***JKPK (JURNAL KIMIA DAN PENDIDIKAN KIMIA)**, Vol. 8, No.3, 2023* *pp. 396-406*
Chemistry Education Study Program, Universitas Sebelas Maret *ISSN 2503-4146*
https://jurnal.uns.ac.id/jkpk *ISSN 2503-4154 (online)*

THE EFFECT OF A CULTURALLY RESPONSIVE TEACHING APPROACH INTEGRATED WITH COMICS WITH THE THINK TALK WRITE LEARNING MODEL ON STUDENTS' LEARNING ACTIVITIES AND ACHIEVEMENT IN BASIC LAW OF CHEMISTRY TOPICS

Afifah Khoirunnisa, Bakti Mulyani*, Elfi Susanti Vh, Sri Yamtinah, Mohammad Masykuri, Maria Ulfa, Ari Syahidul Shidiq

Chemistry Education Study Program, Faculty of Teacher Training and Education, Universitas Sebelas Maret, Seurakarta, Central Java, Indonesia

ARTICLE INFO

Keywords:
Culturally Responsive Teaching; Comics, Think Talk, Write; Learning Activities; Learning Achievement

Article History:
Received: 2023-11-03
Accepted: 2023-12-18
Published: 2023-12-31

**Corresponding Author*
Email:baktimulyani@staff.uns.ac.id
doi:10.20961/jkpk.v8i3.80152

ABSTRACT

This study examines the impact of integrating the Culturally Responsive Teaching (CRT) approach with comic-based learning and the Think Talk Write (TTW) model on student learning activities and achievements in fundamental chemistry. Focusing on chemical reactions (combustion, rusting, fermentation, etc.) and laws (Dalton's, Proust's, Gay-Lussac's, etc.), the research adopts a pretest-posttest non-equivalent control group design in a quasi-experimental setting with 36 students divided equally between control and experimental groups. Comparative analysis shows that the experimental group outperforms the control group in learning activities and achievements. The experimental group, subjected to the CRT and TTW model, demonstrates significantly higher engagement in learning activities. The N-Gain Score test reveals a notable increase in learning effectiveness—56.40% for the experimental group versus 29.69% for the control group, indicating the latter's relative ineffectiveness. In learning achievement, the experimental group exhibits a considerable improvement of 67.20%, while the control group shows a moderate gain of 50.12%. The results of the Multivariate Analysis of Variance (MANOVA) test, with the positive effect of integrating CRT with comics and the TTW model on student learning activities and achievements. The study highlights the efficacy of this approach in enhancing students' understanding and engagement in chemistry, suggesting a promising direction for future educational practices.

How to cite: A. Khoirunnisa, B. Mulyani, E. S. Vh, S. Yamtinah, M. Masykuri, M. Ulfa, and A. S. S. Shidiq, "The Effect of a Culturally Responsive Teaching Approach Integrated with Comics with the Think Talk Write Learning Model on Students' Learning Activities and Achievement in Basic Law of Chemistry Topics," *JKPK (Jurnal Kimia dan Pendidikan Kimia),* vol. 8, no. 3, pp. 396-406, 2023. http://dx.doi.org/10.20961/jkpk.v8i3.80152

INTRODUCTION

The COVID-19 pandemic has precipitated significant changes across various sectors, particularly education. This shift encompasses a transition from traditional face-to-face instruction to online learning modalities. The online learning approach has been pivotal in creating an effective and comfortable learning environment for students during the pandemic [1]. However, a major concern associated with this shift is learning loss, decreased skills, and prolonged home-based learning [2,3].

To address this challenge, an independent curriculum has been introduced to mitigate the learning losses incurred during the pandemic [4]. Unlike the previous

curriculum, which focuses primarily on education with essential context, the independent curriculum emphasizes differentiated learning tailored to students' achievement stages [5,6]. This curriculum is implemented through various methods but follows a gradual approach to differentiated learning, encompassing content, processes, and products.

Implementation involves mapping students' learning needs based on categories such as learning readiness, interests, talents, and learning profiles [7]. Students are then divided into three implicit groups: those requiring guidance, a moderately advanced group, and an advanced group. This structure aims to provide a more personalized learning experience, catering to students' diverse needs and capabilities.

Integrating the Culturally Responsive Teaching (CRT) approach with learning media such as comics is seen to have a considerable impact on student achievement [8,9]. In Understanding Comics, Scott McCloud describes comics as a series of images that collectively convey information and engage the reader [10]. This choice of media is driven by student preferences for interactive and illustrative learning tools, as revealed in interview feedback.

The Think Talk Write (TTW) model is employed as the learning strategy, characterized by a sequence of thinking (through reading), talking (via discussions and opinion exchange), and writing (documenting discussion outcomes or note-taking) [11]. This model effectively enhances student learning activities and achievements, as its structure promotes rigorous individual or group learning activities, thereby improving understanding of basic chemical law material. The approach and the TTW model are well-suited for the independent curriculum, meeting student needs and incorporating essential cultural and character elements.

Student learning activities include all tasks students perform in the learning process to achieve educational objectives [12]. These activities range from adhering to teacher instructions for group formation to engaging in discussions and asking questions [13]. Oemar Hamalik emphasizes that learning activities cover all interactions between teachers and students directed toward educational goals [14]. Paul Diedrich categorizes these activities into eight indicators: visual, oral, listening, writing, drawing, motor, mental, and emotional [15]. However, this study focuses on six indicators, excluding drawing and motor activities.

Learning achievement results from a task or job, blending the concepts of achievement and learning [16]. Learning involves the development of competencies, attitudes, and skills [17]. Therefore, student learning achievement includes outcomes from teaching and learning processes, spanning cognitive (knowledge), affective (attitudes), and psychomotor (skills) aspects [16,18]. This study evaluates the affective aspect of student learning achievement through Pretests and Posttests. Integrating CRT with TTW is expected to create a more student-centered learning environment, likely increasing student engagement compared to traditional, less student-focused methods. This study aims to determine the effects of integrating the CRT approach with comics and the TTW model on learning activities and student learning achievement.

In the educational process, the CRT approach is effectively integrated into learning media such as comics, which can significantly impact student achievement [9]. As Scott

McCloud explains in *Understanding Comics*, comics are a sequence of images combined to convey information and engage the reader [10]. This choice of media is based on students' preferences for interactive learning tools with illustrative examples of lesson topics, as determined from interview results. The learning model employed is the TTW model, a cooperative learning strategy involving a sequence of thinking (through reading), talking (via discussion and opinion exchange), and writing (documenting discussion outcomes or note-taking) [11]. This model enhances learning activities and achievement, as its syntax facilitates intensive individual or group learning activities, thereby improving students' understanding of basic chemical law material. Both CRT and TTW are poised to be effective in the independent curriculum, aligning with student needs and integrating cultural and character elements essential to this curriculum.

Student learning activities encompass all tasks students perform in the learning process to achieve educational objectives [12]. These activities include following teacher instructions for group formation, participating in discussions, and posing questions [13]. Oemar Hamalik defines learning activities as all efforts in the teacher-student interaction aimed at reaching educational goals [14]. Paul Diedrich identifies eight indicators of student learning activities: visual, oral, listening, writing, drawing, motor, mental, and emotional activities [15]. This study, however, focuses on six of these indicators, excluding drawing and motor activities.

Learning achievement, a combination of achievement and learning, is the outcome of a task or job [16]. Learning refers to developing competencies, attitudes, and skills [17]. Thus, student learning achievement encapsulates the results obtained after various teaching and learning processes, covering cognitive (knowledge), affective (attitudes), and psychomotor (skills) aspects [16,18]. This study measures the affective aspect of student learning achievement through Pretests and Posttests. The integration of CRT and TTW is anticipated to foster a more student-centered learning environment, potentially increasing student engagement compared to traditional methods, which are less student-focused and may hinder students' development. Consequently, this study explores the impact of integrating the Culturally Responsive Teaching (CRT) approach with comics and the Think Talk Write (TTW) model on learning activities and student learning achievement.

METHODS

1.Research Design and Participation

This study employs a quasi-experimental research design known as the Pretest-Posttest Non-equivalent Control Group, utilizing cluster random sampling to select the control and experimental groups. The hypothesis formulation and results are based on observations made within these two groups. To ensure comparability, the homogeneity test is applied to the entire population of students' grades from the preceding lesson. If the homogeneity requirement is met, two classes are randomly selected. The first selected class becomes the experimental group. At the same time, the variance balance test is conducted using the t-test to assess the balance of abilities between the control and experimental groups. Both groups undergo testing using identical instruments, and the results are analyzed to determine the effectiveness of each treatment.

The study involves two distinct groups: the experimental group (comprising 36 students) subjected to the Culturally Responsive Teaching (CRT) approach integrated with the Think Talk Write (TTW) model using comics, and the control group (also comprising 36 students) subjected to the Discovery Learning model without the CRT-integrated comic approach.

Table 1 outlines the specifics of this research design, detailing the allocation of participants to the experimental and control groups and providing a clear visual representation of the study's structure.

Table 1. Research design

Group	Pretest	Treatment	Posts
Experiment	X_1	Y_1	Z_1
Control	X_2	Y_2	Z_2

Description: X_1 = Pretest for experimental class; X_2 = Pretest for control class; Y_1 = Learning with CRT approach integrated with comics with TTW model; Y_2 = Learning with Discovery Learning model without CRT approach integrated with comics; Z_1 = Post-test for experimental class; Z_1 = Posttest for control class

Table 2. Research participation data

Experiment Group		Control Group	
Female	Male	Female	Male
26	10	26	10

2.Research Setting and Duration

The research was conducted over three sessions, each lasting 135 minutes, aligning with the established learning objectives in the independent curriculum (ATP). The curriculum outlines four key points, translating to nine lesson hours (9 JP/9x45 minutes). The structure of the first meeting included an opening segment (5 minutes), a pretest session (15 minutes), core activities (105 minutes), and a closing segment (5 minutes). The second meeting followed a similar structure with an opening segment (5 minutes), core activities (125 minutes), and a closing segment (5 minutes). The third meeting encompassed an opening segment (5 minutes), core activities (105 minutes), a post-test session (15 minutes), and a closing segment (5 minutes).

3. Treatment and Interventions

The control group's core activities comprised stimulations, problem statements, data collection, data processing, verification, and generalization. Meanwhile, the experimental group engaged in presenting information, organizing students into learning teams, facilitating teamwork (Talk and Write), testing on study materials (Talk), and providing recognition. The flow of learning objectives (ATP) is detailed in Table 3.

Table 3. The flow of learning objective

Meeting	ATP
1st Meeting	10.17 Identify various chemical reactions and determine the products produced (2 hours of learning). 10.18 Equalise the various chemical reactions (1 hour of learning).
2nd Meeting	10.18 Equalise the various kinds of chemical reactions (1 JP). 10.19 Make equations chemical reactions complete with phase from the given word equation (1 hour of learning). 10.20 Explain the laws of chemistry (Lavoisier's law, Proust, Dalton, Gay Lussac, and Avogadro) (1 hour of learning).
3rd Meeting	10.20 Explain the laws of chemistry (Lavoisier's law, Proust, Dalton, Gay Lussac, and Avogadro) (3 hours of learning).

4. Data Collection Procedures

Before the learning sessions, preliminary observations were conducted in experimental and control groups to assess student learning activities. Additionally, a pretest was administered to gauge the initial level of student learning achievement. The observations aimed to encompass various aspects, as outlined by six indicators (visual activities, oral activities, listening activities, writing activities, mental activities, and emotional activities). A designated observer in the

classroom conducted these observations during each meeting. Subsequently, the percentage of student learning activities was calculated using trial $AP = \frac{\sum P}{\sum J}\ x\ 100\%$, where $\sum P$ is the number of students who do learning activities and $\sum J$ is the total number of students.

Table 4. Research instruments

Variable	Question Type	Number of Question	
		Pretest	Posttest
Student Learning Achievement	Multiple choice with five answer options	10	10
Student Learning Activity	Student response questionnaire with 4 Linkert scales	20	20

Students were requested to complete a learning activity questionnaire to supplement the observational data before and after the treatment (pretest and posttest conducted in the first and last meetings, respectively). This questionnaire addressed the six learning activity indicators measured. Throughout the learning process, continuous observations were made to assess the evolution of student learning activities in both the experimental and control groups. Upon the conclusion of the learning sessions, both groups underwent a posttest to evaluate student learning achievement post-treatment. The detailed research instrument is outlined in Table 4.

Pretests and posttests to measure student learning achievement are prepared according to the criteria for achieving learning objectives (KKTP) in an independent curriculum based on ATP.

5. Instrumentation and Content

The research utilized several validated instruments, including student learning activity observation sheets, student learning activity questionnaires, pretest-posttest questions, chemistry comics, and teaching modules. These instruments underwent validation by two panelists, and their feasibility was assessed using the Gregory formula. Additionally, the reliability of the pretest-posttest questions was tested through the KR-20 formula, while item analysis and question difficulty were conducted using SPSS version 26.

6. Data Analysis Techniques

Data analysis commenced with prerequisite tests, encompassing normality and homogeneity tests. The pretest and posttest values were calculated using the N-Gain Score to assess the effectiveness and quantify the increase in learning activities and student achievement in each class. This study employed two dependent variables: student learning activity and student. Upon confirming the normality and homogeneity of the data, hypothesis testing was carried out using the Multivariate Analysis of Variance (Manova) test with SPSS version 26. The Manova test is designed to analyze multiple dependent variables, comprehensively evaluating the research hypotheses.

RESULTS AND DISCUSSION

1. Integration of CRT Approach in Chemistry Comics

Culturally Responsive Teaching (CRT) utilizes students' cultural knowledge, prior experiences, and diverse performance styles to foster meaningful learning experiences [19]. As detailed in "Culturally Responsive Teaching: Theory, Research, and Practice," the core principle is establishing a partnership between educators and students to enhance learning. This process acknowledges the importance of academic achievement and preserving students' cultural identities. The five central principles of

CRT include content integration, knowledge construction facilitation, prejudice reduction, promotion of social justice, and academic development. Implementing a learning model incorporating the CRT approach involves five phases: self-identification, cultural understanding, collaboration, critical reflective thinking, and transformative construction [20]. Specifically, in the "Basic Law of Chemistry" chapter, CRT can be integrated by referencing various cultural phenomena and local wisdom from Indonesia, as demonstrated in Table 5.

Table 5. Application of CRT

Cultural Phenomena and Local Wisdom	Chemistry Materials
Pawai Obor Ramadhan	Combustion Reaction, Laws of Multiple proportions (Dalton), Law of Definite Proportions (Proust)
Jamasan Pusaka Ceremony	Rusting Reaction and Laws of Multiple Proportion (Dalton)
Tempe	Fermentation Reaction
Water Purification with Alum	Precipitation Reaction
"Dewi Sri" Organic Fertiliser	Decay Reaction and Laws of Gaseous Volumes (Gay-Lussac)
Cooking with Firewood	Laws of Conservation of Mass (Lavoisier)

Cultural phenomena are integrated into comic media to cater to students' needs, offering an engaging and visually illustrated educational experience.

The image above illustrates how CRT is integrated into a chemistry comic, demonstrating the connection between the Kirab Pusaka culture of Keraton Surakarta and the scientific concepts of rust reactions and Dalton's Law. A ritual in the Kirab Pusaka Ceremony is the Jamasan Pusaka. In this event, the palace's heritage objects (Pusaka) are bathed in a special concoction known as Warangan, which is composed of chemical components like warangan stone powder, arsenic compounds, and lime. Culturally, Warangan is revered as a sacred potion linked to supernatural powers. The belief is that if the Pusaka is not bathed, it will anger the ancestors.

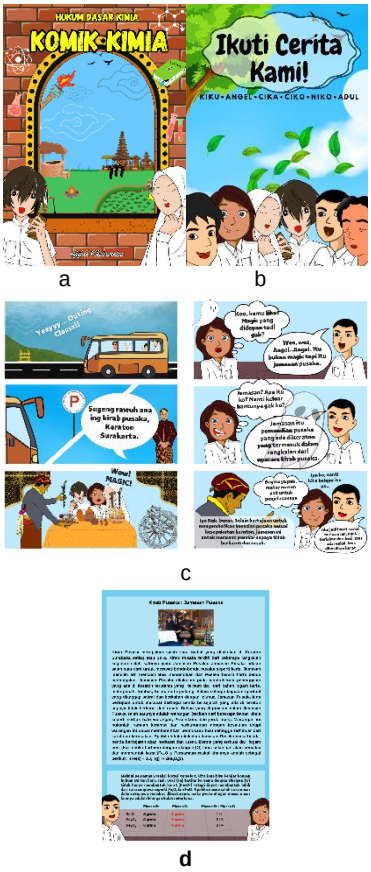

Figure 1. Chemistry Comic Integrating CRT Approach: a. First page of the chemistry comic. b. Introduction of characters. c. A comic strip introducing a scientific issue. d. A narrative explanation of cultural phenomena.

From a chemistry perspective, Warangan, with its chemical composition, effectively cleans the surface of iron (Fe) or other metals, preventing rust and deterioration. The absence of the Jamasan Pusaka ritual could lead to these historical objects rusting and becoming damaged. This ties into the chemical reaction of rusting, where metal or iron, when exposed to oxygen, will, over time, react and form rust. The chemical reaction can be represented as:

$4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$……**(1)**

This equation also serves as a basis for understanding Dalton's Law. It shows that when iron reacts with oxygen, it forms rust and can produce more than one compound. When the mass of one element in a compound is constant, the mass ratio of the other elements will be in simple whole numbers.

	Mass (Fe)	Mass (O)	Fe : O
FeO	6 grams	6 grams	1: 1
Fe_2O_3	6 grams	9 grams	2 : 3
Fe_3O_4	6 grams	8 grams	3: 4

2. Implementation of the TTW Model

This research implements the TTW (Thinking, Talking, Writing) model, initially introduced by Huinker and Laughlin [21]. The model is structured around the stages of thinking, talking, and writing, providing a systematic approach to learning. Initially, students engage with the material individually to understand the problem, followed by active participation in discussions, and finally, articulating the outcomes of these discussions in their own words [22].

The TTW learning syntax integrates cooperative learning syntax with the Culturally Responsive Teaching (CRT) approach. This integration comprises several stages: firstly, the teacher presents the learning objectives and motivates the students (Self Identification phase). Secondly, information is conveyed through various learning media, facilitating the thinking, Self-identification, and Cultural Understanding stages. Thirdly, the teacher guides the formation of learning teams to promote efficient collaboration. Following this, the teacher acknowledges and appreciates individuals' and groups' efforts and outcomes. The fifth stage involves testing students on the learned material or having groups present their work, aligning with the Transformative Construction phase. The teacher aids study groups during task execution, covering the stages of Talk, Writing, Collaboration, and Critical Reflective Thinking. This method aligns with the notion that a learning model should enable students to comfortably answer, convey, and express their thoughts or ideas [23].

3. Effect of the CRT Approach and TTW Model on Learning Activities and Achievement

At the outset, students were administered a pretest to gauge learning activities and achievement during the first meeting. The average pretest value for student learning activities in the control group was 64.41%, compared to 63.78% in the experimental group. These values fall into the 'suitable' category, which ranges from 'very good' (76-100%) to 'less good' (≤ 25%) [24]. The average pretest scores for student learning achievement were 34.44 in the control group and 36.11 in the experimental group, indicating slightly higher initial performance in the experimental group.

Throughout the learning process, observations of student learning activities were recorded. The control group had a marginal increase in learning activities from the first to the third meeting, with averages of 58.3%, 64.67%, and 69.17%, respectively. Conversely, the experimental group showed a significant increase, with averages of 68.3%, 78%, and 81.17% per meeting. By the third meeting, learning activities in the control group reached the 'good' category, while those in the experimental group achieved the 'excellent'

category. This trend was corroborated by the post-test results at the third meeting, where the control group averaged 75.17% ('good') and the experimental group 84.41% ('very good'). Additionally, the post-test results for learning achievement were 69.17 in the control group and 79.44 in the experimental group, further demonstrating the higher average learning achievement in the experimental group.

Analyzing the pretest and posttest results on student learning activities in both groups revealed increases across various indicators, including visual, oral, listening, writing, mental, and emotional activities. In the control group, the increases ranged from 8.34% in emotional activities to 15.97% in oral activities. In contrast, the experimental group saw more substantial increases, with visual activities improving by 21.7% and writing activities by 24.13%. The highest increase in the experimental group was in writing activities, indicating the effectiveness of the CRT approach and TTW model in enhancing students' writing skills through various activities.

The differences in pretest and posttest results were quantified using the N-Gain Score test, with gain factors categorized as <40% (ineffective), 40%-50% (less effective), 56%-75% (moderately effective), and >76% (effective) [25]. The control group's N-Gain Score in student learning activities was 29.69% (ineffective), while the experimental group achieved 56.40% (moderately effective). The control group scored 50.12% (less effective) for student learning achievement, and the experimental group scored 67.20% (quite effective). Further statistical tests were conducted on the pretest and posttest results, including normality, homogeneity, and independence tests. The normality test indicated that the data for the control and experimental classes were normally distributed for student learning activities and achievement. The homogeneity test results suggested that the data was homogeneous. Finally, the independence test results indicated a significant relationship (difference) between the independent variables and student learning activities and achievement.

Table 6. Prerequisite analysis test results

Prerequisite Analysis	Variable	Sig.	Conclusion
Normality Test			
Control	Learning Achievement	0.141	Normal Data
	Learning Activities	0.051	Normal Data
Experiment	Learning Achievement	0.100	Normal Data
	Learning Activities	0.215	Normal Data
Homogeneity Test	Learning Achievement	0.585	Homogeneous
	Learning Activities	0.104	Homogeneous
Independence Test	Learning Achievement	0.021	There is a Difference
	Learning Activities	0.000	There is a Difference

Given that the data meets the normality assumption, as indicated in Table 6, hypothesis testing was conducted using the Multivariate Analysis of Variance (MANOVA) test. The results of the MANOVA test are presented in Table 7. The significance value obtained was <0.05, specifically 0.000, leading to rejecting the null hypothesis (H0). Consequently, integrating the comic-based CRT approach with the TTW model significantly impacts student learning activities and achievement. This outcome underscores the effectiveness of

combining the CRT approach with the TTW model in enhancing both aspects of student learning.

Table 7. Manova Test Results

Difference between pretest and posttest scores of control and experimental groups	Sig. 0,000	Decision H_0 rejected

The findings of this study are corroborated by Winstead et al. [26], who suggest that the CRT approach can be effectively integrated into chemistry learning. A similar study by Naniastuti [27] compared two learning models and found that the TTW-type cooperative learning model significantly enhances students' chemistry learning achievements compared to the Make-A-Match model. Naimnule's research [28] also supports these findings, demonstrating that the Think Talk Write (TTW) model can improve students' cognitive learning activities and outcomes. Further evidence is provided by Nugraha [29], who showed that using chemical comics as learning media enhances student creativity and learning outcomes in thermochemical material. This approach was also effective in improving students' conceptual understanding of chemical bonding material [30] and positively influenced students' perceptions of learning chemistry, particularly in the context of water quality [31].

CONCLUSION

Applying the Culturally Responsive Teaching (CRT) approach, integrated with comic media and the Think Talk Write (TTW) model, has made chemistry learning more meaningful and efficient. This approach notably improves student learning activities and achievement, as evidenced by the results of the N-Gain Score test, which indicates higher increases in the experimental group compared to the control group. Furthermore, the results of the Multivariate Analysis of Variance (MANOVA) test demonstrate a significant effect of this integrated approach on students' learning activities and achievement in the fundamental laws of chemistry. For future researchers and educators, the findings of this study offer valuable insights and serve as a reference for implementing the CRT approach, comic media, and the TTW model in teaching chemistry. This is particularly relevant for topics like the basic laws of chemistry. Additionally, there is a promising avenue for further research to explore other internal or external factors that influence student learning activities. Research could also focus on the impact of the CRT approach on fostering a sense of national pride and shaping students' perspectives on culture.

REFERENCES

[1] W. Zhang, Y. Wang, L. Yang, and C. Wang, "Suspending Classes Without Stopping Learning: China's Education Emergency Management Policy in the COVID-19 Outbreak," *Journal of Risk and Financial Management*, vol. 13, no. 3, pp. 55, 2020, doi: 10.3390/jrfm13030055.

[2] R. Donnelly and H. A. Patrinos, "Learning loss during COVID-19: An Early Systematic Review," *PROSPECTS*, vol. 52, no. 1, pp. 601-609, 2022, doi: 10.1007/s11125-021-09582-6.

[3] P. Engzell, A. Frey, and M. D. Verhagen, "Learning loss due to School Closures during the COVID-19 Pandemic," *Proceeding of the National Academy of Sciences*, vol. 118, no. 17, pp. 1-7, 2021, doi: 10.1073/pnas.2022376118.

[4] T. Marlina, "Urgensi dan Implikasi Pelaksanaan Kurikulum Merdeka pada Sekolah Dasar/Madrasah Ibtidaiyah," in *Prosiding SNPE FKIP Universitas Muhammadiyah Metro*, vol. 1, no. 1, pp. 67-72, 2022.

[5] A. Trisan, E. Rina, and H. Dewi, "Identifikasi Miskonsepsi Siswa pada Pembelajaran Kimia Menggunakan Metode Four-Tier Diagnostik Test di SMA Negeri 03 Kota Bengkulu," *Alotrop: Jurnal Pendidikan dan Ilmu Kimia*, vol. 6, no. 2, pp. 110-117, 2022, doi: 10.33369/alo.v6i2.25099.

[6] A. Baene and A. Lahagu, "Penerapan Model Pembelajaran Problem Solving dalam Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran IPS Terpadu di SMP Negeri 1 Gunung Sitoli Utara," *Jurnal Tunas Pendidikan,* vol. 6, no. 1, pp. 24-32, 2023, doi: 10.52060/pgsd.v6i1.1380.

[7] A. Suprijono, *Cooperatif Learning*. Yogyakarta: Pustaka Pelajar, 2012, ISBN: 9786028479103.

[8] I. H. Arif, A. Lukman, and Z. I. Tuara, "Penerapan Pendekatan Culturally Responsive Teaching Terintegrasi Etnokimia dalam Mengembangkan Keterampilan Siswa Abad 21 pada Materi Hidrolisis di MAN 1 Tikep," *Jurnal Ilmiah Wahana Pendidikan*, vol. 7, no. 2, pp. 194-204, 2021, doi: 10.5281/zonodo.4661844.

[9] S. McCloud, *Memahami Komik (terj. S. Kinanti)*. Jakarta: KPG (Kepustakaan Populer Gramedia), 2018, ISBN: 9789799023551.

[10] H. D. Ayu, S. Saputro, Sarwanto, and S. Mulyani, "Meta-Analysis of the Relationship Between Learning Media in Hybrid Learning and Critical Thinking and Creativity in Science," *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, vol. 8, no. 2, pp. 221-234, 2023, doi: 10.20961/jkpk.v8i2.66855.

[11] Suyatno, *Mengajar Pembelajaran Inovatif*. Sidoarjo: Masmedia Buana Pustaka, 2009, ISBN: 9786028503990.

[12] T. Taher, "Peningkatan Aktivitas Belajar Siswa Melalui Pembelajaran Kimia Berbasis Budaya Lokal," *Jambura Journal of Educational Chemistry*, vol. 1, no. 2, pp. 69-73, 2019, doi: 10.34312/jjec.v1i2.2667.

[13] H. Medita, N. Mukhamad, and M. Abdul, "Pengembangan Perangkat Pembelajaran Interaktif Kimia Menggunakan Media Chemical Domino Dintinjau dari Aktivitas dan Hasil Belajar Siswa," *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, vol. 3, no. 2, pp. 63-72, 2018, doi: 10.20961/jkpk.v3i2.20908.

[14] H. Oemar, *Metode Belajar dan Kesulitan Belajar*. Bandung: Tarsito, 2005.

[15] Nasution, *Diktatik Asas-Asas Mengajar*. Jakarta: Bumi Aksara, 2008, ISBN: 9789795262268.

[16] A. Syafi'i, T. Marfiyanto, and S. K. Rodiyah, "Studi Tentang Prestasi Belajar Siswa dalam Berbagai Aspek dan Faktor yang Mempengaruhi," *Jurnal Komunikasi Pendidikan*, vol. 2, no. 2, pp. 115-123, 2018, doi: 10.32585/jkp.v2i2.114.

[17] F. Solikhin and A. Wijanarko, "The Development of Android-Based Learning Media (Chemdroid) on The Topic Thermochemist to Improve The Students' Achievement," *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, vol. 6, no. 2, pp. 138-152, 2021, doi: 10.20961/jkpk.v6i2.46849.

[18] Soebiyanto, M. Masykuri, and Ashadi, "Pembelajaran Kimia Menggunakan Model Student Teams Achievement Division (STD) dan Team Games Tournament (TGT) Ditinjau dari Kemampuan Awal dan Gaya Belajar," *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, vol. 1, no. 1, pp. 52-66, 2016,

doi: 10.20961/jkpk.v1i1.10116.

[19] G. Gay, *Culturally Responsive Teaching: Theory, Practice, and Research*. New York: Teacher College Press, 2000, ISBN: 9780807750780.

[20] Y. Rahmawati, H. Baeti, A. Ridwan, S. Suhartono, and R. Rafiuddin, "A Culturally Responsive Teaching Approach and Ethnochemistry Integration of Tegal Culture for Developing Chemistry Students' Critical Thinking Skills in Acid-Based Learning," in *Journal of Physics: Conference Series*, vol. 1402, no. 5, pp. 1-6, 2019, doi: 10.1088/1742/6596/1402/5/055050.

[21] D. Huinker and C. Laughlin, "Talk Your Way into Writing," in *Communication in Mathematics K-12 and Beyond*, 1996.

[22] Fanilawati, Rusman, and Z. Fitri, "Penerapan Model Pembelajaran Think Talk Write (TTW) pada Materi Hukum-Hukum Dasar Kimia di Kelas X SMAN 1 Krueng Barona Jaya," *Jurnal Ilmiah Mahasiswa Pendidikan Kimia*, vol. 1, no. 4, pp. 97-104, 2016.

[23] S. Yamtinah, Hariyanto, Sukarmin, and S. Saputro, "The Science Learning Material Using PjBL Model Integrated with Science, Technology, Engineering, and Mathematics (STEM) Approaches to Enhance Students' Communication Skills," *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, vol. 5, no. 1, pp. 62-69, 2020, doi: 10.20961/jkpk.v5i1.39665.

[24] N. Trianto, *Model Pembelajaran Terpadu*. Jakarta: Bumi Aksara, 2010, ISBN: 9789790107809.

[25] V. B. Langngan, D. A. Tulandi, and T. Mandang, "Efektivitas Laboratorium Virtual sebagai Media Pembelajaran pada Eksperimen Viskositas," *Charm Sains Jurnal Pendidikan Fisika*, vol. 2, no. 2, pp. 88-93, 2021, doi: 10.53682/charmsains.v2i2.112.

[26] A. J. Winstead, P. C. McCarthy, D. S. Rice, and G. W. Nyambura, "Linking Chemistry to Community: Integration of Culturally Responsive Teaching into General Chemistry I Laboratory in a Remote Setting," *Journal of Chemical Education*, vol. 99, no. 1, pp. 402-408, 2022, doi: 10.1021/acs.jchemed.1c00494.

[27] I. Naniastuti, E. Nurvitasari, and I. Marlisa, "Perbandingan Model Pembelajaran Think Talk Write dan Make a Match terhadap Prestasi Belajar Kimia Siswa Kelas XI SMA YPK Merauke," *Musamus Journal Science Education*, vol. 1, no. 2, 2019, doi: 10.35724/mjose.v1i2.1699.

[28] L. Naimnule, O. Vinsensius, and U. R. S. Vinsensia, "Peningkatan Aktivitas dan Hasil Belajar Kognitif Siswa Melalui Penerapan Model Pembelajaran Think Talk Write (TTW) di SMUK," *Jurnal Pendidikan: Teori Pendidikan dan Pengembangan*, vol. 1, no. 10, pp. 2050 – 2053, 2016, doi: 10.17977/jp.v1i10.7622.

[29] D. N. Nugraha, "Pengembangan Komik Kimia sebagai Media Pembelajaran Berbasis CET (Chemo-Edutaiment)," *Chemistry in Education*, vol. 9, no. 2, pp. 84-90, 2020.

[30] I. N. Sinta, S. Wardani, and C. Kurniawan, "The Influence of Comic Media on Students's Concept Understanding on Chemical Bonding Materials," *International Journal of Active Learning*, vol. 6, no. 2, pp. 85-90, 2021.

[31] F. Affeldt, D. Meinhart, and I. Eilks, "The Use of Comics in Experimental Instructions in a Non-Formal Chemistry Learning Context," *International Journal of Education in Mathematic, Science, and Technology (IJMST)*, vol. 6, no. 1, pp. 93-104, 2018, doi: 10.18404/ijemst.380620.