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The application of the chunking technique combined with writing is thinking to improve communication skills

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ABSTRACT

The student's cognitive load is high, and the level of thinking and communication skills is low. So, the chunking technique combined with writing thinking is implemented. The purpose of this study was to determine the difference in communication skills of students of circulatory system material taught with chunking techniques combined with writing is thinking, chunking techniques, and lecture techniques in class XI students of SMA Negeri 20 Gowa in the 2024/2025 school year. This type of research includes experiments in the form of a pretest, posttest, and nonequivalent control group design. Sampling technique with purposive sampling with specific consideration in the form of almost the same initial ability of students from three treatment classes where class XI. 1 (experimental class), XI.2 (positive control class), and XI.3 (negative control class), each of which totaled 30 students. Data acquisition using non-test instruments to see students' communication skills and teaching module implementation sheet. Hypothesis testing uses the Anacova test because the data is normally distributed and homogeneous. The results of hypothesis testing showed that the significance value was <0.000. This shows the sig value < α (0.05), so it can be concluded that H_0 is rejected and H_1 is accepted. This means that there are differences in the communication skills of students who are taught with chunking techniques combined with writing thinking (experimental class), chunking techniques (positive control class), and lecture techniques (negative control class) on human circulatory system material.

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Keywords
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INTRODUCTION

Education plays a vital role in improving the quality of human life. The essence of the purpose of education is to develop children's abilities, skills, and character so that they can participate in the life of a democratic nation. Moreover, education is expected to allow individuals to recognize their potential and develop their creativity (Puspita & Andriani, 2021). The skills people need in the 21st century are communication skills and mastery of information technology (Tican & Deniz, 2020). The relevance of information communication is not only due to the rapid development of information technology but also the need for more practical knowledge exchange and communication between

learners in the educational process (Shetelia et al., 2024). From the explanation above, the quality of good learners is that learners must have the ability to support communication skills.

Communication skills are conveying and receiving messages clearly, effectively, and appropriately. These skills cover a wide range of aspects, from the use of words to body expressions and the ability to listen to and understand other people's messages (Saraih et al., 2022). Communication skills are key elements in various life contexts, including personal relationships, work, education, and social life. Good communication skills are indispensable in multiple aspects of life, in interpersonal relationships, and in the learning process (Jamaluddin *et al.*, 2023).

Students' communication skills are low, especially in South Sulawesi (Jamaluddin et al., 2024). Another study found at SMK Kartini Jember concluded that the level of communication was low, such as students were reluctant to express their opinions and channel their ideas, so their communication skills were still lacking (Alfiyansyah et al., 2021). Currently, there are still many obstacles to communication, especially with regard to the reality of high school students in the Piyungan sub-district. Based on interviews with one of the biology teachers, the criteria for communication skills are low (Putra & Jamal, 2020). This is in line with observations and interviews with one of the biology teachers at SMA Negeri 20 Gowa, who stated that students' cognitive load is high, and their level of thinking and communication skills is low.

Several factors cause learners to have low communication skills. Some of them involve social, cultural, educational, and environmental aspects, such as lack of practice and experience, lack of facilities, discomfort or anxiety, lack of feedback, different learning styles, untrained listening skills, lack of cultural awareness, and most importantly the absence of role models for learners in fostering communication skills. In addition, the role of educators in empowering communication skills is less considered (Jamaluddin et al., 2024). This is supported by research by Carrion et al. (2024), which suggests that one way to improve learners' communication skills is to provide training programs centered on improving evidence-based communication developed for learners in senior high schools. Effective communication is crucial to enhancing learners' skills, and factors influencing message interpretation, such as language, culture, and values, must be considered. However, applying learning techniques based on learning dimensions can improve learners' communication skills, namely, the *chunking* technique combined with *writing thinking*.

The chunking technique is the information being broken down into smaller "chunks" for easy recall and understanding (Yasri & Piwat, 2021). By grouping frequently occurring words, the brain can absorb more information, processing each word in a sentence individually, and the brain will process chunks of words. Thus, learners learn ready-made phrases and expressions that can be used in everyday conversation and understood by native speakers (Shchegoleva, 2022). One way to understand the learning material well is by explaining it simply, namely by *writing and thinking*. This technique includes writing concepts on paper using their own words or language simply as if they were going to teach it to someone else.

Biology subjects have many complex terms and materials that learners find difficult to understand (Syamsurizal & Ardianti, 2021). The abstract nature of biological concepts and the many unfamiliar terminology contribute to students' difficulties (Farahani et al., 2023). Grade XI high school students are required to learn the material of the human circulatory system. Based on an

interview with one of the biology teachers at SMA Negeri 20 Gowa Regency, the material on the human circulatory system is the material that is quite difficult for students to understand because the organs studied cannot be seen directly by students, require a high level of understanding because it is difficult to convey in verbal language. The process that occurs in it is also tricky if observed directly (Jauharati et al., 2022). Based on the description that has been presented, research was conducted on the application of *chunking techniques* combined with *writing thinking* to improve the communication skills of SMA Negeri 20 Gowa students in learning the human circulatory system.

METHOD

The approach used in this research is Quantitative. The type of research used in this research is *quasi-experiment,* with the design used being a pretest-postest *nonquivalent control group design*. Furthermore, the two classes were given a test before learning activities (*pretest*) and a test after teaching activities (*posttest*). The population of this study were all students of class XI SMA Negeri 20 Gowa Regency, consisting of six study groups with a total of 200 students.

The sampling technique in this study was *purposive sampling*. In this study, the sampling technique was used based on the ability of students who were not much different between the experimental group and the control group, which was described as class XI.1 (experimental), class XI.2 (positive control) and class XI.3 (negative control) with the number of students in each class of 30 people.

This study uses data collection techniques in the form of non-tests, namely *subjective rating scale* questionnaire sheets containing 22 statements. Communication skills consist of verbal communication, including oral and written communication. Nonverbal communication includes sign language, and interpersonal communication includes verbal or nonverbal communication referring to the indicators made.

The instrument used is a questionnaire consisting of 22 items with a Likert scale with categories of 4 (Always), 3 (Often), Rarely (2), and 1 (Never). The instrument resulted from modifications developed by Jahidin (2022) consisting of several skill components: verb communication (oral and written), nonverbal communication, and interpersonal communication. The following lattice of *subjective rating scale* questionnaire is presented in Table 1.

This study's data processing stages are descriptive analysis and inferential statistics (Anacova test). Before conducting this inferential statistical test, several prerequisite tests were carried out, namely the normality and homogeneity tests. The decision-making provisions of the data that have been analyzed are made by looking at the significance of the value. If the α value >0.05, then the research data is normally distributed and homogeneous, but if the α value <0.05, then the research data is declared not normally distributed and not homogeneous. The decision-making provisions in the Anacova test are if the sig value> α, then H_0 is accepted, meaning that there is no significant difference, and if sig < α, then H_1 is accepted, meaning that there is a substantial difference with the level α = (0.05).

The syntax procedure for the chunking technique proposed by Risakotta (2022) includes: Preparation: provide a learning video about the human circulatory system. Reviewing reading strategies: The teacher discusses specific text parsing strategies before asking learners to paraphrase

the text. *Chunking* text: the learning video that has been *chunked* from the subject matter of the human circulatory system into sub-materials, including blood components, types of blood groups, blood clotting mechanisms and blood transfusions, the structure of the human heart, various blood vessels, the circulatory cycle, disorders of the circulatory system and treatment technology in the circulatory system. Next, learners watch a video that explains the concept of the circulatory system in humans, which has been *chunked*. Paraphrasing meaning: learners have to rewrite the "chunks" in their own words. At the end of this activity, learners have a paraphrased version of the video written on a *writing* sheet. Assessment and sharing: the teacher asks learners to compare their written versions of the video with their group mates. This step often leads to an interesting discussion about interpreting the meaning of different concepts in the exact words.

Table 1. Lattice of questionnaire subjective rating scale communication skills

Components of Communication Skills	Aspects assessed	Indicators	Number of Statements
Verbal Communication	Oral Communication	Can express opinions and listen to the views of others	2
		Mastering the material or topic to be delivered	2
		Conveys information systematically and clearly	1
	Written Communication	Present the results of the discussion in an appropriate written form	1
Non-Verbal Communication	Sign Language	Make eye contact	1
		Reading body language	2
Interpersonal Communication	Verbal or non-verbal communication	Skills to maintain good manners	4
		Fast response	2
		Attention and Care	5
		Silence	2
Number of questions			**22**

(Jahidin, 2022)

The syntax procedure in the *writing thinking* technique proposed by Holly & Carver (2022) includes learners writing the topic or concept they want to learn on paper. Next, learners explain the idea using their own words or simple language as if they are teaching others. Then, learners review and re-identify concepts not yet known from the previous process. Suppose they have difficulty with a part of the concept. In that case, they re-identify the idea using some literature, re-read it using some literature, and conduct discussion activities between students and students and students and teachers until it is fully understood. If learners still use many complex terms or language in their explanation, rewrite it with simpler terms or language so that they are sure others can understand their explanation. Next, learners are asked to present the concepts they understand in front of the class or other groups.

RESULTS AND DISCUSSION

Assessment of learners' communication skills used before and after learning is measured using a communication skills questionnaire. The communication skills questionnaire consists of 22 statement items. Then, students are asked to provide answers, and each answer is given a score. The results of the acquisition of communication skills data can be seen in Table 2 below

Table 2. Distribution of descriptive statistical values of students' communication skills in experimental and control classes

Statistics	Communication Skills					
	Experiment (*Chunking* Technique Combined with *Writing is Thinking*)		Control			
			Positive Control (*Chunking* technique)		Negative Control (Lecture Technique)	
	Pretest	*Posttest*	*Pretest*	*Posttest*	*Pretest*	*Posttest*
Sample Size	30	30	30	30	30	30
Average	59	83	52	75	48	65
Std. Deviation	4.93	7.56	4.73	10.99	5.47	7.79
Lowest Score	50	64	43	47	38	52
Highest Score	69	100	65	94	64	82

Table. 2 shows that the average communication skills of students before learning in the experimental class through the *Chunking* Combined *Writing is Thinking* technique of students is 59 and after learning, 83. The standard deviation before applying the *Chunking* Combined *Writing is Thinking* technique is 4.93; after the application, it becomes 7.56. The lowest score before using the *Chunking* Combined *Writing is Thinking* technique was 50, and the highest was 69. Meanwhile, for the acquisition after the application, the lowest score was 64, and the highest score was 100.

Students' communication skills in the positive control class before learning through the *Chunking* technique can be described as students' average communication skills before the application is 52 and after the application becomes 75. The standard deviation before the *Chunking* technique is 4.73; after the application, it becomes 10.99. The lowest score before applying the *Chunking* technique was 43, and the highest was 65. As for the acquisition after the application, the lowest value is 47, and the highest value is 94. Students' communication skills in the negative control class before learning through the lecture technique can be described as students' average communication skills before the application is 48 and after the application becomes 65. The standard deviation before the lecture technique is 5.47; after the application, it becomes 7.79. The lowest score before applying the lecture technique was 38, and the highest was 64. As for the acquisition after the application, the lowest value is 52, and the highest value is 82.

Table 3. Frequency and percentage distribution of pretest and posttest scores of communication skills of learners in experimental and control classes

Interval Value	Category	Class											
		Experiment (*Chunking* Technique Combined with *Writing is Thinking*)				Positive Control (*Chunking* technique)				Negative Control (Lecture Technique)			
		Pretest		*Posttest*		*Pretest*		*Posttest*		*Pretest*		*Posttest*	
		F	%	F	%	F	%	F	%	F	%	F	%
80-100	Very good	0	0	21	70	0	0	9	30	0	0	2	6.67
60-79	Good	13	43.33	9	30	2	6.67	18	60	1	3.33	22	73.33
40-59	Medium	17	56.67	0	0	28	93.33	3	10	27	90	6	20
20-39	Low	0	0	0	0	0	0	0	0	2	6.67	0	0
0-19	Very Low	0	0	0	0	0	0	0	0	0	0	0	0

More details about the Frequency and Percentage Distribution of *Pretest* and *Posttest* Scores of Communication Skills of Learners in Experimental and Control Classes can be seen in Figure 1.

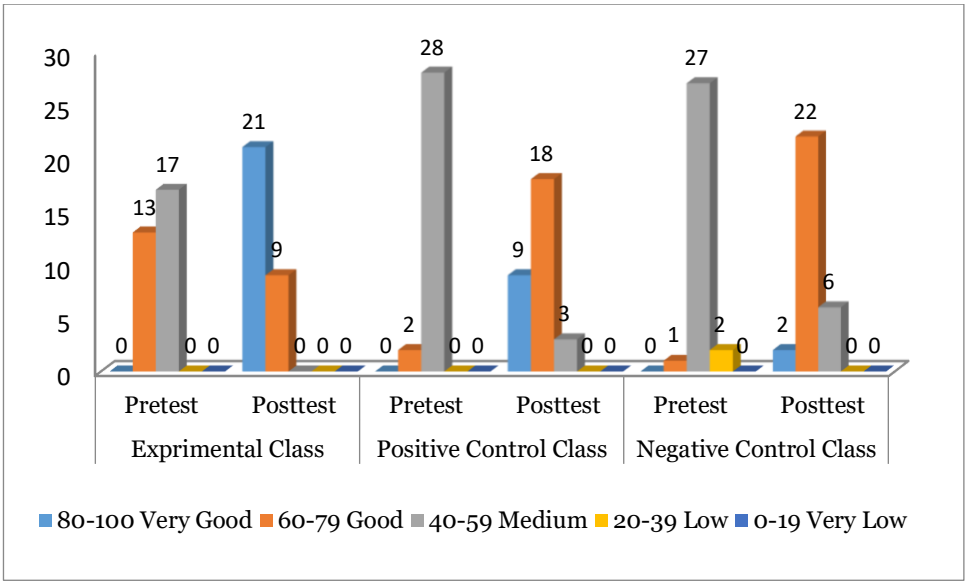


Figure 1. Frequency distribution diagram of communication skills of experimental and control class students

In Figure 1, it can be seen that the frequency of communication skills through the *Chunking* Combined *Writing is Thinking* technique before implementation can be described that 13 students are in a good category with a percentage of 43.33%, and 17 students are in the medium category with a percentage of 56.67%. Furthermore, after the application, 21 learners were in the excellent category with a percentage of 70%, and 9 were in the good category with a percentage of 30%.

The positive control class treated with the *Chunking* technique before the application shows that two learners are in a good category with a percentage of 6.67% and 28 learners in the moderate category with a percentage of 93.33%. Furthermore, after the application, it can be described that 9 students are in the excellent category with a percentage of 30%, 18 students in the good category with a percentage of 60%, and 3 students in the moderate category with a percentage of 10%.

Whereas in the negative control class, which was treated with the Lecture technique before the application, it can be described that 1 learner was in the good category with a percentage of 3.33%, 27 learners were in the medium category with a percentage of 90% and 2 learners were in the low category with a percentage of 6.67%. Furthermore, after the application, it can be described that 2 students are in the excellent category with a percentage of 6.67%, 22 students in the good category with a percentage of 73.33%, and 6 students in the medium category with a percentage of 20%.

Before conducting this inferential statistical test, several prerequisite tests were carried out, namely the normality and homogeneity tests. The provisions for making decisions from the data that have been analyzed are by looking at the significance value if the α value> 0.05, then the research data is normally distributed, but if the α value <0.05, then the research data is declared not normally distributed. The results of the normality test in this study can be seen in Table 3.

Based on Table 4, it can be seen that the results of the normality test on the results of students' communication skills from the *pretest* and *posttest* scores in the experimental and control classes show a significance value above 0.05, which means that the cognitive load data, level of thinking and communication skills of class XI at SMA Negeri 20 Gowa Regency by applying the *Chunking*

technique combined with *Writing is Thinking*, *Chunking* technique and Lecture technique have normally distributed data.

Table 4. Results of pretest and posttest normality test of cognitive load, thinking level, and communication skills

Variables	Data	Sig	Sig Level (α)	Conclusion
Communication Skills	*Pretest* Experiment	0,543	> 0.05	Normal
	Experimental *Posttest*	0,456		Normal
	Positive Control *Pretest*	0,581		Normal
	Positive Control *Posttest*	0,077		Normal
	Negative Control *Pretest*	0,170		Normal
	Negative Control *Posttest*	0,367		Normal

The homogeneity test was carried out to know whether the samples used, namely class XI.1 (experimental class), XI.2 (positive control class), and XI.3 (negative control class) came from a homogeneous population variance. The provisions for making decisions from the data that have been analyzed are carried out by looking at the significance value. If the α value> 0.05, then the research data is homogeneous, but if the α value <0.05, then the research data is not homogeneous. The results of the homogeneity test in this study can be seen in Table 4.

Table 5. Results of homogeneity test of cognitive load, thinking level, and communication skills

Variables	Sig	Sig level (α)	Conclusion
Communication Skills Pretest	0,846	> 0,05	Homogeneous
Communication Skills *Posttest*	0,393		Homogeneous

Based on Table 5, it can be seen that in the calculation of data management for testing the homogeneity of variance using *SPSS for Windows* 23.0 the data obtained can be described as the value of the communication skills questionnaire on the *pretest* shows that sig 0, 393> 0.05 while the posttest shows that sig 0.846> 0.05 It can be concluded that communication skills through *chunking* techniques combined with *writing is thinking*, *chunking* techniques and *lecture techniques* are homogeneous.

Based on the results of hypothesis testing it shows that the significance value is <0.000. This shows the sig value < α (0.05), so it can be concluded that H_0 is rejected and H_1 is accepted. This means there are differences in the communication skills of students taught with *chunking* techniques combined with *writing thinking*, *chunking* techniques, and lecture techniques on human circulatory system material.

Table 6. Hypothesis test results (anacova) communication skills of learners

Test of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Corrected Model	4923.838[a]	3	1641.279	30.906	.000
Intercept	4591.125	1	4591.125	6314.681	.000
PretestKom	538.100	1	538.100	13.882	.000
Class	2811.212	2	1405.606	17.455	.000
Error	6925.284	86	80.527		
Total	514655.000	90			
Corrected Total	11849.122	89			

Based on the research data analysis, the research discussion is intended to explain the results of related research in the form of students' communication skills. Experimental study on differences in students' communication skills through *chunking* techniques combined with *writing is thinking*, *chunking* techniques, and lecture techniques in the Biology subject of Blood Circulatory System Material Class XI SMA Negeri 20 Gowa Regency which consists of 5 meetings including 1 meeting for *pretest*, 3 meetings for the learning process and 1 meeting for *posttest*.

The communication skills of students in the *chunking* technique combined with *writing is thinking*. *After applying* these techniques, the number of students in the very good and good categories is more dominant. At the same time, no students are in the medium, low, and very low categories. This is because there are discussion activities when applying learning techniques. This activity is carried out in groups that stimulate students to convey concepts understood in writing, orally and interpersonally. This is in line with research conducted by Nujumi et al (2021), which suggests that discussion group guidance has a significant influence in improving students' communication skills.

Meanwhile, communication is not limited to forms of communication that use verbal language alone; it also includes facial expressions, images, and technology. In addition, the form of communication carried out in the application of the *chunking* learning technique combined with *writing is thinking* is the rewriting of concepts understood from the material presented through the learning video shown and has been in small *chunks* during the learning process. This aligns with research conducted by Smith (2024) suggesting that combining audio, video and animation elements used in learning can improve storytelling skills or narrative techniques. In addition, the utilization of media in education is significant and should be considered by teachers to facilitate learners' academic progress (Kerimoglu, 2024).

This writing can be in summaries, explanations, and even questions. Writing can improve productive skills such as speaking (Saqr et al., 2021). The questions in the *writing* sheet stimulate learners to think and discuss to solve problems of concepts that have not been understood. Furthermore, the teacher provides *feedback* and guidance that improves students' communication skills, increases understanding of concepts, and makes learning more effective and meaningful. This is in line with research conducted by Ghane et al. (2024) that giving *writing thinking* sheets to students is a form of teacher feedback to find out a deeper understanding of the strengths and weaknesses of students in conveying material information obtained, helping to improve student's communication skills and is very effective for teaching in the long term. Learners who write and use their own words to express understood information related to the material tend to understand concepts, objects, or information strongly. This is supported by research by Afonso et al. (2024), which states that more familiar words are preferred over new words that are unfamiliar to learners, so good concept understanding can encourage improving quality communication skills.

Discussion activities on the application of *chunking* techniques combined with *writing is thinking* can improve students' communication skills. This is because the distribution of human circulatory system material *chunked* by the teacher and written on the *writing is a thinking* sheet. Students are encouraged to present as if the material will be taught to others. This is in line with the idea of Kannan et al. (2022) that discussion activities are an effort to improve the communication

skills of students and instructors in the learning environment and involve students effectively. Discussion and presentation activities are part of reflection during the learning process that encourages active learning and develops thinking and argumentation skills. As a result, communication skills such as listening, speaking, writing, and coding or symbols can be improved (Talavera et al., 2024).

The communication skills of students improved with the application of the *chunking* technique, resulting in students being categorized as medium, with no students falling into the low or very low categories. This is because *chunking* the material can increase students' understanding, especially students who are classified as low-ability in conveying the information obtained. Chunking material based on learning videos stimulates learners to improve communication skills, including listening, speaking, and writing skills related to the material taught by the teacher. This is supported by Risakotta's research (2022) that doing a section on the material can help improve learners' skills and understanding. This aligns with Radiusman's (2020) idea that learners' conceptual understanding of the material is essential for developing overall communication skills.

The communication skills of students improved with the lecture technique, showing a more dominant presence in the medium category compared to the chunking technique, with no students falling into the low or very low categories. So it can be concluded that applying the *chunking* technique is more effective than the lecture technique. This is because the lecture technique used in this study combines discussion, question and answer, and assignment activities to improve students' communication skills. This is supported by Lediana's research (2024), which suggests that lecture, discussion, and question-and-answer techniques can be used to develop students' interpersonal skills. By using discussion, learning will focus on learners and be required to be confident in communicating, expressing opinions, and respecting other people's differences of opinion (Farahian et al., 2022).

The hypothesis proposed by the researcher states that there are differences in students' communication skills between the *chunking* technique *combined with writing thinking*, *chunking* technique, and lecture technique. Applying the *chunking technique combined with writing thinking* provides a greater value for communication skills than the *chunking* technique and lecture technique. This is due to the *chunking* technique combined with *writing thinking,* which can improve communication skills, both oral and written. This technique enhances the ability to write by thinking through impressions (listening, criticizing, and alternative solutions). The results of the impressions are communicated through a discussion presentation. This technique also facilitates learners in practicing speaking and writing Indonesian fluently. This technique is based on the understanding that learning is a social behavior that encourages learners to think, talk, and then write down concepts understood from the material shown (Rosdiana, 2020).

According to Sairo (2021), writing activities using the *chunking* technique combined with *thinking are* practical tools for improving students' writing competence. Learners who use this tool will become more effective, faster, and more efficient in generating more detailed ideas and compiling them into more organized paragraphs than those who use conventional methods. Learners can improve significantly in connecting ideas, which directly affects the unity of their writing

products, thus improving learners' communication skills by integrating multiple dimensions towards an overarching vision of meaningful learning for learners (Huang et al., 2024).

CONCLUSION

The communication skills of students in class XI SMA Negeri 20 Gowa Regency, combined with the *chunking* technique and *writing and thinking,* show that students have an average score of 83. *The chunking* technique obtained an average value of 75. In comparison, the lecture technique obtained an average value of 65. So, it can be concluded that there is a difference in the load of students' communication skills through the *chunking* technique combined with *writing and thinking*. The *chunking* technique and the lecture technique show that the significance value is 0.000 <0.05.

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