EDUARTS
Jurnal Pendidikan Seni
https://journal.unnes.ac.id/journals/eduart
E-ISSN:2721-785X P-ISSN: 2252-6625
Volume 14 Issue 3 Year 2025 Page 1-14

IMPROVING TYPOGRAPHY MATERIAL COMPREHENSION THROUGH COLLABORATIVE LEARNING METHODS USING COGNITIVE DIAGNOSTIC ASSESSMENT IN JUNIOR HIGH SCHOOL (SMP) STUDENTS

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Received: *19 May 2025*
Revised: *12 August 2025*
Accepted: *19 August 2025*
Published: *1 September 2025*

Abstract. This study was motivated by the low level of understanding of typography theory among seventh-grade students at SMP Negeri 1 Singosari. The purpose of this study is to improve their comprehension of typography art material through the implementation of the collaborative learning method combined with cognitive diagnostic assessment. The research approach used is descriptive qualitative, employing a Classroom Action Research (CAR) design consisting of two cycles, each with stages of planning, implementation, observation, and reflection. The data sources for this study were 33 students from class VII-D, with data types including results from cognitive diagnostic assessment tests, student analysis outcomes, student creativity results, and records from each cycle. Data analysis results showed an increase in the average cognitive diagnostic assessment scores from 84.2 in the pre-action stage to 90 for skills scores and 82.6 for work analysis scores in Cycle I. These scores further improved to 93.3 for skills and 84.5 for analysis in Cycle II. The conclusion of this study is that the implementation of the collaborative learning method through cognitive diagnostic assessment can significantly enhance students' understanding of typography.

Keywords: Typography, Collaborative Learning, Diagnostic Assessment, Classroom Action Research

1. Introduction

The rapid advancement of the times is marked by the development of science and technology, making the focus on human resource development particularly in the field of education vitally important. According to Rahman et al (2022), education is a conscious effort to preserve cultural heritage. Quality education is reflected in the creation of a conducive learning environment. Such an environment is characterized by high educational standards and active participation from students in developing their potential, whether spiritually, morally, or intellectually. However, there are still students who struggle with critical thinking during the learning process, show a lack of concentration, and have not yet demonstrated optimal responsibility toward the tasks assigned by the teacher in class.

Another problem that arises during the learning process is students' difficulty in engaging in discussions or exchanging ideas with their classmates. In addition, the low level of student concentration in understanding the material delivered by the teacher poses a significant challenge. On the other hand, the teaching methods used tend to lack variety and are still focused on completing individual assignments. These conditions contribute to a learning atmosphere that is less conducive and tends to be monotonous for students. Meanwhile, in the context of modern education, the curriculum should be designed to support student-centered learning (Khofifah, 2020). To achieve this, it is necessary to implement

innovative and participatory learning methods, such as the collaborative learning method. This method is expected to enhance students' understanding of the material, encourage critical thinking skills, and overall contribute to improving the quality and outcomes of learning.

The implementation of engaging learning methods is believed to encourage students to become more active, independent, and skilled in critical thinking throughout the learning process. One of the key elements in delivering material is the learning method itself, as the appropriate method can shape students' thinking patterns to be more systematic and directed. One relevant method in this context is the collaborative learning method. According to (Purwati and Erawati, 2021, p. 38), collaborative learning is a method that encourages students to interact, cooperate, and share roles, tasks, and responsibilities in solving problems. This method emphasizes active student participation in exploring and understanding information relevant to the learning topic (Adisaka et al., 2022). Several advantages of collaborative learning, as noted by (Inah & Pertiwi, 2017), include: 1) students learn how to deliberate; 2) students learn to respect others' opinions; 3) critical and rational thinking skills improve; 4) it fosters a spirit of cooperation; and 5) it creates a healthy competitive atmosphere. Furthermore, (Mustopa & Rama, 2024) add that collaborative learning emphasizes core working principles, including: 1) each group member works together to achieve common goals and relies on one another; 2) students are responsible for their own learning process; 3) cooperative skills are directly practiced and evaluated through feedback; and 4) groups are encouraged to face learning challenges and engage in cohesive activities. According to (Fitriasai et al, 2020), collaborative learning also provides the advantage of knowledge exchange among students, which enhances overall understanding. Meanwhile, (Tenrisau, 2023, p. 10) highlights several benefits of the collaborative method, such as: 1) helping students gain a deeper understanding of the material; 2) offering shared knowledge and learning experiences; 3) stimulating learning interest; 4) promoting critical thinking; 5) enriching students' perspectives; 6) creating a comfortable classroom atmosphere that supports problem-solving; and 7) making the learning process more enjoyable.

In addition to the application of collaborative learning methods, another effort that can be made to improve students' understanding is through cognitive diagnostic assessment. According to (Puspita Rakhmi et al, 2023), cognitive diagnostic assessment is a process conducted prior to implementing a learning method in order to identify students' characteristics and obtain information about their level of understanding of the learning material. This assessment can take various forms, such as providing trigger questions, quizzes on basic knowledge, and so on.

Typographic material is a subject that can stimulate creative thinking skills, including knowledge of typographic functions, techniques for creating typography, and the procedures involved in producing typographic artworks. The application of collaborative learning methods can assist students in understanding the material presented. Particularly in Art and Culture subjects, an engaging and enjoyable learning method is necessary to prevent students from feeling bored, thereby supporting the achievement of the desired learning outcomes.

Based on observations conducted by the researcher at SMP Negeri 1 Singosari in the Art and Culture subject, it was found that many students exhibited disruptive behavior and lacked focus on their assigned tasks. This occurred because the learning process still relied on individual practical activities implemented by the teachers. As a result, most student work in class was not completed properly. According to an interview with the subject teacher of class VII-D, the difficulty in managing the classroom was due to the students' characteristics, as they were still in a transitional phase from elementary to junior high school.

Based on these issues, it is necessary to use an appropriate learning method to foster concentration and create a more conducive classroom learning environment. One approach that aligns with these conditions is the collaborative learning method supported by cognitive diagnostic assessment. Through this assessment, students are grouped according to their ability levels and cognitive characteristics, allowing for more effective and dynamic group learning particularly in typography material within the Art and Culture subject. Theoretically, the collaborative method supported by cognitive diagnostic assessment aligns with the Teaching at the Right Level approach, which emphasizes the importance of grouping students based on initial assessment results to classify their ability levels.

Previous research conducted by (Oktafiani et al, 2022), titled "*Collaborative Learning in Improving Mathematics Learning Ability at Madrasah Aliyah Miftahul Jannah Selatbaru, Bengkalis Regency,*" aimed to enhance students' learning motivation and critical thinking skills through the application of collaborative learning. Meanwhile, (Nursalam, 2016), in his study titled "*Diagnosis of Mathematics Learning Difficulties: A Study of Elementary School Students in Makassar City,*" sought to identify various learning difficulties experienced by students so that instructional strategies could be implemented more appropriately to improve learning outcomes. Furthermore, (Suarno, 2023), through his research entitled "*Implementation of Cognitive Diagnostic Assessment in the Independent Curriculum for English Subject in Grade XI/Phase F at Madrasah Aliyah Negeri Sorong City,*" aimed to identify students' initial understanding, explore their learning needs, and design appropriate instruction based on the results of cognitive diagnostic assessment.

Based on these considerations, it is necessary to implement a collaborative learning method to improve students' understanding of the material. The researcher, in this study, adopted the title: "*Enhancing Typography Material Comprehension Using the Collaborative Learning Method through Cognitive Diagnostic Assessment in Class VII-D of SMP Negeri 1 Singosari.*" The collaborative learning method is expected to enhance students' comprehension and their overall learning outcomes. The objectives of this classroom action research are as follows; 1) To implement the collaborative learning method through cognitive diagnostic assessment in order to improve students' understanding of typography material in class VII-D of SMP Negeri 1 Singosari. 2) To describe the results of implementing the collaborative learning method based on cognitive diagnostic assessment in enhancing students' understanding of typography material in class VII-D of SMP Negeri 1 Singosari.

Theoretically, this method aligns with the "Teaching at the Right Level" approach, which emphasizes the importance of grouping students based on initial assessment results to classify their learning levels. The main focus of the problem formulation in this study is to describe the stages of implementing the collaborative learning method designed based on the results of cognitive diagnostic assessment. To address this problem, the study begins with the administration of a cognitive diagnostic assessment to determine students' initial understanding of typography, followed by grouping students based on the assessment results. After that, collaborative learning activities will be designed and implemented within groups (such as discussions, project assignments, teamwork, and presentations), while monitoring and documenting the dynamics of implementation and students' active roles in the collaborative learning process.

Theoretically, this study is expected to contribute to the development of student-centered learning theories and serve as a reference for designing similar innovative learning strategies. The practical benefits of this research encompass several aspects. For students, it is expected to enhance a more meaningful and in-depth understanding of typography material. For teachers, the findings of this study can provide insights and new experiences in implementing collaborative learning methods based on cognitive diagnostic assessment in the classroom setting. As for the researcher, this study serves as a means to directly apply the theories and concepts acquired during academic studies into real-world practice.

This study is a type of Classroom Action Research (CAR) aimed at improving students' understanding of typography material through the implementation of a collaborative learning method based on cognitive diagnostic assessment. The research was conducted in class VII-D of SMP Negeri 1 Singosari during the even semester of the 2024/2025 academic year.

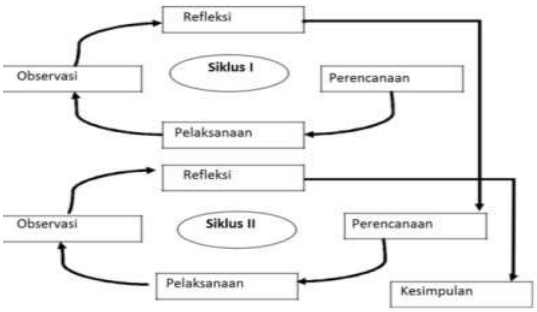

Figure 1. Research Model by Kemmis and McTaggart
Source: Maliasih et al., 2017

This research is a type of Classroom Action Research (CAR) aimed at improving students' understanding of typography material through the implementation of collaborative learning methods based on cognitive diagnostic assessment. The study was conducted in class VII-D at SMP Negeri 1 Singosari during the even semester of the 2024/2025 academic year**.** This cycle may continue into the next one if the results from the previous cycle have not yet achieved the predetermined success indicators. The stages in each cycle are described below:

a. Planning

At this stage, the researcher designs the action plan to be carried out. This includes preparing teaching modules, selecting the learning method to be used, and preparing assessment tools and learning media by implementing the collaborative learning method through cognitive diagnostic assessment.

b. Action

This stage is the implementation of the previously prepared plan. The teacher and researcher begin to apply the learning strategies or methods in the classroom according to the predetermined scenario. In this study, the learning design was carried out using the collaborative learning method, beginning with the administration of the cognitive diagnostic assessment. Based on the results of this assessment, the researcher formed study groups, whose members were selected by considering each student's skill level. The purpose of forming these groups was to gain an early picture of students' abilities and to ensure each group had a balanced composition, so that the collaborative learning process could run optimally.

c. Observation

The researcher, along with an observer, observed the learning process student behavior, participation, and reactions. Data were collected in the form of field notes, documentation, questionnaires, and observation sheets. This stage also serves as input and reflection for improving the next cycle of learning.

d. Reflection

In this stage, the researcher analyzes the results of the actions and observations to determine whether the learning objectives have been achieved. If the results are not optimal, the researcher will make improvements and prepare a revised plan for the next cycle.

The subjects involved in this study included the researcher, the seventh-grade Art and Culture teacher, Mr. Ahmad Burhanuddin Rabbani, and the students of class VII at SMP Negeri 1 Singosari, totaling 33 students—consisting of 8 male and 25 female students. The data collected in this study consisted of both qualitative and quantitative data. Qualitative data were obtained through student and teacher response questionnaires to assess the success level of the study and serve as evaluation material for the next cycle, as well as through documentation and interviews. Meanwhile, quantitative data were obtained from students' scores in learning typography material during the pre-action phase, Cycle I, and Cycle II. The primary data source in this classroom action research was the 33 students of class VII-D, specifically their scores in learning typography through the collaborative learning method supported by cognitive diagnostic assessment.

The data collection used by the researcher are explained as follows:

a. Questionnaries

The purpose of the questionnaires in this study was to identify any obstacles faced by the researcher during the learning process, which could be used as evaluation

materials for the next cycle.

b. Interviews

The type of interview used was a structured interview. This type was chosen to provide the researcher flexibility in asking questions, while still adhering to a set of prepared questions, and to give respondents (sources) the flexibility in answering.

c. Documentation

Documentation activities included the entire learning process, learning outcomes, and implementation of actions in Cycle I and Cycle II.

d. Cognitive Diagnostic Assesment Test

According to Nichols, as cited in Prihatni et al. (2016, p. 115), this is an evaluation instrument designed to analyze each individual's strengths and weaknesses in thinking processes, problem-solving, and concept mastery. It serves as a foundation for designing targeted and appropriate learning interventions tailored to each student's needs.

According to Rijali (2019, p. 84), data analysis is the effort to systematically search for and organize data such as observation records, interviews, and others to enhance the researcher's understanding of the problem being studied and to be shared as findings with others. The data analysis technique used in this study was a mixed-method analysis, involving both qualitative and quantitative data:

a. Qualitative Data

These were used to process the results of interviews with teachers and students, as well as to analyze observation tables of student and teacher activities.

b. Quantitative Data

These were used to process results obtained from student and teacher questionnaires, group evaluation rubrics, individual evaluation rubrics, diagnostic assessment test results, and students' achievement percentages.

2. Results and Discussion

This section presents the comprehensive data on the students' understanding of typography material in class VII-D at SMP Negeri 1 Singosari. The study was carried out in two cycles, preceded by a pre-action phase that served as the foundation for the implementation of the subsequent cycles. The applied teaching method was collaborative learning, based on the results of cognitive diagnostic assessments. The following is a breakdown of the results and discussion for each stage:

2.1 Pre-Action Phase

Before conducting the classroom actions, the researcher carried out initial observations and data collection in class VII-D to identify the actual learning conditions in the Art and Culture subject, particularly in typography. This pre-action stage aimed to determine the students' level of understanding of the material previously taught and to identify issues in the learning process. Observation results indicated that most students were not actively participating in the learning activities. There was limited student-to-student discussion, and most of the learning was still dominated by individual tasks. The classroom environment was not yet fully conducive; some students were unfocused, passive, and reluctant to express ideas or showcase their work.

Table 1. Results of Cognitive Diagnostic Assessment in the Pre-Action Phase

Average Score	84,24
Minimum Score	72
Maximum Score	100
Students Below Minimum Mastery Criteria (KKM)	9 Siswa
Success Rate (%)	27,28%
Students Meeting Minimum Mastery Criteria (KKM)	24 Siswa
Succes Rate (%)	72,72%

Source: Personal Document

From the table above, to obtain more objective data regarding students' understanding of typography, the researcher collaborated with the Art and Culture teacher to administer a cognitive diagnostic test. The results showed an average score of 84.24, with a maximum score of 100 and a minimum score of 72. Out of 33 students, 24 students (72.72%) met the minimum competency criteria (80), while 9 students (27.28%) did not.

Although the average score was relatively good, nearly one-third of the students had not yet achieved the expected competency, indicating a gap in understanding. Some students were still dependent on their peers, lacked initiative in exploring information, and had difficulty independently grasping the basic concepts of typography.

This condition served as the basis for implementing collaborative learning supported by cognitive diagnostic assessment. The assessment was used to map students' initial abilities and to form heterogeneous learning groups, allowing students with higher understanding to assist their peers. This approach aimed to create a more active, engaging classroom environment, and enhance overall student understanding of the typography material.

2.2 Cycle I

In order to improve the understanding of typography material among class VII-D students, the researcher chose to implement a collaborative learning method based on the results of cognitive diagnostic assessment. The learning activities were designed to take place over two meetings, with a total time allocation of three instructional hours. This method was chosen with the aim of encouraging collaboration among students and enhancing social interaction within groups. The syntax or steps for implementing the collaborative learning method in the first meeting, with a time allocation of one instructional hour, are described as follows:

Table 2. Explanation of Collaborative Learning Method Syntax

Sintak	Activity	Documentation
Orientation and Exploration (Schema Activation)	• Students answer questions from the teacher about the definition of typography, its brief history, and its role in modern typographic art. • Students take notes on key points and ask questions if anything is unclear.	

Social Interaction and Experimentation (Knowledge Construction)	• The teacher provides several key questions to assess students' understanding of the typography material	
Experimentation and Problem Solving (Accommodation and Assimilation)	• The teacher divides students into small groups and facilitates discussion. • Each group analyzes letter examples they find around them. • Group discussion to create typography collaboratively.	
Evaluation and Generalization	• Each group presents their project results to the teacher and classmates. • he teacher gives feedback to each group and reinforces key concepts.	

Source: Personal Document

Through the collaborative learning syntax in the first meeting, students not only gained a conceptual understanding of typography but also developed social, communication, and collaborative problem-solving skills.

In the second meeting, the learning activities were more focused on reinforcing typography concepts and applying student collaboration in the form of group projects. The session began with a brief review of the previous material by the teacher to remind students about the definition of typography, its brief history, and its function in modern typographic art. The syntax of the collaborative learning method implemented in the second meeting, with an allocated duration of two instructional hours, is explained as follows:

Table 3. Explanation of Collaborative Learning Method Syntax

Syntax	Activity	Documentation
Orientation and Exploration (Schema Activation)	• Students prepare their respective groups according to the teacher's instructions.	
Social Interaction and Experimentation (Knowledge Construction)	• Students divide tasks among group members based on the assignments given by the teacher.	
Experimentation and Problem Solving (Accommodation and Assimilation)	• Students begin working on the tasks according to their assigned parts.	
Evaluation and Generalization	• The teacher evaluates the implementation of the day's learning activities. • The teacher assesses the students' completed work.	

Source: Personal Document

2.3 Cycle II

Entering the second cycle, the learning process focused on enhancing students' understanding and skills in applying typography concepts more deeply. This cycle was designed based on reflections from the first cycle. Several aspects were identified for improvement, including time management, group member engagement, students' confidence in expressing ideas, and the accuracy in using typographic elements. Building upon the spirit of collaboration developed in the previous cycle, students were once again divided into small groups. In this cycle, the groups were tasked with exploring various visual media within the school environment or digital sources to identify interesting and effective uses of typography. The allocated time for Cycle II was three instructional hours, conducted over two meetings. The following is a breakdown of the syntax and learning activities during the first meeting of the second cycle:

Table 4. Explanation of Collaborative Learning Method Syntax

Syntax	Activity	Documentation
Orientation and Exploration (Schema Activation)	• Students answer questions from the teacher regarding the basic design principles in typographic art: legibility, readability, visibility, and clarity • The teacher provides visual examples (posters, logos, simple graphic designs) • Students take notes on key points and ask questions if anything is unclear.	
Social Interaction and Experimentation (Knowledge Construction)	• The teacher presents several key questions to assess students' understanding of typographic principles.	
Experimentation and Problem Solving (Accommodation and Assimilation)	• Students are divided into small groups by the teacher. • Each established group provides feedback on incorrect typographic designs. • Group discussion to propose improvements to the incorrect typographic design, accompanied by clear arguments.	

Evaluation and Generalization	• The teacher provides several key questions to assess how well students understand the principles of typography.	

Source: Personal Document

Through the application of collaborative learning syntax in the first meeting, students were not only guided to understand the concept of typography theoretically but also trained to develop social skills and teamwork abilities in solving problems collaboratively. In the second meeting, the learning activities focused on strengthening students' understanding of typography concepts while also fostering collaboration among students through group projects.

Table 5. Explanation of Collaborative Learning Method Syntax

Sintaks	Kegiatan	Foto
Orientation and Exploration (Schema Activation)	• The teacher begins organizing the students into their respective groups.	
Social Interaction and Experimentation (Knowledge Construction)	• The teacher assigns tasks to each team or group member.	
Experimentation and Problem Solving (Accommodation and Assimilation)	• The teacher monitors students' working methods and observes their learning process.	

Evaluation and Generalization	• The teacher assesses each group's analysis by having them present their results.. • The teacher provides feedback on the students' completed work.	

Source: Personal Document

2.4 Skill and Analysis Scores Cycle I

Table 6. Recapitulation of Typography Skills Scores for Food and Beverage Product Name Design

Group Name	Creativity & Aesthetics	Legibility & Clarity of Letters	Group Collaboration	Technique & Media Accuracy	Total Score	Percentage
Group 1	20	20	25	25	90	90%
Group 2	25	20	20	25	90	90%
Group 3	25	25	25	20	90	90%
Group 4	20	20	25	15	85	85%
Group 5	25	20	25	20	90	90%
Group 6	25	25	20	25	95	95%
Average					90	90%

Source: Personal Document

The overall results of Cycle I indicate that the collaborative learning method combined with cognitive diagnostic assessment had a positive impact on students' mastery of typographic design skills. This data can serve as the basis for improving learning in the next cycle, with a focus on enhancing technical aspects and legibility.

Table 7. Recapitulation of Typography Skills Scores for Food and Beverage Product Name Design

Group Name	Font Character & Style Analysis	Identifying Appealing Elements	Legibility Identification	Coloring & Ornamentation Technique Analysis	Reflection & Suggestions for Improvement	Total Score	Persentage
Group 1	20	18	15	15	15	83	83%
Group 2	18	20	15	15	15	83	83%
Group 3	18	15	15	18	15	81	81%
Group 4	18	18	15	15	15	81	81%
Group 5	18	18	15	18	15	84	84%
Group 6	18	18	15	18	15	84	84%
Average						82,6	82,6%

Source: Personal Document

In summary, the results of Cycle I show that the implementation of collaborative learning supported by cognitive diagnostic assessment can improve students' basic typography skills. However, to achieve more significant improvements in Cycle II, it is necessary to strengthen visual analysis skills and provide guidance to improve students' reflective abilities regarding their creative processes.

2.5 Skill and Analysis Scores Cycle II

Table 8. Recapitulation of Typography Skills Scores for Food and Beverage Product Name Design

Group Name	Creativity & Aesthetics	Legibility & Clarity of Letters	Group Collaboration	Technique & Media Accuracy	Total Score	Persentage

Group 1	25	20	25	25	95	95%
Group 2	25	25	20	25	95	95%
Group 3	20	25	25	20	90	90%
Group 4	25	25	20	25	95	95%
Group 5	25	25	20	25	95	95%
Group 6	20	20	25	25	90	90%
Average					93,3	93,3%

Source: Personal Document

The average score in Cycle II was 93.3%, showing a significant improvement from the 90% recorded in Cycle I. This increase reflects the success of the collaborative learning strategy and the use of cognitive diagnostic assessments, which allowed the teacher to provide targeted feedback. Therefore, since the learning goals had been achieved effectively, no further cycle was necessary.

Table 9. Recapitulation of Typography Skills Scores for Food and Beverage Product Name Design

Group Name	Font Character & Style Analysis	Identifying Appealing Elements	Legibility Identification	Coloring & Ornamentation Technique Analysis	Reflection & Suggestions for Improvement	Total Score	Persentage
Group 1	20	15	15	20	15	85	85%
Group 2	20	10	15	20	18	83	83%
Group 3	20	15	15	15	20	85	85%
Group 4	20	18	15	15	15	83	81%
Group 5	20	20	15	15	15	85	85%
Group 6	20	18	15	15	18	86	86%
Average						84,5	84,5%

Source: Personal Document

The average score of 84.5% in typography work analysis indicates that the learning actions taken in Cycle II successfully enhanced students' ability to create and analyze typographic works collaboratively through cognitive diagnostic assessment. As a result, the action was concluded at this cycle, having met the success indicators optimally.

3. Conclusion

Based on the results of the classroom action research carried out over two cycles, it can be concluded that the implementation of the collaborative learning method supported by cognitive diagnostic assessment successfully improved students' understanding of typography material in class VII-D of SMP Negeri 1 Singosari.

In the pre-action phase, the percentage of students who passed the cognitive diagnostic assessment test was 72.7%, with an average score of 84.24. In Cycle I, the average score for practical skills reached 90, while the analysis score reached 82.6. In Cycle II, the skill score rose to 93.3, and the analysis score reached 84.5.

This increase shows that the method used was not only capable of accurately identifying students' initial learning difficulties through cognitive diagnostic assessment but also encouraged active participation and collaboration among students in understanding the material. Therefore, this method is feasible to be adopted as an alternative learning strategy, particularly for conceptual and practical subjects.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest in the publication of this article.

Funding Information

None

Acknowledgement

The authors would like to express their sincere gratitude to all informants who were involved in this research.

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