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The Influence of Comic Media in the Team Games Tournament (TGT) Model to Improve Science Literacy in Elementary School Class III Animal Life Cycle Materials

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Abstract: This study aims to determine the effect of using comic media in the Team Games Tournament (TGT) learning model on improving the science literacy of elementary school students on the topic of animal life cycle. Science literacy is an essential skill that should be fostered from an early age. This quantitative study employed a quasi-experimental pretest-posttest control group design involving 48 third-grade students at SDN Duren Tiga 13, South Jakarta, divided into an experimental class (21 students) and control class (27 class). A 25 item multiple choice instrument was used, analyzed using the Rasch model via the Winstep application. Results showed that 20 out 21 students (95.24%) in experimental goup improved, while only 1 declined. In contrast, only 18 of 27 students (66.70%) in control class improved, with 4 remaining unchanged and 5 declining. An Independent sample t-test confirmed a significant difference between the groups, $t(46) = 2.973$, $p = 0.005$. these findings indicate that integrating comic media with the TGT model learning effectively enhance students' science literacy and may serve as an engaging alternative to conventional instruction.

Keywords: Comic; Elementary school science; Science literacy; Team games tournament

Introduction

Literacy is a very important ability for elementary school students to understand and apply scientific concepts in daily life, including the ability to use science knowledge, indentify questions, and draw conclusions based on evidence to understand and help make decisions about the natural world and human interaction with environment (Fauziah et al., 2023; Nurliana et al., 2023; Sukmawati et al., 2022; Sukmawati et al., 2023). This competency is very important for the young generation to face increasingly complex global challenges. In the elementary school curriculum, the content of animal life cycles includes IPAS learning, which aims to provide a basic understanding of the life cycle of living thing, especially for animals to maintain their species, interaction with the environment (Zandvakili et al., 2019). However, facts in the field show that the science literacy ability of students in Indonesia is still below the average of countries in ASEAN, this is supported by Sukmawati's opinion in her journal (Sukmawati et al., 2022) and the results of national and international surveys, PISA (Proggramme for International Student Assessment), which may be caused by learning approaches that are less effective and interesting, making learning monotonous and decreasing student motivation in science literacy. Effective science learning in elementary school requires learning designs that are creative and interactive to increase student engagement and improve

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understanding of scientific concepts. One of the solutions is the use of teaching media, teaching media must be created creatively, one example is, colored comic teaching media.

Comic media has high appeal and is able to improve students' literacy by presenting complex information using simple language and attractive visuals, with uniqe advantage as teaching medium that presents events chronologically in an easy to understand format (Rosida & Hastuti, 2020). In addition, the application of the learning model to the learning process also needs to be considered because the learning model plays an important role in the success of the teaching and learning process, this opinion is in line with the opinion of the expert, namely Russefendi in (Nurhayati et al., 2022) which states that there are several factors for learning success, one of which is the learning model in the presentation of materials.

The TGT (Team Games Tournament) learning model is an effective solution for creating an interactive classroom atmosphere by providing enjoyable learning and optimizing student interaction to increase learning motivation (Resti & Aprian, 2019). By integrating comic teaching media and the TGT learning model, it is hoped that students can be more active and motivated to understand scientific concepts with animal life cycle materials in depth based on previous research that discusses the benefits of comic media in the learning process that can increase students' interest and understanding of learning materials (Sukmawati, 2023; Sukmawati et al., 2021b, 2021a). However, most studies have not specifically examined teaching media and learning models, especially in science literacy learning at the elementary school level.

Therefore, there is research gap that has not been specifically addressed in previous studies, namely the integration of visual media, such as comics, with active learning models in the context of improving science literacy at the elementary school level (Izzati et al., 2024; Putri et al., 2024; Saputri et al., 2024; Sukmawati et al., 2024). This study aims to fill that gap by developing a learning approach that combines visual media and active strategies to enhance student unsderstanding of science content. Through this approach, the research is expected not only to improve student learning outcomes but also to foster their interest and love for science and science literacy. This aligns with the goals of national education, which strive to create more creative and meaning ful learning experiences. Ultimately, student, student are ecfected to better understand and apply science concepts and develop critical thinking skill to solve real-life problem scientific context.

Method

This research was conducted at SDN Duren Tiga 13 South Jakarta, in May 2025 The research uses a quantitative method with Quasi Experiment Control Group Pretest-Posttest Design. Quasi Experiment Control Group Pretest-Posttest according to Marten Yogaswara et al. (2020) a quasi experiment is a type of experimental research that uses intact groups without random assignment to experimental and control groups. This research use this design is due to the existence of a pretest to determine the condition of the object before the treatment is applied, and the results of the treatment can be seen from the comparison between the pretest and the posttest (Novianti et al., 2023; Ramadhani et al., 2022; Sukmawati et al., 2023). The form of instrument questions in this study is to use 25 multiple-choice questions that contain elements of science literacy and are given to 48 students who have been divided into control classes and experimental classes, in this case for the wrong questions will be given a number of 0 and the correct ones will be given a number of 1. Validity and reliability have also been carried out and evaluated using instruments (Gufron et al., 2018; Rusdi et al., 2020).

The data analysis technique in this study uses descriptive and quantitative analysis. The analysis was carried out by comparing student pretest and posttest scores using the Rasch Model, with assistance from the Winsteps application. One of the analyses perfomed was stacking test, which compares students abilities before and after treatment based on their developmental progress (Fitria et al., 2022; Ifdaniyah et al., 2024; Istiqomah et al., 2023; Kusnadi et al., 2023). In this study, sampling techniques were also used using Cluster Sampling according to Fiqri et al. (2022) a sampling technique conducted in groups and carried out in specific areas or clusters, where all members of each selected group are included as sample members.

Result and Discussion

Result

The use of comic media and the TGT model learning in this study aimed to increase student science literacy in elementary schools. The instrument use showed good content validity but low in person reliability, which is likely due to the small sample size. Despite this, the instrument was still deemed appropriate for use in improving science literacy (Muthi'ah et al., 2023; Sukmawati et al, 2024; Wahjusaputri et al., 2024).

Descriptive statistic were first calculated to provide an overall picture of students performance before and after the intervention. Table 1 shows the group statistics from the posttest scores. The experimental class

achieved a mean score of 89.29 with standard deviation of 15.16, while the control class had a mean of 69.37 with a standard deviation 15.08, this indicate a notable difference in average performance between the two groups.

Table 1. Groups Statistic

Class	N	Mean	Std. deviation	Std. error mean
Score posttest_experiment	21	82.29	15.156	3.307
Score posttest_control	27	69.37	15.077	2.902

To further confirm the difference in learning outcomes between the experimental and control class, an independent samples t-test was conducted. The results indicated a statistically significant difference in gain scores between the two groups, with a Sig. (2-tailed) value of 0.05, this suggests that the intervation had a meaningful impact on improving science literacy.

Table 2. Independent Samples Test

F (levene)	Sig. (levene)	t	df	P (2-tailed)	Mean diff	95% CI lower	95%CI upper
0.450	0.506	2.937	46	0.005	12.915	4.065	21.766
		2.935	43.028	0.005	12.915	4.400	21.788

The Results of the Experimental Class Analysis with Learning Using Comic Media in the TGT Learning Model

From the results of the analysis of students using the Rasch model, it was seen that 20 out of 21 students had experienced improvement, this shows that the majority of participants experienced positive development after being given treatment between the pretest and posttest times. This increase can be interpreted as the effective result of a training or learning aimed at improving students' literacy skills.

Table 3. Results of Pre and Post Test Analysis of Experimental Class

Participants	Pretest	Posttest	Measure posttest- pretest	Information
1	-4.38	-1.20	3.18	Increase
2	-3.98	-2.36	1.62	Increase
3	-3.30	-3.54	-0.24	Decreased
4	-3.30	-1.20	2.10	Increase
5	-5.15	-1.89	3.26	Increase
6	-5.77	-4.76	1.01	Increase
7	-4.76	-1.20	3.56	Increase
8	-5.55	-3.77	1.78	Increase
9	-4.76	-1.89	2.87	Increase
10	-4.76	-1.20	3.56	Increase
11	-4.95	-3.54	1.41	Increase
12	-3.54	-1.20	2.34	Increase
13	-3.54	-1.20	2.34	Increase
14	-4.38	-3.77	0.61	Increase
15	-3.77	-1.89	1.88	Increase
16	-3.77	-2.73	1.04	Increase
17	-5.35	-4.38	0.97	Increase
18	-4.76	-2.36	2.40	Increase
19	-4.95	-1.89	3.06	Increase
20	-5.77	-3.54	2.23	Increase
21	-5.15	-3.77	1.38	Increas

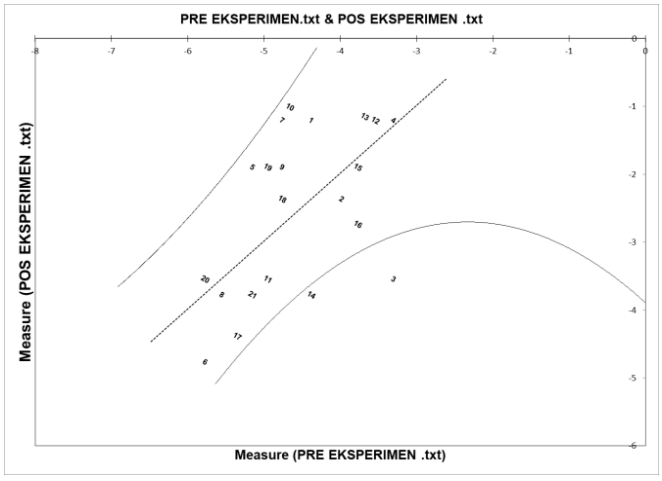

Figure 1. Results of pre and post test analysis of experimental class

The table 3 present the pretest and posttest scores of 21 students in experimental class. Based on Rasch model analysis, 20 out 21 students showed an increase in their ability measures. The highest individual gains were recorded by student 7 and student 10, both with an increase of 3.56 logits, followed by student 5 with gain of 3.26 logits. Only one student, number 3, experienced a decreased, form -3.30 to -3.45, resulting in a decline of logit of -0.24 logits.

The Results of the Control Class Analysis with Conventional Learning

From the results of the student analysis in the control class, there was also an increase but not as optimal as the class that was subjected to treatment (Fitria et al., 2024; Sukmawati, 2020; Sulistiani et al., 2024; Wahjusaputri et al., 2022). There are some students who remain at their ability and there are some students who also decline.

Table 4. Results of Pre and Post Test Analysis of Control Class

Participants	Pretest	Posttest	Measure posttest-pretest	Information
1	-0.08	0.85	0.93	Increase
2	0.10	2.18	2.08	Increase
3	-1.05	-0.08	0.97	Increase
4	1.06	1.06	0.00	Remain
5	-0.84	1.83	2.67	Increase
6	0.65	0.65	0.00	Remain
7	-0.84	2.18	3.02	Increase
8	0.46	1.28	0.82	Increase
9	0.10	0.46	0.36	Decreased
10	-0.08	-1.05	-0.97	Decreased
11	-1.05	1.54	2.59	Increase
12	-0.08	0.85	0.93	Increase
13	0.46	2.18	1.72	Increase
14	0.28	1.54	1.26	Increase
15	0.10	0.85	0.75	Decreased
16	0.85	0.85	0.00	Remain
17	0.28	0.28	0.00	Remain
18	1.06	0.85	-0.21	Decreased
19	-0.84	0.65	1.49	Increase
20	-0.64	3.41	4.05	Increase
21	-0.08	1.28	1.36	Increase
22	0.10	0.46	0.36	Decreased
23	0.28	1.28	1.00	Increase
24	-0.64	0.65	1.29	Increase
25	0.46	1.83	1.37	Increase
26	-0.84	0.10	0.94	Increase
27	0.46	0.10	-0.36	Increase

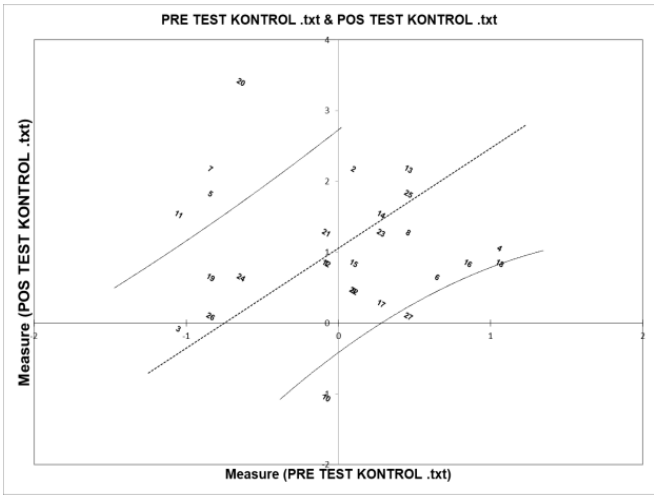

Figure 2. Results of pre and post test analysis of control class

The table 4 shows the data for the control class, which consisted of 27 students. 18 student showed improvement in scores, including students number: 1, 2, 3, 5, 7, 8, 11, 12, 13, 14, 19, 20, 21, 23, 24, 25, 26, and 27. Among these, student 20 had the highest increase with gain of 4.05 logits. In contrast, 5 student showed decrease in score; student 9, 10, 15, 18, and 22. Additionally, 4 student (4, 6, 16, and 17) showed no change between pretest and posttest.

Discussion

The finding of study demonstrate that use of comic media combined with the TGT (Team Games Tournament) learning model contributed to significant improvement in students science literacy outcomes (Aulia et al., 2024; Latifah et al., 2024; Sukmawati et al., 2021; Sukmawati & Sari, 2024). The statistical result from the independent samples t-test showed a meaningful difference and the posttest scores between the experimental class and control class, indicating that the treatment was effective in enhancing learning outcomes. In the experimental group, 20 out 21 student showed improvement, with several students such as student number 7 and 10 experiencing gains of more than 3 logits. The one student who showed a decline may have been affected by limited participation in learning activities, as observed during the implementation phase. The improvement of 20 out of 21 participants (95.24%) provides strong evidence that integration of comic media within the TGT learning model positively impacts students' science literacy. This is further supported by the instrument's content validity, as confirmed through expert judgment, ensuring its alignment with curriculum competencies and learning indicators.

In contrast, the control class showed more varied outcome, with only 18 out 27 students improving, 4 remaining the same, and 5 showing a decline in performance. This suggest that the integration of comic media and TGT model learning may offer stronger engagement and concept comprehension than conventional teaching approaches (Febianti et al., 2024; Hartomo et al., 2024; Lestari et al., 2024). The use of comic media provides visual context that helps students connect abstract science concept to real life experiences, this finding aligns with Arief et al. (2022) who found that comic media enhances students conceptual understanding in learning environments. 67% of students, namely in numbers (1, 2, 3, 5, 7, 8, 11, 12, 13, 14, 19, 20, 21, 23, 24, 25, 26, 27) experienced an improvement in the posttest, it can be said that the student has quite good literacy skills. For example, student number 20 experienced the highest increase spike, which is to have a celismatic measure of 4.05, this is because the student has a higher cognitive level than other students, this is analyzed with the help of the researchers' observations in class.

The TGT model promote active participation and collaborative learning, which are known top positively affect motivation and engagement, according to (Muttaqien et al., 2021), active learning strategies such as TGT improve students retention and academic performance. While the improvement observed in this study is promising, some limition need to be considered. The person reability of the instrument was found to be low, likely due to small sample size. This limition should

be considered in interpreting the findings, and future research is encouraged to use larger sample size for improved generalizability (Alwi, 2015).

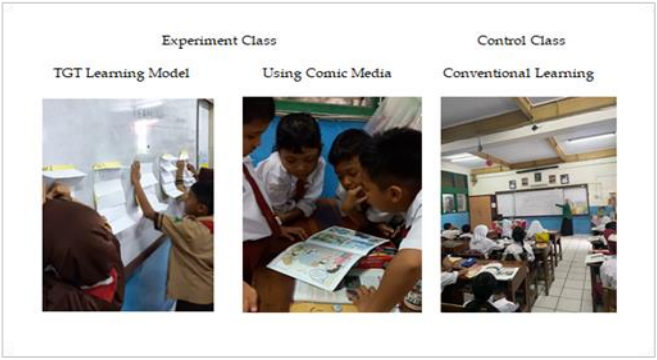

Figure 3. Implementation procedures in experimental and control classes

Conclusion

This study demonstrates that integrating comic media with the Team Games Tournament (TGT) learning model can effectively improve elementary students' science literacy. The experimental class, which received comic-based instruction showed significantly better learning outcomes compared to the control class, as confirmed by independent t test analysis. The findings indicate that this approach provides an engaging and collaborative learning environment that enhaces students understanding of concepts. This learning strategy has the potential to be implemented in science education, especially at the primary level. Overall, the integration of visual media cooperative learning methods is a promising alternative to conventional teaching. Future studies are encouraged to involve larger and more diverse samples sizes to further validate these findings and improve the generalizability of the result.

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Conflicts of Interest
The author states that there is no conflict of interest in the research until the writing of this article. The author also guarantees that there are no circumstances or personal interests that can be considered a reprentry or interpretation of the results of the research reported accurately.

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