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Meta-Analysis Of The Learning Cycle 5E Learning Model On Student Learning Outcomes In Elementary Schools

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Abstract
This research is aimed at analyzing the effectiveness of the learning cycle 5e teaching model on the students' outcomes. The method of this research used a meta-analysis of previous studies that apply the learning cycle 5e learning model to the student learning outcomes. Research begins with formulating the research problems, browsing the relevant studies to be analyzed. The data collection technique was done through searching e-journals via Google Scholar. From the tracing on the internet obtained 8 scientific articles that have been published, the instrument is in the form of coding based on predetermined criteria. The data of this research were analyzed by using effect size. Research findings revealed that the whole studies were conducted have an impact and effective on students' learning outcomes in elementary school with an effect size 0.875892 or in the medium category. The 5e learning cycle model also has an impact and effective in terms of grade level, namely in grades 4 and 5, using this model can improve learning outcomes also. The conclusion of this study is that the 5e learning cycle model is effective on student learning outcomes compared to other learning models..

Keywords: *learning cycle 5e; learning outcomes; elementary students*

INTRODUCTION

Learning is essentially a process of interaction with all situations surrounding an individual (Rusman et al., 2012). Furthermore, Slameto (2003) states that learning is a process undertaken by an individual to achieve a change in overall behavior as a result of their own experiences interacting with their environment. Meanwhile, Rohani (2004) defines learning as a change in a person's behavior toward a situation caused by repeated experiences in that situation, where the behavioral change cannot be explained.

Ambarita (2006) states that learning outcomes are a process of positive qualitative change that occurs in a student's behavior due to increased knowledge, skills, values, attitudes, interests, appreciation, logical and critical thinking skills, interactive skills, and creativity. Furthermore, Bundu (2006) defines the stages of change in an individual's overall behavior as relatively permanent as a result of experience and interaction with the environment, involving cognitive processes. Meanwhile, according to Sudjana (2009), student learning outcomes are essentially changes in behavior as a result of learning, broadly encompassing cognitive, affective, and psychomotor domains. Hamalik (2004) defines learning outcomes as mastery of

behavior achieved by students in participating in the teaching and learning process in accordance with established educational objectives.

The process of assessing learning outcomes can provide teachers with information about students' progress in achieving their learning objectives through learning activities. Winkel (in Haryanti & Widodo, 2025) defines student learning outcomes as the success achieved by students, namely academic achievement in school, expressed numerically. To determine the extent to which a person has achieved learning outcomes, an evaluation must be conducted. To determine progress, criteria (benchmarks) must be established that refer to predetermined objectives so that the extent of the influence of teaching and learning strategies on students can be determined. Student learning outcomes as tests or final exams for the majority of students (Susanti, 2014).

Learning outcomes as goals are considered more important, but the process of students acquiring understanding and knowledge is considered even more important. Students construct their knowledge of known phenomena by using their experiences, cognitive structures, and beliefs. This is in line with the opinion of who stated that in constructivist learning theory, learning is a process of someone acquiring knowledge by constructing their own knowledge within the individual. Students play an active role in learning because learning is student-centered (Bada & Olusegun, 2015).

Learning models based on constructivist theory can provide opportunities for students to learn through real experiences and construct their own knowledge, so that mastery of scientific processes, scientific products, and scientific attitudes can be obtained by students in the learning process. The more the role and activeness of students in learning, the more knowledge is obtained. This is different from learning models based on behaviorist theory, which makes students passive objects in learning, because learning is teacher-centered (Mishra, 2023). Learning models based on behaviorist theory prioritize the abilities and learning outcomes obtained, so learning models with a constructivist approach are thought to be more effective than learning models using a behaviorist approach.

RESEARCH METHODS

This research is a quantitative study. The form of quantitative research used in this study is meta-analysis, which is a study to see the magnitude of the effect of a treatment. Meta-analysis is a study using existing studies and has been used by other researchers, which is carried out systematically and quantitatively to obtain accurate conclusions (Retnawati, 2020). In meta-analysis research is used to analyze empirical studies that have been conducted by previous researchers, quantitative research results, research results in a form that can be compared.

Data collection was done by searching Google Scholar. The instrument for data collection is by using a coding sheet. The variables that will be coded are: 1) research title, 2) research year, 3) researcher's name, and pretest and posttest results in each study in the form of scores. The sample used in this study was 15 scientific publication articles. The data analysis technique used effect size to determine the magnitude of the influence of the 5e learning cycle model on student learning outcomes in elementary schools (Ridwan et al., 2021).

RESULTS

The meta-analysis was conducted by collecting several relevant articles according to the theme. The sources were gathered from both journals and Google Scholar. The following eight relevant articles served as data sources for this meta-analysis.

No.	Authors	Title	Years
1	Fitri Puspita Sari	Pengaruh Penggunaan Model Pembelajaran *learning cycle 5e* terhadap Hasil Belajar IPA Siswa Kelas IV di SDN 03 kepahing.	2013
2	Niluh Irma Wijeyanti, I GustiAgung Oka Negara dan Siti Zulaikha	Pengaruh Model pembelajaran *learning cycle 5e* berbantu peta konsep (*concept mapping)* terhadap Hasil Belajar Ipa Siswa SD Negri 2 Tribubeneng Badung.	2014
3	Zuli Utami	Pengaruh Model Pembelajaran *learning cycle 5e* terhadap Hasil Belajar Siswa Kelas VI SDN Sendangadi 1.	2016
4	Yunita Jais dan Samirin	Pengaruh penerapan Model siklus belajar *learning cycle 5e* Dengan memanfaatkan Media Audio Visul Terhadap Hasil Belajar IPA SD.	2020
5	Erwinda Widyanawati.	Keefektifan Model *Learning Cycle 5e* Terhadap Hasil Belajar Ipa Materi Perubahan Lingkungan Pada Siswa Kelas IV SD Gugus Kartini Jepara.	2016
6	I Gst. A. Eny Indrawati , I Md. Putra , Ida Bgs. Gd. Surya Abadi	Pengaruh Pengaruh Pembelajaran *Learning Cycle 5E* Berbantu Media Lingkungan Terhadap Hasil Belajar Pkn Kelas V Sdn Tonja.	2014
7	Putu Dian Cita Resty , I Nengah Suadnyana , I Komang Ngurah Wiyasa.	Pengaruh Model Siklus Belajar *learning cycle 5E* Terhadap Hasil Belajar Ipa Siswa Kelas IV SDN Gugus Kompyang Sujana Kecamatan Denpasar Barat Tahun Ajaran 2016/2017.	2017
8	Dwi Ratna Dewi , DB. Kt. Ngr. Semara Putra , Md. Putra	Pengaruh Model Pembelajaran Silkus *Belajar (Learning Cycle) 5e* Terhadap Hasil Belajar Ipa Siswa Kelas V SD 26 Pemecutan Denpasar Barat.	2013

Effect Size of the Learning Cycle 5e Learning Model on Student Learning Outcomes.

Overall Effect Size Data

Data on the effect size of scientific publication articles on the Learning Cycle 5e learning model, based on four categories: weak effect, simple effect, moderate effect, and high effect, can be seen in Table 1 below:

Table 1. Overall Effect Size Analysis Results

No	Experiment		control		*Efffect size*	categories
	Pretest	***Posttes***	***Pretes***	***Posttes***		
1	48.10	77.38	44.40	66.80	0.831897	medium effect
2	50.32	83.57	47.92	73.71	0.342647	weak effect
3	53.18	81.14	53.85	69.23	0.056995	weak effect
4	43.64	83.92	43.68	58.92	0.001936	weak effect
5	65.5	76.17	65.22	66.97	0.019560	weak effect
6	59.93	80.93	59.93	69.35	1.207643	high effect
7	63.49	86.86	38,81	78,10	3.455044	high effect
8	52.5	70.00	40.00	58.24	1.209276	medium effect

Average Effect Size	**0.875892 (medium effect)**
SD	**1.167028**

The effect size analysis was performed using Microsoft Excel 2016. The data analysis results in Table 1 show that the eight scientific publication articles analyzed provided different effect size values, with four articles having weak effects, two articles having moderate effects, and two articles having high effects. The calculation yielded a total effect size of 0.875892, categorized as high effects, with a standard deviation of 1.167028.

Effect Size Result Data Based on Class Level Used

Table 2. Effect size results based on grade level

No	Grade	N article	Effect size	Categories
1	4	5	2.262685	high effect
2	5	3	1.585401	high effect

Table 2 illustrates that the use of the 5e learning cycle model in student learning outcomes is most widely used in the fourth grade with five articles, while the least use is in the fifth grade with three articles. However, if seen from the effect size that the use of the 5e learning cycle model with student learning outcomes from scientific publication articles is in the fourth grade with an effect size of 2.262685 in the high category, in the fifth grade with an effect size of 1.585401 in the high category. The table reveals that the highest influence is in the fourth grade, so the

fourth grade is the most effective in using the 5e learning cycle model compared to other classes.

Characteristics of an Effective 5e Learning Cycle Model

The 5e learning cycle model from the eight journals analyzed was deemed effective because each researcher successfully implemented each step in the model in its implementation: 1) Teachers prepare or condition students for learning; 2) Students work collaboratively in small groups to complete assigned tasks without direct instruction from the teacher; 3) Students explain the concepts their groups discovered in their own words; 4) Students apply the concepts they learned to solve problem-solving problems. 5) Evaluation can be conducted through quizzes or open-ended questions at the end of the lesson to determine students' understanding of the concepts learned; and 6) Conclusion.

DISCUSSION

The cyclical learning model is said to have a positive influence, supported by Kamdi's opinion (2007), which states that the learning cycle is a student-centered learning model whose sequence has been organized in such a way that students can master the competencies that must be achieved in learning. The 5e learning cycle learning model is one of the learning models with a constructivist approach that can provide opportunities for students to more actively discover and construct their own knowledge through five stages: engagement, exploration, explanation, elaboration, and evaluation. The 5e learning cycle learning model with a constructivist approach is more effective than conventional learning models based on behaviorist theory because learning models based on constructivist learning theory prioritize the process over the learning outcomes, while learning models based on behaviorist learning theory emphasize the learning outcomes obtained. Knowledge built on one's own experience will also provide a more comprehensive understanding, better mastery, and longer retention in students' memories.

The use of the 5e learning cycle model on student learning outcomes has various effects, both in terms of its use at different grade levels and the improvement of different student abilities. Therefore, the results found that the use of the 5e learning cycle model is very effective for use in elementary schools. The 5e learning cycle model from the 8 journals analyzed is said to be effective because in its application, each researcher carried out each step in the model well, namely: 1) the teacher prepares or conditions students to learn; 2) students work together in small groups to work on assignments given by the teacher without direct instruction from the teacher; 3) students explain the concepts of their group's findings in their own words; 4) students apply the concepts they have learned to solve problem-solving

problems. 5) Evaluation can be done through giving tests (quizzes) or open-ended questions at the end of the lesson to determine the extent of students' understanding of the concepts learned. The high level of influence in each class has implications for student development. Psychologically, students are in the concrete operational stage, according to Piaget's theory, between the ages of 6 and 11. This is the age at which children begin elementary school (Sapriati et al., 2011). In the concrete operational stage, there has been a shift from less logical to more logical thinking. Operational thinking is based on concrete or tangible things. At this stage, children are also able to group objects and events, create order, and solve numerical problems. Furthermore, according to Yusuf (2014), children aged 6-11 are characterized by three new abilities or skills: classifying (grouping), arranging and organizing, and connecting or calculating numbers (in Susanti, 2013).

The syntax or learning stages of the 5e learning cycle model show that learning with the 5e learning cycle model can be used to overcome the problem of active student participation, because each stage really demands student involvement. Madu & Amaechi (2012), stated that the use of the 5e learning cycle will enable active student participation. The 5e learning cycle model is applied in learning that prioritizes learning outcomes. Sudjana (2010) Learning outcomes are the abilities that students have after receiving learning experiences. Learning outcomes can be seen as a form of learning activities to determine the results of student learning abilities.

CONCLUSION

Based on the findings and analysis of the research results, a meta-analysis of eight scientific publication articles concluded that the 5e learning cycle model has a significant effect on elementary school student learning outcomes, with a total effect size of 0.875892, categorized as a moderate effect, and a standard deviation of 1.167028. Each article had varying effect sizes, with four articles having a weak effect, two articles having a moderate effect, and five articles having a high effect. Based on the findings, the use of the 5e learning cycle model and the ability to explain, the 5e learning cycle model can be used in both upper and lower grades, taking into account psychological aspects and student developmental levels.

After conducting the meta-analysis, the authors propose several suggestions for future improvements: 1) Teachers can use the 5e learning cycle model in the learning process by selecting and adapting material concepts deemed appropriate to the learning model and being able to manage the class well in guiding students towards achieving learning objectives. 2) For research, a researcher should be more detailed in including the completeness of research data for scientific articles, such as the design

used, hypothesis test results, sample size, treatment duration, material taught and others. 3) For further research, it is recommended to use more articles used in meta-analysis research so that the data obtained is broader and the research results can be viewed in more depth.

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