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Effectiveness Of The Jigsaw Learning Model In Chemistry Learning

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Abstract

This study evaluates the jigsaw learning model's efficacy for teaching chemistry. The Systematic Literature Review (SLR) method was the research methodology employed in this study. Data is gathered by documenting every article relevant to the inquiry. Seventeen publications from national journals were used in this study. The research findings led to the conclusion that the jigsaw learning model's efficacy in chemistry education can be used as a response to student issues to improve learning activities, learning outcomes, student motivation, and student achievement—all of which will contribute to raising the standard of education in Indonesia.
Keywords: *Literature review, jigsaw learning model, chemistry learning*

Abstrak

Tujuan dari penelitian ini adalah untuk mengevaluasi keefektifan model pembelajaran Jigsaw dalam pengajaran kimia. Metode Systematic Literature Review (SLR) merupakan metodologi penelitian yang digunakan dalam penelitian ini. Mendokumentasikan setiap artikel yang relevan dengan penyelidikan adalah cara pengumpulan data. Tujuh belas publikasi dari jurnal nasional digunakan dalam penelitian ini. Temuan penelitian menghasilkan kesimpulan bahwa keampuhan model pembelajaran Jigsaw dalam pendidikan kimia dapat digunakan sebagai respon terhadap permasalahan siswa dalam rangka meningkatkan aktivitas pembelajaran, hasil belajar, motivasi siswa, dan prestasi belajar siswa yang kesemuanya akan berkontribusi dalam meningkatkan motivasi belajar siswa. standar pendidikan di Indonesia.
Kata Kunci: Review literatur, model pembelajaran jigsaw, pembelajaran kimia

1. INTRODUCTION

Education is one of the essential foundations in the development of every country. Education is the foundation of progress and the main factor in the welfare of a nation. Education aims to produce a new generation of humans who are intelligent, noble, and equipped with life skills (Melati et al., 2021). According to Kunandar (2007), a person acquires various knowledge, abilities, and skills and, perhaps more importantly, several applicable life arrangements in the form of positive standards and rules through education. In short, education is a personal human effort to instill and improve existing potentials so that they can then benefit society (Rahman et al., 2022).

UUSPN No. 20 of 2003 states that learning is an interaction activity between learners and educators with learning references in their environment (Pane & Darwis Dasopang, 2017). The immediate environment of learners can be a valuable learning resource for them; related experiences make it easier for learners to learn the concepts they have just learned. This understanding aligns with what Oemar Hamalik said: learning is an interconnected method with interaction in learning activities between students and educators (Hamalik, 2007). The learning process takes the form of interaction in an atmosphere of interactive educational activities, namely interactions with goals formulated in the learning unit. Students and teachers achieve predetermined goals through these interactions, forming the learning process.

Learning requires a varied and creative teacher to utilize learning models and methods for a fun class. Using various learning models and methods will make it more enjoyable for students to create a conducive class and increase their interest in learning. Teachers who can master abilities comparable to the needs and competency standards set and can improve student learning outcomes are effective teachers (Suparlan, 2006). In implementing the teaching and learning process, a model is needed to obtain the targeted objectives successfully. The applied model must be based on the material taught to support learning well. Teachers must be able to determine the model carefully so that the model used is appropriate and that learning can be maximized. Sudrajat (2008) defines the learning model as a description of the learning process, from the opening to the closing of learning, made explicitly by the teacher.

The learning model is one of the crucial components in learning, especially for teachers. A model that suits the needs of the material and students will undoubtedly be more readily accepted in the classroom (Abidin, 2019). The existence of a learning model can be the key to the success of the learning process through good student responses. Meanwhile, according to Soekanto and Shoimin (2017), a learning model is a conceptual framework containing procedures or stages to organize a lesson. Things that need to be given attention in determining the learning model to be applied, one of which is to pay attention to the conditions of the students to make it easier for them to understand and accept the material presented to be memorable. The function of applying the learning model is to provide a good direction for teachers to carry out classroom learning activities.

Chemistry is one of the branches of natural science that contributes significantly to the development of science and technology, along with other similar sciences. For this reason, studying chemistry at school requires particular reasoning and skills to support the process (Wiwit et al., 2012). Through this statement, chemistry has become one of the science fields that students do not favor because most consider it difficult and tedious (Sanjiwani et al., 2018). "Difficult and boring" indicates that students do not understand and understand what they are learning, so they need alternatives to solve the problem. They see that learning chemistry requires appropriate learning methods to increase the field's value and achieve better results in the future. Among the methods that can be used is the jigsaw-type cooperative learning model.

Rusman (2013) states that the definition of the jigsaw-type cooperative learning model is a cooperative learning model where students learn in small groups in the classroom consisting of 4 - 6 students in a mixed manner; this model opens up great opportunities for students to learn to work together in their groups, help each other, and be responsible for themselves. The interaction created in the learning group becomes the core of this jigsaw-type cooperative learning model. Dewey (1989) states, "Cooperative learning is an instructional use of small groups in which students work together to maximize their own and each other's learning." Cooperative learning means that students learn together, express ideas and thoughts to each other, and take personal and group responsibility. The process of group learning activities can train students to aim for ideas, thoughts, and opinions.

The jigsaw-type cooperative learning model has advantages, especially in increasing student participation in the learning process (Magdalena & Maria Pawe, 2023). This model is also used to improve the quality of learning through a series of activities (Sumarni, 2019). Students with diverse backgrounds must work together and help each other understand the material being taught. This activity can help increase children's participation in learning. This model can also increase children's enthusiasm for learning because children are encouraged to understand the material together. This model also increases students' social interaction because of the demand to provide mutual understanding between groups. This interaction improves students' social relationships and socialization skills. Jigsaw-type learning is a method that encourages students to work together to learn the same material. With this method, teachers are shown how to understand the circumstances and experiences of students and then help connect learning materials to make them more meaningful to students.

Based on the formulation of the problem, this research was conducted to know the effectiveness of learning the jigsaw-type cooperative learning model in chemistry learning at school.

2.METHODS

This research was conducted to know the effectiveness of the jigsaw learning model in chemistry learning through analysis conducted by researchers. This type of research uses a descriptive qualitative literature review method (literature study). In reviewing the quality of literature, several things need to be considered. Among the considerations used as an essential reference for reviewing the quality of literature are: 1). Articles can be accessed publicly and free of charge, and the related web is trusted; 2). The quality of the research methodology used in the article is in the category of classroom action research; 3) Presentation of quality data and discussion; 4). The data obtained are relevant and sufficient; 5). Recent references in the last ten years (2014-2024). The results obtained from the review process are then inputted in a table matrix with the reference source column, journal name, research method, and results.

3. RESULTS AND DISCUSSION

Literature review-based research conducted to examine the jigsaw learning model in chemistry learning was carried out by reviewing 17 research articles from Indonesian-language journals. The results show that the model in chemistry and learning has been well implemented.

Table 1. Review-Journal

No	Reference	Journal	Method	Research Results
1.	Siti dan Abdul (2016)	Jurnal Inovasi Pendidikan Sains	Penelitian Tindakan Kelas	This study showed increased teacher and student activities, an outstanding category. Then, using the jigsaw learning model also increased motivation with a suitable category and improved students' cognitive and affective learning outcomes.
2.	Siti Istijabatun (2015)	Jurnal Inovasi Pendidikan Kimia	Penelitian Tindakan Kelas	The findings of this study support the assumption that with the Jigsaw learning model, student motivation and learning outcomes increase. I am judging by the increase in activity and the proportion of students who completed cycle I and II.
3.	Esti Setya (2023)	Eduproxima : Jurnal Ilmiah Pendidikan IPA	Penelitian Tindakan Kelas	According to the data analysis, there was an increase in the average score of students in each cycle, so it positively impacted student achievement.
4.	Gusti Made (2020)	Indonesian Journal of Educational Development	Penelitian Tindakan Kelas	After learning using the Jigsaw-type cooperative learning approach in two cycles, there is an increase in students' motivation and chemistry learning outcomes.
5.	Lhony dan Zulfiani (2021)	Chemistry Education Journal	Penelitian Tindakan Kelas	The Jigsaw cooperative learning approach can be used to improve student learning outcomes. Student

No	Reference	Journal	Method	Research Results
				learning outcomes increased by 53%.
6.	Lia Kosfina (2018)		Penelitian Tindakan Kelas	Based on the research results, Jigsaw-style cooperative learning has improved students' activities and learning outcomes. There was an increase in the average student learning outcomes from 74.67 during cycle I to 89.27 during cycle II.
7.	Tintin Dwi (2016)	Jurnal LPPM	Penelitian Tindakan Kelas	The PBMP pattern learning and the Jigsaw cooperative learning model can improve student learning outcomes, increase student motivation, and encourage participation in the learning process. These conclusions can be drawn from the research findings.
8.	Nazimah (2021)	Jurnal Penelitian Sosial Agama	Penelitian Tindakan Kelas	The research findings conclude that class X experienced increased student activity and learning outcomes from cycle I to cycle I using the Jigsaw-type cooperative learning approach.
9.	Reni Vinola (2020)	KATALIS Jurnal Penelitian Kimia dan Pendidikan Kimia	Penelitian Tindakan Kelas	Based on the data analysis of the research results, students of class X1 SMA Negeri 1 Manyak can increase their learning activities by using the Jigsaw technique to study the subject matter of developing the periodic system of elements. They are seen with a percentage increase of 12.9%. In addition, there was an increase in learning outcomes in terms of process and results by 6.9 or 8.4%.
10.	Febriyani Ishak (2022)	POPULER: Jurnal Penelitian Mahasiswa	Penelitian Tindakan Kelas	The research findings concluded that the average student activity in classroom learning increased from 50.42% in cycle I to 72.69% in cycle II.
11.	Siti Amanah (2023)	JHPP : Jurnal Hasil Penelitian dan Pengembangan	Penelitian Tindakan Kelas	The improvement in learning outcomes can be seen from the findings of the completed class action research project. The test results showed an increase, with cycle I reaching a score of 50.7%, cycle II reaching 66.7%, and cycle III

No	Reference	Journal	Method	Research Results
				reaching 84.9%.
12.	Heribirtus Suradi (2023)	SECONDARY : Jurnal Inovasi Pendidikan Menengah	Penelitian Tindakan Kelas	This study concluded that learning Chemistry with the Jigsaw approach can improve learning outcomes and student engagement. This can be seen from the decreased involvement of less involved students, which is 0% after cycle II. The decrease in the frequency of student failures and the increase in the average daily assessment scores indicate an increase in student learning outcomes.
13.	Syarifuddin (2020)	Jurnal Chemica	Penelitian Tindakan Kelas	Reading assignments combined with the Jigsaw Type cooperative learning model can improve student learning activities related to elemental chemistry. Based on the daily test of cycle I and II material, the average learning outcome was 78.14, with a classical completeness of 93.10%, according to the data.
14.	Rahmawaty Tuna (2022)	AKSARA: Jurnal Ilmu Pendidikan Nonformal	Penelitian Tindakan Kelas	Students can become more engaged, achieve better learning outcomes, and be more motivated to learn if cooperative learning models such as Jigsaw are applied with a focus on reaction speed. This is shown by three cycles of an increase in activity of 95%, an increase in average learning outcomes of 84.9%, and an increase in student learning motivation of 84.9%.
15.	Nursiah (2022)	SINTHOP: Media Kajian Pendidikan, Agama, Sosial dan Budaya	Penelitian Tindakan Kelas	The research findings proved that the jigsaw-type cooperative learning approach improved student learning outcomes when learning salt hydrolysis in chemistry class. After the treatment, the observation results prove that the percentage of students who have achieved learning completeness is 100%, and their learning activities have progressed to the active and very active categories.
16	Rahmawaty Tuna (2021)	AKSARA: Jurnal Ilmu	Penelitian Tindakan	The Jigsaw learning approach reported higher motivation and

No	Reference	Journal	Method	Research Results
		Pendidikan Nonformal	Kelas	achievement in chemistry, particularly regarding chemical reaction rates. This improvement is seen in students' cognitive, emotional, and psychomotor domains. It can be shown in the percentage and average obtained after conducting three cycles.
17	Siti Amanah (2023)	Jurnal Hasil Penelitian Dan Pengembangan	Penelitian Tindakan Kelas	From the discussion of the results of class action research conducted in class XI IPA 1 SMA N 1, Tegalombo showed an increase in learning outcomes after three cycles on hydrocarbon material.

This review article discusses the effectiveness of the jigsaw learning model in chemistry learning. Based on the results of the literature, the application of the jigsaw-type cooperative learning model can increase student learning motivation (Arafah & Hamid, 2016; Darudin, 2021; Istijabatun, 2015; Madiun & Tahun, 2015; Tuna, 2022), improve student learning outcomes (Amanah, 2023; Laisnima & Zulfiani, 2021; Nursiah, 2022; Suradi, 2023; Vinolia, 2020), improving teacher and student activities (Febriyani Ishak, 2022; Kosfina, 2018), and improving student achievement (Penelitian & Agama, 2021; Septaria, 2022; Tuna, 2022) after several cycles of classroom action research.

Students' learning activities increased when the Jigsaw-type cooperative learning model was applied. According to Suweken (2013), increased student activity in learning to understand the subject matter is the foundation for active concept understanding. Therefore, the Jigsaw learning model is considered suitable because it can foster an exciting and enjoyable learning environment by allowing students to interact with each other in expert groups, thus making all students seem very involved in the discussion process (Werdiningsih & Mukhlishin, 2021). Furthermore, the Jigsaw cooperative learning model allows students to build their knowledge, which can also have an impact on student learning outcomes by making learning outcomes more meaningful and able to be remembered in long-term memory (Febriyani Ishak, 2022). According to the research results (Penelitian & Agama, 2021), students' creativity and mental and motor activities result from their learning activities. According to research (Suradi, 2023), group learning with friends also provides students with new and exciting experiences that impact mastering the material conveyed by their friends. It also affirms students who voice their opinions, enriches members who observe their participation, and allows everyone to advance in mastery of the material and student activity.

Students' learning achievement increases when the Jigsaw-type cooperative learning model is applied. According to (Aswirna, 2012), the Jigsaw-type cooperative learning paradigm in chemistry learning tends to increase students' absorption and learning achievement. In line with that, research (Penelitian & Agama, 2021) on using the Jigsaw cooperative learning model in Chemistry subjects revealed that students were more satisfied with this learning model than the lecture format. In addition, by using the jigsaw model, students can more easily understand the concepts and materials discussed in chemistry lessons, which increases student learning achievement.

Students' learning outcomes improve when applying the Jigsaw-type cooperative learning model. Of course, increasing students' interest and motivation during the learning process leads to increased learning outcomes (Arafah & Hamid, 2016). According to Siti Istijabun (2015), the purpose of the Jigsaw learning model is to make students more responsible to each other, their

group, and themselves. It also aims to foster students' curiosity and cooperation. Therefore, the Jigsaw learning approach is expected to improve students' learning outcomes. Because Jigsaw cooperative learning makes students feel comfortable and happy, there is an actual increase in learning outcomes between before and after learning. In addition, Jigsaw-style cooperative learning becomes more successful because students will retain the material longer, directly or indirectly, resulting in a better understanding of the subject matter (Kosfina, 2018).

Students' learning motivation increases when the Jigsaw-type cooperative learning model is applied. In this jigsaw-type cooperative learning technique, the teacher stimulates students' curiosity at the apperception stage by providing real-world examples, thus increasing their motivation. Students will be more enthusiastic about following the learning process if they get inspiration from the teacher at the beginning of the learning (Werdiningsih & Mukhlishin, 2021). This can be seen in students who want to talk about solutions to problems and listen attentively (Arafah & Hamid, 2016). Due to peer pressure and awareness of continuous evaluation, students using the Jigsaw learning model develop curiosity, critical thinking, and teamwork, which may spur them to work hard in their studies (Tuna, 2022). Based on the research findings of Siti Istijabun (2015), there was an increase in the number of students participating in question-and-answer activities from cycle I to cycle II. Compared to the conditions of the pre-jigsaw model, this shows increased student activity as a measure of motivation (Istijabatun, 2015).

Based on the results and discussion previously presented, the effectiveness of the Jigsaw learning model in learning chemistry can be used as a solution to overcome student problems so that it positively impacts learning activities, learning outcomes, student motivation, and student achievement.

4. CONCLUSION

After reviewing seventeen previous studies on the Jigsaw learning model in chemistry education, it can be concluded that the effectiveness of the Jigsaw learning model in chemistry learning can be used as a solution to overcome student problems so that it has a positive impact on learning activities, learning outcomes, student motivation, and student achievement, which can result in improving the quality of education in Indonesia.

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