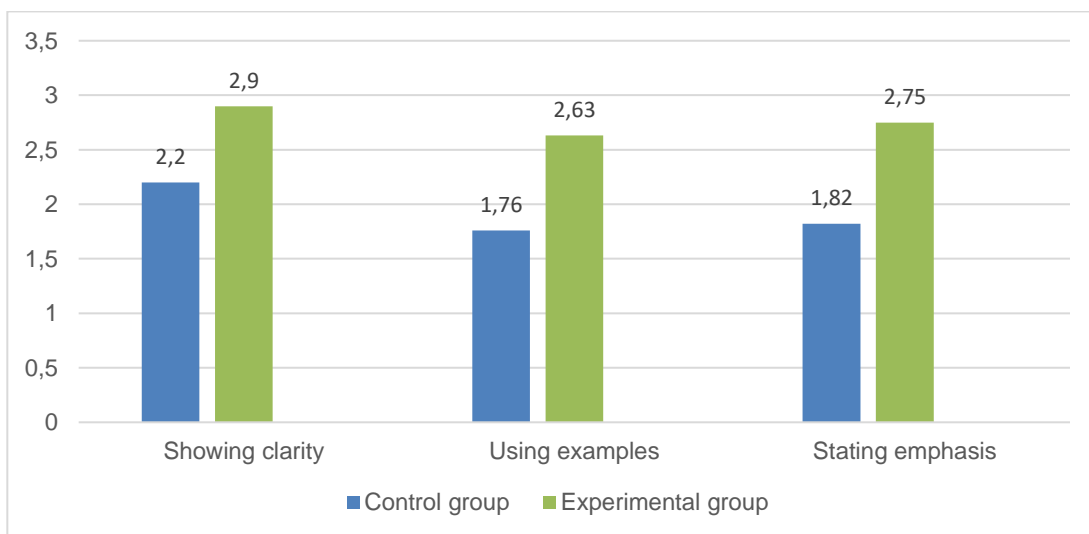

Figure 1. Recapitulation of each indicator of explaining skills in both groups

In line with the results of a study by Chen et al. (2019), which shows that the learning process of biology concepts is more effective when using the visual cartoon-based media than the conventional model. The media is important in the learning process for student development. Media can improve the interaction between teachers and students, thus increasing student participation (Arifah et al., 2021; Firdausi et al., 2017; Liao et al., 2019). The study of Chen et al. (2019) also demonstrates similar results, in which one of the challenges for instructors is getting students to connect with the subject in a way that encourages them to learn. The visual design of developmental biology cartoons will encourage deeper connections between students and the material (Chen et al., 2019; Resmol & Leasa, 2022). This approach will create a community of scientific practice. Students can focus on investigating material and are informed by popular and scientific media, students' questions, and their instructors. The goal is to engage students in a meaningful way with the materials, to develop students' science process skills, and to enhance students' understanding of the broad principles of developmental biology. Although significant challenges arise when implemented, this approach successfully impacts the student's learning achievement.

Afterward, the pre-test score in the control group (58.80) is lower than the experimental group (61.55). The distribution data of pre-test scores are presented in Table 2. It proves that the understanding concepts in both the control group and the experimental group are not significantly different. However, based on the analysis and processing of the post-test average value of the control group with the application of the team games tournament model, it obtained an average score of 67.68 (Table 3). Meanwhile, the experimental group, using the application of the student facilitator and explaining model assisted by media games reached an average score of 83.15 (Table 3). It reveals that the understanding of concepts between the control group and the experimental group is different. The student facilitator and explaining model assisted by media games can improve students' understanding of concepts in environmental pollution learning.

Table 2. The pre-test result in control group and experimental group

Group	N	Mean	Std. Deviation	Minimum	Maximum
A (Control)	32	61,55	7,299	50	73
B (Experimental)	32	58,80	8,653	47	70

Table 3. The post-test result in control group and experimental group

Group	N	Mean	Std. Deviation	Minimum	Maximum
A (Control)	32	67.68	7.119	60	83
B (Experimental)	32	83.15	7.471	70	93

Some studies show that the more complex animations are the most effective in fostering students' understanding of the events depicted (Islam et al., 2014; Lawson et al., 2018; Soika et al., 2010). The preliminary research suggests that increasing complex representations may be more desirable to convey (Lindner et al., 2019). The students gained an understanding of concepts after the teacher used the student facilitator and explaining model in classroom learning. The students' explaining skills in the experimental group, which showed a high post-test score, is also supported by the student response questionnaires result (Table 4). Based on the student response questionnaire analysis, the lowest score was 54, while the highest was 86. The average score was 77.08 with a standard deviation of 7.509. It conveys that the experimental group has a positive response to the implementation of the student facilitator and explaining model assisted by the media game. The positive response from the experimental results proves that the media game has various advantages for the learning environment. Games can provide self-motivation to students (Arifah et al., 2021; Chen et al., 2019; Criollo-C & Luján-Mora, 2019; Iftene & Trandabăţ, 2018). In some cases, encourage students to learn and make learning more enjoyable.

Table 4. The students' response to the student facilitator and explaining model assisted by media game

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation
Student response	32	32	54	86	3083	77.08	7.509
Valid N (listwise)	32						

The student facilitator and explaining model assisted by the media games in learning environmental pollution can facilitate explaining skills. The ability to explain in the experimental group is higher than in the control group. The results of hypothesis testing show the *p*-value $0.001 < 0.05$. It means that the student facilitator and explaining model assisted by the media of games can significantly improve the skills to explain the concept of environmental pollution. The explaining skills of the student in the experimental class are better than the control group. The learning model can improve students' explaining skills. There is an opportunity for students to give explanations in their groups to practice their explaining skills (Hajar & Sukma, 2020; Isnaini & Sari, 2022; Masjudin & Arini, 2014; Rahayu, 2020). Students become trained to be able to explain concepts clearly. In addition, students will also be accustomed to giving examples to facilitate explanations to other students. The discussion in the group makes students know the concepts that need emphasis. Emphasizing the information is also influenced by the teacher as a facilitator in the classroom. Students accustomed to expressing their opinions will be more fluent in explaining information.

Using the media of learning games is more fun than conventional learning (Arifah et al., 2021; Iftene & Trandabăţ, 2018). The student facilitator and explaining model assisted by the media games in learning environmental pollution also can facilitate understanding of the concept. The concept understanding in the experimental class is also higher than in the control class. The results of this study indicate a significant effect of the student facilitator and explaining model on students' understanding of concepts. The existence of games integrated into learning motivates students to be active (Arifah et al., 2021; Casanoves et al., 2017). They will be actively involved in group discussions. Activities in this group also play a role in improving their skills in explaining information.

Conclusion

The conclusion of this study reveals that there is significant differences in students' explaining skill between experimental group and control group (*p*-value $0.001 < 0.05$). The student facilitator and explaining model assisted by the media games in learning environmental pollution can facilitate explaining skills. The learning model can significantly improve the skills to explain the concept of

environmental pollution. The learning model also can improve students' understanding of concepts in environmental pollution.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

P. K. H.: methodology; A. G. A. and S. H. N.: validation; P. K. H.: analysis and writing—original draft preparation; and P. K. H., A. G. A., and S. H. N.: review and editing.

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