Journal of Biology Learning
Vol. 7., No. 2, September 2025, pp. 64-70
ISSN 2623-2243 (print), 2623–1476 (online)
http://journal.univetbantara.ac.id/index.php/jbl/index

The Effect of the SSPBLS Model Using Quizizz Media on the Learning Outcomes of High School Students on Digestive System Materials

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Received April 21, 2025; accepted September 30, 2025; published September 30, 2025

ABSTRACT

This study aims to analyze the application of SSPBLS (Socio-Scientific Problem based Learning with Spiritual Value) on digestive system materials at SMA Muhammadiyah 1 Sragen for the academic year 2024/2025 and to find out whether this model can improve student learning outcomes. The type of research used is quantitative with experimental design. Data collection was carried out through learning outcome tests, observations, and interviews. Based on the results of the t-test, a significance value (sig.) of 0.22 was obtained, which was more than 0.05, which showed that there was no significant difference between the experimental group using the SSPBLS model and the control group using conventional learning methods. The results of this study show that the application of the SSPBLS model to the digestive system material in terms of final average scores can improve student learning outcomes. These results show that SSPBLS has the potential to improve student understanding through a problem-based approach that connects scientific phenomena with social issues, and its application in the field has met expectations. This research contributes to enriching contextual learning approaches through the application of the SSPBLS model which is proven to improve student learning outcomes by integrating social issues, critical thinking skills, and character values and provides alternative effective learning strategies to improve learning outcomes, with an emphasis on students' active involvement in solving problems based on social issues.

KEYWORDS

Socio-Scientific, Problem-Based Learning, Spiritual Values, Quiz

1. Introduction

Education plays a very important role in a teaching and learning process so that students become educated both in religion and knowledge. In the learning process, it is inseparable from learning media where media plays a role as a tool in the teaching and learning process to facilitate the learning process and as a tool for an educator to convey knowledge and materials. The more sophisticated the technological era, the more technology is used which is basically aimed at facilitating human work in daily life (Junaidi, 2019; Cloete, 2017; Lai & Bower, 2019). In addition to the rapid development of technology, education in the 21st century also faces complex challenges that require a strong emphasis on students' cognitive skills.

The complexity of the problems faced in the 21st century today makes educators try to educate the younger generation to excel in achievements and noble character. Students are one of the younger generation who will face all their challenges. It takes a process to educate students, especially honing their thinking skills. The thinking skills in question are high-level thinking skills or often referred to as High-Level Thinking Skills (HOTS). In measuring HOTS, in addition to looking at critical and creative aspects, the most important thing is the use of operational verbs (Hidayati & Retnawati, 2018; Ramdiah, & Royani, 2019; Sari et al., 2021). Therefore, preparing students with HOTS becomes an essential goal in modern education, which also aligns with the demand for competencies in the Industrial Revolution era.

Education today needs to prepare quality students who are able to go through the science education process so that they have a high level of thinking ability, attitude, and skills. The skills that students must possess include critical thinking, problem-solving, collaboration, and various other skills. These skills are skills needed in the Industrial Revolution (Sajidan et al., 2022; Reaves, 2019). To develop such skills effectively, teaching methods and learning media play a pivotal role in the classroom setting.

Two very important elements in the teaching and learning process are teaching methods and learning media (Lubis et al., 2023; Subramani & Iyappan, 2018). These two aspects are interrelated, although the choice of a particular pedagogy will affect the appropriate type of learning medium, other considerations, such as the learning objectives, the type of assignment, and the answers that students are expected to master, should be taken into account when choosing a pedagogy. On the other hand, there are several aspects that need to be considered, including learning characteristics and the context of student learning. However, it can be said that the main function of learning media is as an educational tool and also affects the climate, conditions and learning environment that are regulated and created by teachers (Fauzi et al., 2023; Rahim et al., 2022). In this regard, an interactive learning process becomes highly important because it allows students to construct knowledge meaningfully through active participation.

The interactive learning process is the ideal learning. This learning process supports the student's process in building their knowledge in accordance with a constructivist view (Lukita et al., 2017). The interaction that occurs between teachers and students creates a pleasant learning atmosphere so that teachers can easily direct and motivate students in the process of forming their knowledge. This is also supported by Government Regulation number 19 paragraph (1) which states that, "the learning process in educational units is carried out in an interactive, inspiring, fun, challenging, motivating students to participate actively, providing sufficient space for initiative, creativity and independence in accordance with the talents, interests and physical and psychological development of students." This interactive learning process can be built by utilizing technological and information advances (Wao et al., 2022; Fakhrutdinova & Nurkhamitov, 2016). However, in practice, some schools still rely heavily on conventional methods, which limits opportunities to foster higher-order thinking skills.

SMA Muhammadiyah 1 Sragen has not implemented a socio-scientific learning model and learning is usually only through giving lectures, discussions and practicums that are still based on the direction of the teacher, so it needs to be applied because the socio-scientific PBL spirit model is a learning model whose syntax comes from the synthesis of SSI (Socioscientific) syntax and PBL syntax and then combined with spiritual values to form a new syntax. The synthesis of SSI syntax and PBL syntax is oriented towards empowering higher-level thinking skills. In order for the synthesis of SSI syntax and PBL syntax to be more effective in enhancing higher thinking skills, the syntax is based on spiritual values (Kusumadani, 2024). Alongside the learning model, the integration of appropriate learning media is also essential to ensure that students remain motivated and engaged in the learning process.

The use of learning media aims to develop interesting presentations and learning processes through the use of media. In the learning process, including Biology learning, the presence of learning media can arouse new desires and interests, increase motivation, and provide its own stimulation (Wulandari, 2018; Maulana et al., 2022). Quizizz is an educational game application that is narrative and flexible, in addition to being used as a means of delivering material, Quizizz can also be used as an interesting and fun learning channel. By utilizing this Quizizz application, teachers can create a more lively learning atmosphere, so that they can achieve learning goals (Rahmawati et al., 2022; Sari et al., 2024). Thus, combining innovative learning models such as Socio-scientific PBL Spirit with engaging digital media like Quizizz may provide a more comprehensive approach to empower students' higher-order thinking skills.

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Learning with socio-scientific problem-based learning with spiritual values (Socio-scientific PBL Spirit) allows the learning process based on socio-scientific problems by integrating spiritual values that actively involve students both online and offline in observing, analyzing, criticizing, testing/experimenting, and finding solutions to social science problems that occur in society (Kusumadani, 2024). Biology is the science that studies the objects and problems of natural phenomena. Broadly speaking, biology includes two main activities, namely observation to obtain empirical evidence and the reasoning process to obtain concepts. Learning biology is an activity to uncover the secrets of nature related to living things (Safariyani 2021). The inability to connect scientific concepts with daily life has an impact on the inability to think critically and find solutions to social problems that occur in society. Therefore, to strengthen students' engagement and interactivity, schools must also leverage technological tools that align with the principles of 21st century learning.

SMA Muhammadiyah 1 Sragen as part of the driving school needs to utilize technology to support 21st century learning. The integration of Quizizz is a concrete step in the implementation of TPACK (Technological, Pedagogical, Content Knowledge). Students at school are also less interactive when given questions with student worksheets as usual, so it is necessary to integrate quizizz so that if using quizizz media it will refer to students to be more interactive, and allow students to learn independently or in small groups, in accordance with the SSPBLS approach that encourages students to be active, independent and collaborative learners.

2. Method

This study uses a quantitative approach with a quasi-experimental design. This research involved two groups of students, namely grade 11.1 and grade 11.2. The first group used the SSPBLS learning model, while the second group used the Problem Based Learning (PBL) learning model. In the PBL model, problems can be about anything (science, engineering, social, economics, etc.) that aim to build critical thinking, collaboration, and problem-solving skills. The SSIPBLS model focuses specifically on scientific social issues: that is, controversial issues related to science and social impacts (e.g., vaccinations, climate change, nuclear energy, genetic engineering). Not only looking for technical solutions, but also developing ethical values, social empathy, and morality-based decisions." His "spirit" emphasizes character building: social concern, responsibility, ethical thinking, not just scientific problem-solving. This research was conducted at SMA Muhammadiyah 1 Sragen in the odd semester of the 2025/2026 academic year, precisely in January.

The population of this study is students of SMA Muhammadiyah 1 Sragen, while the sample is students of grades 11.1 and 11.2. The sampling technique used is Simple Random Sampling, which aims to measure the learning outcomes of the entire population randomly, without considering specific subgroups. Each student has an equal chance of being selected as a research sample, so the posttest results can be representative of the entire population. Class 11.1 as an experimental group used the SSPBLS learning model and class 11.2 as a control group using the PBL learning model. Data analysis was carried out using the Independent Sample T-test. Independent Sample T-test refers to a statistical approach used to test the differences between two independent groups. This model is often used in the Independent Sample T-test to compare the learning outcomes of two different groups, one using Method A and the other using Method B. In the context of education, this test helps evaluate the differences in learning outcomes between two groups of students, each of whom is taught using a different teaching method. By implementing the T-Test-Independent Sample, educators can assess whether there are significant differences in student achievement between groups that use different teaching methods, such as groups that use technology-based learning versus traditional methods.

The learning instrument used is a posttest designed to measure students' understanding of the material and designed in the context of relevant social-scientific issues, posttest is carried out after the learning process as a form of evaluation. Validity is seen from the final learning outcomes of students which show that the average score of the experimental class is higher than that of the control class. This

allows decision-makers in education to choose the most effective teaching approach to improve student learning outcomes. In addition, the model also helps in measuring the variability of learning outcomes, providing a better understanding of the factors that influence success or failure in the learning process. According to (Kusumadani, 2024), the integration of SSI and PBL syntax is more effective in improving higher-level thinking skills, especially in the context of PBL with a spiritual-based approach.

3. Results and Discussion

Learning outcomes using methods 1 and 2 were tested using the Independent Sample T Test to determine the difference in learning outcomes between classes using the SSPBLS model and classes using the Problem Based Learning (PBL) model. Table 1 presents the descriptive statistics of students' learning outcomes in both Group 1 and Group 2. The table shows the number of participants (N), mean scores, standard deviations, and standard errors. As shown, Group 2 obtained a higher mean score compared to Group 1.

Table 1. Descriptive Statistics of Students' Learning Outcomes in Group 1 and Group 2

	Group	*N*	*Mean*	*Standard Deviation*	*Std. Significant Error*
Learning outcomes	Group 1	19	60.00	13.333	3.059
	Group 2	19	73.68	21.137	4.849

Table 1 presents the descriptive statistics of students' learning outcomes in two different groups. The data include the number of participants (N), mean score, standard deviation, and standard error. The results show that the average learning outcome of students in Group 2 was higher (M = 73.68; SD = 21.137) compared to Group 1 (M = 60.00; SD = 13.333). The results of the T-test can be seen in Table 2.

Table 2. Results of the t-test of cognitive learning achievement in Cycles I and II

Cycle	*Test Type*	*Sig.*	*Conclusion*
I	Independent Sample T-Test	0,22	There is a difference
II	Independent Sample T-Test	0,23	There is a difference

The results of the learning achievement test (Table 2) showed a significance value (sig.) of 0.22, which means more than 0.05 in the first cycle and 0.23 > 0.05 in the second cycle. This shows that the application of the SSPBLS learning model can improve student learning outcomes in the digestive system material at SMA Muhammadiyah 1 Sragen in the 2024/2025 academic year but with a difference that is not statistically significant. However, descriptively the average score of the experimental group was higher, so practically the SSPBLS model has the potential to be more effective, although not statistically significant. These results show that SSIPBL improves student understanding through a problem-based approach that connects scientific phenomena with social issues, and its application in the field has been in line with expectations. This shows that the success of the implementation of a problem-based learning model depends not only on the model itself but also on supporting factors such as teacher readiness, available time, student engagement, and adequate infrastructure (Aryulina & Riyanto, 2016; Subekti et al., 2019). In the modern world of education, critical thinking skills have become an essential competency that students must have to face the challenges of the 21st century. However, various studies show that students' critical thinking skills are still relatively low due to the application of learning models that do not stimulate the deep thinking process. In this 21st century, very rapid change is difficult to anticipate in a systematic, structured, and measurable manner (Efiana et al., 2025).

Interactive media also affects the improvement of learning outcomes because multimedia-based interactive media, such as animation, can clarify the presentation of material and provide a deeper visual experience, thereby improving students' understanding and learning outcomes. Studies show a significant improvement in post-test scores after using interactive media (Sahronih et al., 2019;

Kareem, 2018; Maulidya, 2022). Increasing student motivation can capture students' attention through dynamic visualization, increasing their engagement and motivation to learn (Mariati, 2024). This makes learning more interesting and interactive than traditional methods and improves critical thinking skills, research shows that interactive media can help students develop critical thinking skills because they are challenged to think deeply and interact directly with the material (Putra & Salsabila, 2021; Noris, 2023).

However, there are several factors that can make this learning model fail, namely that complex implementation requires careful planning and a deep understanding of the teacher regarding socio-scientific issues and how to integrate spiritual values into learning and requires more time because this method is based on the investigation of real-world problems and deep reflection. The learning process tends to take longer than traditional learning methods. Thus, although it has great potential in improving students' skills and character, the implementation of SSPBLS requires teacher readiness and more time in its management.

The role of syntax in learning outcomes is to be able to connect topics with socially relevant issues so that they can build motivation and curiosity to increase emotional engagement and contextual understanding of the material, then students can explore scientific and social information independently or in groups to solve problems, students can develop logical and ethical solutions to issues, and support them with strong arguments that aim to develop argumentation skills and the ability to express opinions responsibly. Then students present solutions and reflect on the learning process. The role of quizizz is to be able to present quizzes in a game format so that students are more enthusiastic and motivated to learn, there is also a multiplayer mode or live quiz that can foster cooperation and healthy competition (Sari et al., 2024; Elu et al., 2025). SSI acts as a contextual trigger that is relevant to the real life of students. By raising controversial and socially impactful science issues as well as a learning context that fosters students' emotional and intellectual involvement, so as to be able to improve their understanding of scientific concepts and attitudes towards real issues in society (Nugroho et al., 2025).

4. Conclusion

Based on the research that has been conducted and the final result, which is a significant value (sig) of more than 0.05, it shows that the application of the SSIPBLS learning model using quizizz media on the digestive system material at SMA Muhammadiyah 1 Sragen for the 2024/2025 academic year is proven to be no significant difference. This model requires students to actively examine social-science issues, solve problems collaboratively, and apply SPIRIT values, while Quizizz strengthens engagement and motivation to learn through an interactive and technology-based approach.

Therefore, teachers are encouraged to integrate this approach in the learning process to create a more meaningful and contextual learning experience. For further research, it is recommended to explore the application of the Quizizz-assisted PBL SPIRIT socioscientific model to a variety of other subjects, examine its influence on students' affective aspects and 21st century skills, and conduct longitudinal studies to see the ongoing impact on character development and academic achievement.

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