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Strengthening Multimodal Literacy and Self-Talk in Learning Research Methodology: A Factorial Design Study on the English Language Education Students

Yusti Arini [1*], Ika Sulistyarini [1], Ambar Winarti [2], Maria Wulandari [1], Sabariyanto [1]
[1] *UIN Raden Mas Said Surakarta, Indonesia*
[2] *Universitas Muhammadiyah Klaten, Indonesia*

yustiarini@gmail.com*

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ABSTRACT

This research aims to analyze the effect of strengthening multimodal literacy and self-talk in learning research methodology as well as the interaction effect of these two variables. This research is a pre-test and post-test control group experimental design with a 2 x 2 factorial design. The research subjects were selected using the Cluster Random Sampling technique; one experimental group with 31 students given a multimodal learning approach and one control group with 33 students given a monomodal learning approach. Data in this study were collected using achievement tests and self-talk questionnaire. The experimental group received nine sessions of treatment involving multimodal literacy and self-talk reinforcement. For the control group, treatment was also given 9 times using monomodal media and without self-talk reinforcement. The data were analyzed using descriptive statistics, Shapiro-Wilk test and Levene test for pre-requisite test, and Two-Way ANOVA for hypothesis testing. The results show that there is no significant influence of the learning approach or self-talk reinforcement on research methodology competence; however, there was an interaction effect between the two variables. Thus, it is important to conduct research methodology learning that combines a multimodal learning approach using various techniques and media with self-talk reinforcement.

Keywords: Research Methodology Subject, Multimodal Literacy, Self-Talk, Factorial Design, Interaction Effect

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INTRODUCTION

Higher education in Indonesia requires students to conduct research; therefore, mastery of research methodology is essential to distinguish between various types of research. Basically, research methods can be divided into several types, including quantitative, qualitative, basic, applied, evaluation, descriptive, explanatory, experimental, non-experimental, ex post facto, surveys, case studies, and action research which have their own characteristics, weaknesses, and advantages (Firdaus et al., 2021).

Research Methodology is the science of studying how research is conducted scientifically and how to solve research problems systematically by applying various logical steps. Methodology helps to understand not only the product of scientific investigation but also the process itself. Research methodology aims to describe and analyze methods, highlight their limitations and resources, clarify their presuppositions and consequences, and relate their potential to the twilight zone at the 'frontier of knowledge' (Patel & Patel, 2019).

Another concept states that scientific research methodology is a set of principles, procedures, and techniques that researchers use to investigate phenomena and answer

research questions. This methodology provides a structured and systematic approach to conducting research, which increases the reliability, validity, and generalizability of research findings; therefore, researchers must choose an appropriate research methodology based on the nature of the research question and the data collection process (Bahishti, 2022).

Next, there is the term "choice paradigm" emphasized by Patton. The choice paradigm rejects methodological orthodoxy and supports methodological appropriateness as the primary criterion for assessing methodological quality. Thus, this choice paradigm recognizes that different methods are suitable for different questions (Molina-Azorin, 2016). Based on this description, it can be concluded that there are various types of research methods with their respective specifications. Researchers must understand the research methodology well in order to determine which type of research and design is appropriate so that the research results are also valid and trusted.

Meanwhile, a number of courses containing research material are often considered as difficult courses by students of the English Language Education study program at UIN Raden Mas Said Surakarta. During several years of teaching courses on research methodology, such as Introduction to Research Methodology, Quantitative Research in ELT, or Qualitative Research, the researcher observed that many students still experience difficulties mastering this material; even though this material is very important for students to master as an urgent requirement to be able to compile their final thesis assignment until completion. This could be because the material on research is indeed difficult material and requires the lecturer's skills to apply the right strategies and media in the learning process.

Based on interviews with students, lectures containing research materials usually only use a monomodal learning model with textbook media as well as lecture methods and assignments without any feedback from lecturers. As a result, students often have difficulty in the process of compiling their theses, especially in determining the research method or design to be used, including the type of research, samples/subjects and sampling techniques, data collection techniques and instrument.

Furthermore, in the learning process, one of the important issues today is multimodal literacy. Multimodal literacy is an essential skill that must be mastered by students in the millennial era. This era requires students to master not only basic reading, writing, and mathematics but also new literacies, namely data, technology, and human literacy (Firmansyah, 2019). To support the development and analysis of these skills, fundamental concepts of multimodality are predominantly understood and analyzed through the most widely cited Multimodal Discourse Studies literature, which continues to direct global scholarly inquiry from multiple perspectives (H. Liu et al., 2024). Considering this necessity, educational frameworks must move beyond favoring specific modes to ensure students become proficient in the analysis, design, and creation of multimodal texts. Instead of prioritizing traditional formats, these frameworks should equip educators with a comprehensive metalanguage that encompasses all forms of meaning-making (Brosseuk & Downes, 2024).

Kress states that over the past two decades, the concept of multimodality has received much attention from language educators and researchers both in and outside of ELT contexts. The term multimodality refers to an individual's use of multiple modes for the purpose of conveying meaning. These modes can be linguistic, visual, aural, gestural, or spatial (Kessler, 2022). Many educators may not be aware of the extent to which they rely on and utilize different modes as part of their pedagogical toolkit, using storyboard activities, picture description tasks, flashcards, audio and video-based files, multimedia projects, and other multimodal materials. Therefore, according to Jewitt, given the large number and variety of multimodal tasks in academia and beyond, having multimodal literacy or 'multiliteracies' is considered crucial (Kessler, 2022).

Jewitt and Kress also proposed that in educational settings, the importance of developing multimodal literacy to help learners construct meaning from texts that

integrate multiple semiotic sources is now widely recognized (Camiciottoli & Fortanet-Gómez, 2022). Multimodal approaches have been identified as learner-friendly second language teaching strategies because the integration of different learning materials and methods ensures a variety of learning experiences that result in memory retention, increased enthusiasm, motivation, and improved comprehension that can significantly contribute to learner performance (Wijewantha, 2021).

According to Street et al., the use of new media resources widely available on online platforms (e.g., websites, blogs/forums, TED Talks, digitally distributed film genres) encourages learners to make meaning from the multiple semiotic modes (e.g., verbal, visual, aural, spatial, and gestural) that are characteristic of these resources. Furthermore, the effective use of multimodal and multimedia resources in the classroom is now seen as an important strategy in engaging increasingly digitally savvy learners (Camiciottoli & Fortanet-Gómez, 2022).

Furthermore, previous studies have shown that using a multimodal approach to teaching and learning writing enhances students' engagement by enhancing their meaning-making abilities with the use of technology as a tool (Ria et al., 2022). Language learners must learn how to utilize semiotic modes beyond verbal messages to effectively enhance their awareness and facilitate comprehension. This study briefly defines the modes and issues of how multimodal environments can affect ESP and how multimodal modes can impact students' motivation and teacher-student interactions (Laadem & Mallahi, 2019). Another study found that teachers' use of multimodality in CFL teaching demonstrated their commitment in designing content-specific activities to achieve pedagogical goals by utilizing multiple digital technologies as resources (Han et al., 2023). The study by Cai et al. produced five main themes and highlighted how different modes of communication support social presence, thus helping teachers pose the role of students. In addition, the online learning context affects the type of teaching, and the reduced distance between teachers and students enhances teaching presence; however, students felt a lack of affective belonging in their online classes (Cai et al., 2022).

In addition to technical matters, the learning process is also influenced by psychological aspects, one of which is self-talk ability. Self-talk is the systematic use of sign words in a silent or vocal dialogue with oneself. This process has two conceptual properties: the form of verbalization is an essential requirement and the sender of the message is also the recipient. Because self-talk has beneficial effects on emotional regulation, it is widely used to improve performance in sports, academic engagement, and regulate anxiety or depression in clinics. Self-talk with positive content can help improve positive psychological states and regulate cognition, while self-talk with negative content is associated with emotional illness (Kim et al., 2021). Through the practice of negative self-talk, students may experience a decline in emotional vitality, fueled by internal narratives that reinforce the likelihood of unsuccessful outcomes. This defeatist internal dialogue creates a psychological barrier that can ultimately hinder their academic resilience and overall well-being (K. Liu et al., 2021).

Hereinafter, human language is a unique phenomenon in nature that is used to communicate with other members of the species (Hockett, 1959) and, to an equal extent, to communicate with oneself. This latter human behavior is known as self-talk and has long interested researchers (Latinjak et al., 2023). Self-talk as 'verbalizations directed to oneself, either overtly or covertly, are characterized by interpretive elements related to their content; and they (self-talk) (a) reflect a dynamic interaction between organic, spontaneous, goal-directed cognitive processes or (b) convey messages to activate responses through the use of predetermined cues that are strategically developed, to achieve performance-related outcomes (Latinjak et al., 2023). If a person's self-talk is accurate and in line with reality, the person tends to function relatively well and feel good about themselves in everyday life. However, if a person's self-talk is negative,

embarrassing, and unrealistic, the person will experience anxiety, tension, and emotional stress (Plan, 2023).

Hackfort & Schwenkmezger (1993) define self-talk as "the inner speech in which an individual interprets emotions and perceptions, manages and modifies evaluations and cognitions, and provides instruction and reinforcement to oneself." A more recent description of self-talk is provided by Hardy, Hall, & Hardy and has been characterized as "a multidimensional phenomenon of athletes' verbalizations directed to themselves." These self-statements can represent "automatic verbalizations or more deliberate forms of speech and may be expressed out loud or as a silent voice in one's mind" (Georgakaki & Karakasidou, 2017). Building on this multidimensional perspective, the avoidance of explicit communication in self-talk can be interpreted either as a mechanism for emotional self-preservation or as a cognitive tool for fostering creativity through the exploration of unconventional conceptual frameworks (Jiaming, 2025).

Therefore, self-talk is categorized into two types based on its context, namely, positive and negative self-talk (Theodorakis, Hatzigeorgiadis, & Chroni, 2008). Positive self-talk has been described as an asset that enhances self-esteem, motivation and concentration, while negative self-talk is considered critical, self-judgmental, anxiety-inducing and counterproductive (Johnson, Hrycaiko, Johnson, & Halas, 2004; Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) in (Georgakaki & Karakasidou, 2017). Building on this distinction between beneficial and detrimental forms of self-talk, these results further illuminate how individuals naturally adopt varied perspectives in self-talk to manage everyday life, and suggest that distanced self-talk may help regulate emotions in preparatory contexts (Schertz et al., 2025).

Previous research shows that self-talk strategies can improve students' speaking skills. This is known from the learning targets in each cycle that continue to increase. So, researchers conclude that self-talk strategies can improve students' speaking skills in the learning process (Hermansyah, 2021; Humairoh, 2022; Ismail & Çakmak, 2025; Surbakti & Indari, 2022; Syukur et al., 2025). Moreover, self-talk strategies not only improve speaking skills but also help reduce speaking anxiety (Rafada, S. H., & Madini, 2017; Shadinger, D., Katsion, J., Myllykangas, S., & Case, 2020). Other findings suggest that small changes in the language people use to refer to themselves during introspection impact their ability to regulate thoughts, feelings, and behaviors under social pressure, even for vulnerable individuals (Kross et al., 2014).

On the contrary, many college students experience problems with self-esteem and self-image, especially in academics. More than half of college students experience low self-esteem at some point (Maheswari & Maheswari, 2016). Self-efficacy, a major component of self-esteem, is defined as an individual's belief in their own ability to complete tasks and carry out behaviors that lead to desired outcomes. There is a relationship between self-talk and self-efficacy as well as self-efficacy and academic performance. Given the nature of this relationship, it is important to have research exploring the potential relationship between positive self-talk and academic ability (memory recall) (Hunter and Sullins, 2020). The phenomenon of the mental vulnerability of today's young generation, including students, can be seen from the many cases of bullying, mental health, and even extreme acts of suicide; therefore, it is very important for them to have positive self-talk so that they can be more resilient in dealing with various problems, including problems in the academic field.

In line with these efforts to bolster academic resilience and performance, the implementation of appropriate learning methodologies also plays a pivotal role. As stated by Allagui (2023), numerous students valued multimodal writing more for its positive impact on their information and research literacy skills than for its contributions to traditional writing skills. This finding aligns with previous research indicating that the application of a multimodal learning approach has the potential to improve students'

reading comprehension skills in terms of analysis speed, vocabulary recognition, and level of understanding. In addition, there is an increase in students' positive attitudes and the potential to combine this multimodal approach with other learning methods. However, despite existing opportunities, several challenges remain, including time management, facility constraints, confusion in designing modes and tasks, and a lingering student preference for conventional learning (Yuniasari et al., 2023).

Previous research related to self-talk shows that (1) self-talk has a significant influence on learning achievement and self-confidence, (2) the combination of learning self-talk and motivational self-talk significantly increases learning achievement and self-confidence compared to learning and motivational self-talk alone. In general, all experimental groups showed a significant increase in learning achievement and self-confidence compared to the control group (Hidayat and Budiman, 2014; Omar et al., 2024).

What distinguishes this study from previous studies is the combination of multimodal literacy variables with self-talk which is a combination of cognitive and affective domains. The research design used is also an experiment with a 2 x 2 factorial design that allows researchers to explore the data of each research cell completely and in detail. From previous studies, it is still very rare for research focused on multimodal literacy to use quantitative designs; most use literature or qualitative studies so that the effectiveness of applying it in learning cannot be measured validly and reliably.

This study aims to analyze the effect of learning approaches, especially on the importance of strengthening multimodal literacy, as well as the importance of self-talk in the learning process of research methodology courses and the influence of interactions between the two variables. However, the results of this study are expected to be generalized to other courses in the study program so that they can also be applied to a wider lecture process. From the results of the study, the effectiveness of the multimodal learning approach in delivering research-based lecture materials can be interpreted.

The results of this study are expected to contribute in improving the quality of learning in the S1 PBI study program at UIN Raden Mas Said Surakarta, especially in lectures whose material is about Research Methodology, as well as learning with other materials, both English skills and theories or other general materials. By understanding the importance of strengthening multimodal literacy among students and self-talk as a foundation for improving self-concept, self-efficacy, self-confidence, and motivation, it is expected that teachers can implement these aspects in the learning process. The results of this study are also expected to be a reference for other researchers who want to conduct further studies on similar topics.

Based on the theoretical study and the framework of thought above, the researcher proposes a number of hypotheses as follows: 1) $\mu A1 \neq \mu A2$: There is a significant difference in the level of understanding of research methodology between the group of students who are given multimodal literacy reinforcement (*A1*) and the group of students who are given monomodal (*A2*), 2) $\mu B1 \neq \mu B2$: There is a significant difference in the level of understanding of research methodology between the group of students who have positive self-talk (B1) and the group of students who have negative self-talk (*B2*), 3) $\mu A1B1 > \mu A2B1$: The group of students who are given multimodal literacy reinforcement and have positive self-talk (*A1B1*) have a higher level of understanding of research methodology than the group of students who are given monomodal and have positive self-talk (*A2B1*), 4) $\mu A1B2 > \mu A2B2$: The group of students who are given multimodal literacy reinforcement and have negative self-talk (*A1B2*) have a higher level of understanding of research methodology than the group of students who are given monomodal approach and have negative self-talk (*A2B1*), 5) $\mu A1B1 > \mu A1B2$: The group of students who are given multimodal literacy reinforcement and have positive self-talk (*A1B1*) have a higher level of understanding of research methodology than the group of students who are given multimodal literacy and have negative self-talk (*A1B2*), 6) $\mu A2B1 > \mu A2B2$: The group of

students who are given monomodal approach and have positive self-talk (*A2B1*) have a higher level of understanding of research methodology than the group of students who are given monomodal approach and have negative self-talk (*A2B1*), 7), and 7) There is an interaction effect between the learning model (*A*) and the type of self-talk (*B*) on the level of students' understanding concerning research methodology.

METHODOLOGY

This is an experimental study with the type of pre-test and post-test control group design involves two independent variables (learning approach and type of self-talk) and one dependent variable or called a 2 x 2 factorial design. Experimental research is an explanatory research method in which researchers intervene in samples by deliberately providing levels of one or more explanatory characteristics to their units with the aim of producing conclusions about the causal impact of these characteristics on response characteristics (Gile, 2015).

In addition, factorial design is very effective, allowing for the assessment of several intervention elements with strong statistical power, and they provide a chance to identify interactions between these components (Baker et al., 2017). To optimize complex interventions, Collins et al., (2009) advocate for factorial designs, highlighting their dual benefit of providing strong statistical evidence for individual components and identifying vital interaction effects that might otherwise be overlooked. Furthermore, research by Chakraborty et al. (2009) and Kugler et al. (2018) confirms that this approach is highly effective for multi-element programs, particularly due to its ability to maintain statistical power without requiring a prohibitively large sample size. This research uses the following design:

Table 1 Research Design with 2 x 2 Factorial Design

Group	**Learning Approach (*A*)**	**Type of Self-Talk (*B*)**	
		Positive (*B1*)	**Negative (*B2*)**
Experimental	Multimodal (*A1*)	*A1B1*	*A1B2*
Control	Monomodal (*B1*)	*A2B1*	*A2B2*

The population of this study was 260 4th semester English Language Education students of UIN Raden Mas Said Surakarta divided into 8 classes. The research subjects were selected using Cluster Random Sampling technique to obtain one experimental group with the treatment using multimodal learning approach and one control group with the treatment using monomodal learning approach, where each group will be given a pre-test, several treatments, and a post-test. In this study, class 4C with 31 students was selected as the experimental group and class 4B with 33 students as the control group.

The data in this study were collected using tests and questionnaires. The test on understanding research methodology was in the form of multiple choice with 20 items for the pre-test and 25 items for the post-test. Treatment was given to the experimental group using multimodal literacy and self-talk reinforcement 9 times including the provision of pre-test and post-test. For the control group, treatment was also given 9 times including the provision of pre-test and post-test, using monomodal media and without self-talk reinforcement. The pre-test results were given a score of 5 for each correct answer, so that the total score if all answers were correct was 100. The post-test results were given a score of 4 for each correct answer, so that the total score if all answers were correct was 100.

Meanwhile, a closed questionnaire containing 20 statements was given to the research subjects to determine their self-talk category, whether positive or negative. All of the instruments were in English. Furthermore, the results of the self-talk questionnaire were scored using the following criteria:

0 to 5 You are supportive of your own self-esteem and self-worth.
6 to 15 You have some self-sabotaging self-talk, which you should examine.
16 to 45 You're starting to sabotage your own self-worth – what are you telling yourself?
46 to 70 Your negative self-talk could be impacting your success – in business and life.
71 to 100 You must change your negative self-talk, in order to improve your emotional and physical wellbeing.

Based on the interpretation above, the researcher categorizes a score of 0-45 as positive self-talk and 46-100 as negative self-talk. The data in this study were analyzed in several stages. The first stage of data processing used descriptive statistics. This technique was used to obtain a summary of data from research variables and then present it. The results of data analysis with descriptive statistics are in the form of central tendencies (mean, median, mode, standard deviation, and variance). Furthermore, the data were analyzed as part of the prerequisite test before conducting a hypothesis test. The prerequisite tests in this study include the normality test using the Shapiro-Wilk test, and the homogeneity test using the Levene test. If the data meets the prerequisite test, the next stage can be used to test the hypothesis using parametric inferential statistics. The analysis technique used was Two-Way ANOVA. All data analysis was carried out using SPSS 26 version.

Test Result Data of Experimental Group and Control Group

The results of the analysis using descriptive statistics for the pre-test and post-test scores of the experimental group can be seen in Table 2.

Table 2 Results of Descriptive Statistical Analysis
Pre-test and Post-test Scores of the Experimental Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
pre-test scores exp	31	25.00	75.00	53.5484	13.36622
post-test scores exp	31	32.00	92.00	65.0968	17.06332
Valid N (listwise)	31				

From Table 2, it can be seen that the mean value for the pre-test score is 53.55 with a minimum score of 25 and a maximum score of 75. The mean value for the post-test score is 65.09 with a minimum score of 32 and a maximum score of 92. Thus, there is an increase in the average score of 11.54 points.

The histogram graph for frequency distribution of the pre-test scores for the experimental group is shown in Figure 1.

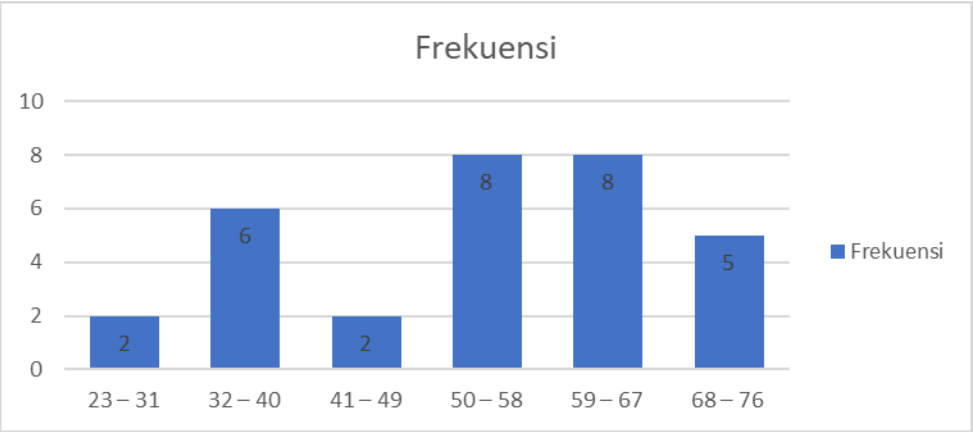

Figure 1 Histogram Graph of Pre-test Scores for the Experimental Group

Frequency distribution for the post-test scores of experimental group is displayed in Figure 2.

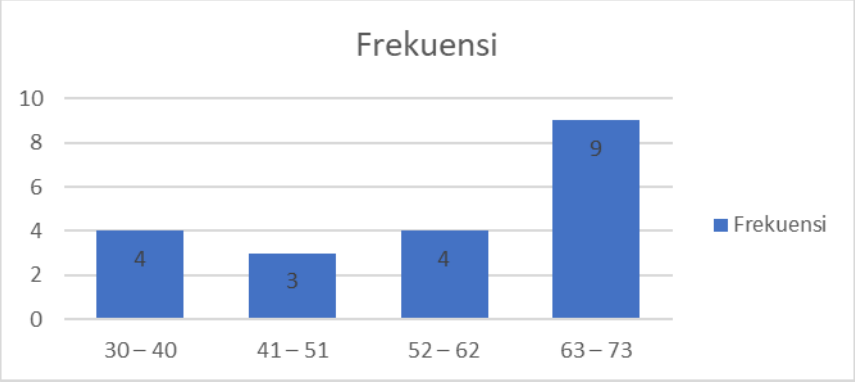

Figure 2 Histogram Graph of Post-test Scores of the Experimental Group

Meanwhile, the results of the analysis using descriptive statistics for the pre-test and post-test scores of the control group can be seen in Table 3.

Table 3 Results of Descriptive Statistical Analysis on Pre-test and Post-test Scores of the Control Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
pre-test scores cont	33	25.00	90.00	60.0909	15.67116
post-test scores cont	33	24.00	84.00	53.5758	17.69716
Valid N (listwise)	33				

From Table 3 it can be seen that the mean value for the pre-test score is 60.09 with a minimum score of 25 and a maximum score of 90. The mean value for the post-test score is 53.57 with a minimum score of 24 and a maximum score of 84. Thus, there is a decrease in the average score of 6.52 points.

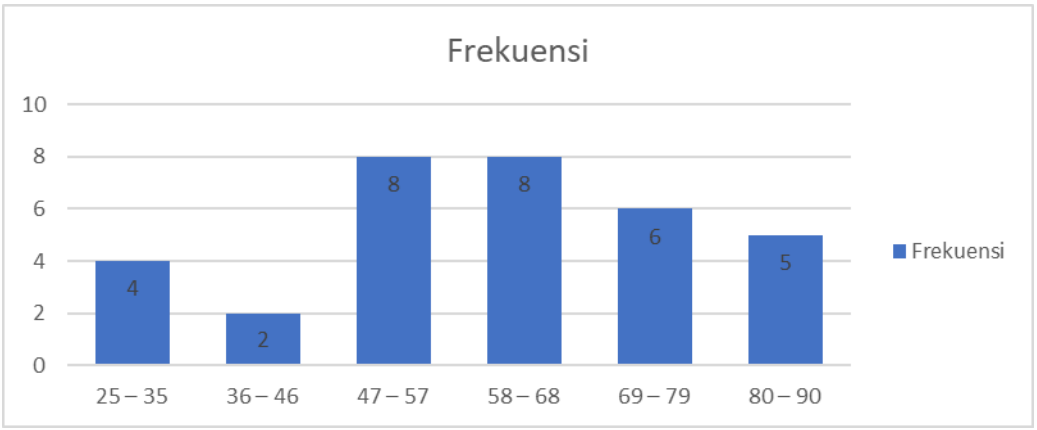

Figure 3 Histogram Graph of Pre-test Scores of the Control Group

To clarify, the post-test scores of control group is also displayed in the following histogram graph.

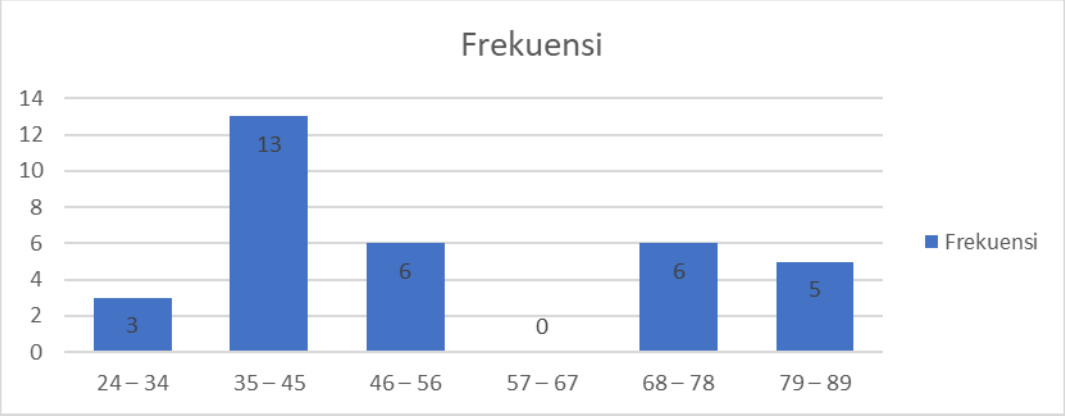

Figure 4 Histogram Graph of Post-test Scores of the Control Group

Data on the Results of Self-Talk Questionnaire for the Experimental Group and the Control Group. The results of the analysis of the self-talk questionnaire score data in both treatment groups using descriptive statistics can be seen in Table 4.

Table 4 Results of Descriptive Statistical Analysis of
Self-Talk Questionnaire Scores in Experimental and Control Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
self-talk exp	31	23.00	76.00	45.0968	14.95628
self-talk cont	33	33.00	86.00	61.3636	14.49314
Valid N (listwise)	31				

Based on Table 4, it can be seen that the mean score in the experimental group is 45.09 with a minimum score of 23 and a maximum score of 76. Meanwhile, the mean score in the control group is 61.36 with a minimum score of 33 and a maximum score of 86. These results indicate that in general the subjects in the experimental group have positive self-talk, while the subjects in the control group have negative self-talk.

The following graph is a further display of the distribution of scores for self-talk questionnaire in experimental group.

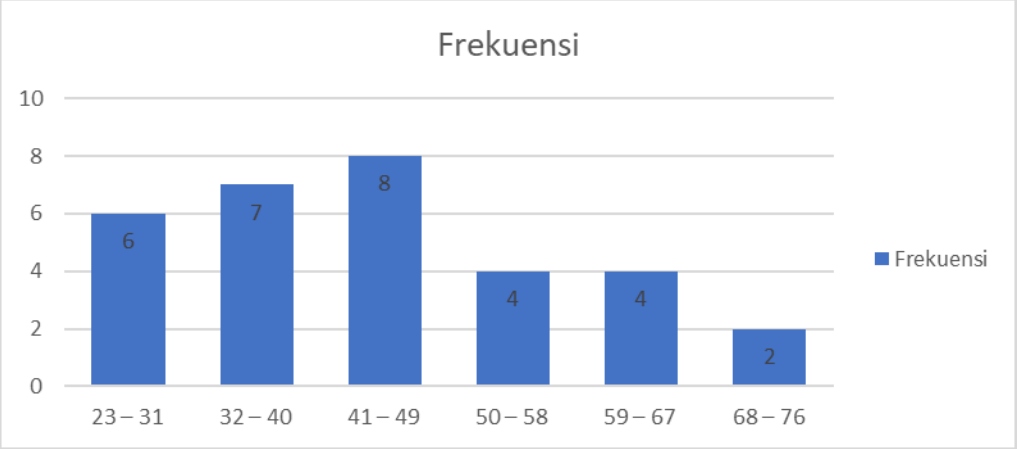

Figure 5 Histogram Graph on Self-talk Questionnaire Scores
of the Experimental Group

The frequency distribution for self-talk questionnaire scores of control group is presented in Figure 6.

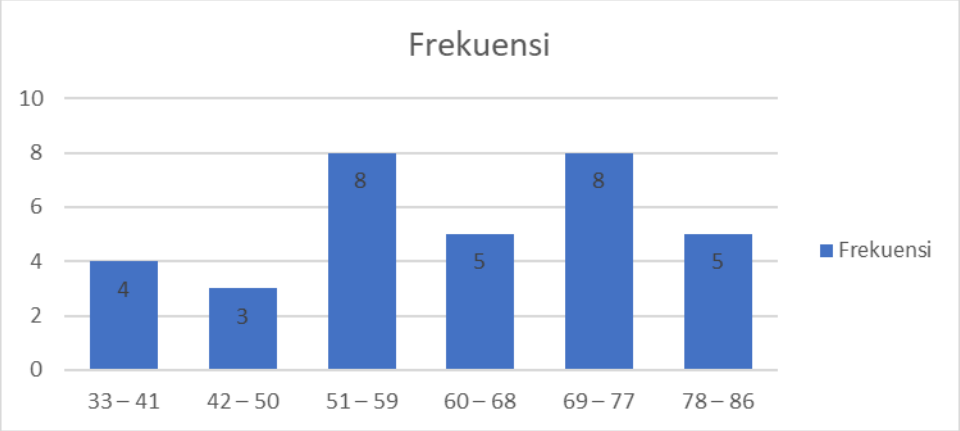

Figure 6 Histogram Graph of Self-talk Questionnaire Scores of the Control Group

Results of the Prerequisite Test for Data Groups

a. Normality Test

The results of the overall data normality test for the experimental group and the control group using the Shapiro-Wilk test are shown in Table 5.

Table 5 Results on the Normality Test of Overall Data for the Experimental Group and Control Group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Standardized Residual for hasil	.090	64	.200*	.976	64	.251

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From Table 5 it can be seen that the normality test result index is 0.251. At the significance level of α = 5%, the index is > 0.05, which means that the data group is normally distributed.

b. Homogeneity Test

The results on the homogeneity test of the overall data in the experimental group and the control group using the Levene test are shown in Table 6.

Table 6 Results on the Homogeneity Test of the Overall Data in the Experimental and Control Group

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Results on research methodology learning results	Based on Mean	.500	3	60	.684
	Based on Median	.211	3	60	.889
	Based on Median and with adjusted df	.211	3	57.201	.889
	Based on trimmed mean	.454	3	60	.715

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: hasil belajar research methodology

b. Design: Intercept + media + selftalk + media * selftalk

Table 6 shows that the homogeneity test result index is 0.684. At the significance level of α = 5%, the index is > 0.05, which means that the variance of the data group is homogeneous. The results of the analysis prerequisite test show that the data is normally distributed with homogeneous variance. This means that the prerequisite test is met, so that further hypothesis testing can be carried out using parametric inferential statistics, namely Two-Way ANOVA. Meanwhile, data analysis using descriptive statistics is shown in Table 7.

Table 7 Results of the Data Analysis using Descriptive Statistics

Descriptive Statistics

Dependent Variable: research methodology learning results

Independent Variable: learning approach	self-talk category	Mean	Std. Deviation	N
Multimodal	Positive	60.82	16.599	17
	Negative	70.29	16.731	14
	Total	65.10	17.063	31
Monomodal	Positive	64.67	21.676	6
	Negative	51.11	16.137	27
	Total	53.58	17.697	33
Total	Positive	61.83	17.611	23
	Negative	57.66	18.574	41
	Total	59.16	18.204	64

Meanwhile, the results of data analysis using Two-Way ANOVA are summarized in Table 8.

Table 8 Results of Data Analysis using Two-Way ANOVA Technique

Tests of Between-Subjects Effects

Dependent Variable: research methodology learning results

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	3711.110[a]	3	1237.037	4.323	.008
Intercept	182518.766	1	182518.766	637.905	.000
Approach	703.847	1	703.847	2.460	.122
Self-talk	50.173	1	50.173	.175	.677
approach* self-talk	1586.486	1	1586.486	5.545	.022
Error	17167.328	60	286.122		
Total	244844.000	64			
Corrected Total	20878.437	63			

a. R Squared =.178 (Adjusted R Squared =.137)

Based on the data listed in Tables 7 and 8, the results of the hypothesis testing can be concluded as follows.

a. $\mu A1 \neq \mu A2$: There is a significant difference in the level of understanding of research methodology in the group of subjects who were given multimodal literacy reinforcement (*A1*) and the group of subjects who were given monomodal approach (*A2*).

The results of the hypothesis testing with Two-Way ANOVA showed that the index for differences in learning outcomes based on the type of approach was 0.122. At a significance level of α = 5%, the index is 0.122 > 0.05; therefore, the decision is that the

hypothesis is rejected, which means that there is no significant difference in ability between the group of subjects given the multimodal approach (*A1*) and the group of subjects given the monomodal approach (*A2*). However, it can be seen that the mean of the experimental group is 65.10, while the mean of the control group is 53.58. These results indicate that the mean in the experimental group is higher than the mean in the control group.

b. $\mu B1 \neq \mu B2$: There is a significant difference in the level of understanding of research methodology in the group of the subjects with positive self-talk (*B1*) and the group of the subjects with negative self-talk (*B2*).

The results of the hypothesis test with Two-Way ANOVA showed that the index for differences in learning outcomes based on the self-talk category was 0.677. At a significance level of $\alpha = 5\%$, the index is $0.677 > 0.05$; therefore, the decision is that the hypothesis is rejected, which means that there is no significant difference in ability between the group of subjects who have positive self-talk (*B1*) and the group of subjects who have negative self-talk (*B2*). However, from the mean value, it can be seen that in the group of subjects with positive self-talk the mean value is 61.83, while the mean of the group of subjects with negative self-talk is 57.66. These results indicate that the mean of the group of subjects with positive self-talk is higher than the mean of the group of subjects with negative self-talk.

c. $\mu A1B1 > \mu A2B1$: The group of students given multimodal literacy reinforcement and have positive self-talk (*A1B1*) have a higher level of understanding of research methodology than the group of students given monomodal approach and have positive self-talk (*A2B1*).

The results of the overall data analysis with descriptive statistics show that the mean of the group of subjects given multimodal approach and have positive self-talk (*A1B1*) is 60.82, while the mean of the group of subjects given monomodal approach and have positive self-talk (*A2B1*) is 64.67. Thus, it can be decided that the hypothesis is rejected, because $60.82 < 64.67$.

d. $\mu A1B2 > \mu A2B2$: The group of students given multimodal literacy reinforcement and have negative self-talk (*A1B2*) have a higher level of understanding of research methodology than the group of students given monomodal approach and have negative self-talk (*A2B2*).

The results of the overall data analysis with descriptive statistics show that the mean of the group of subjects given multimodal approach and have negative self-talk (*A1B2*) is 70.29, while the mean of the group of subjects given monomodal approach and have negative self-talk (*A2B2*) is 51.11. Thus, it can be concluded that the hypothesis is accepted, because $70.20 > 51.11$.

e. $\mu A1B1 > \mu A1B2$: The group of students given multimodal literacy reinforcement and have positive self-talk (*A1B1*) have a higher level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A1B2*).

The results of the overall data analysis with descriptive statistics show that the mean of the group of subjects given multimodal approach and have positive self-talk (*A1B1*) is 60.82, while the mean of the group of subjects given multimodal approach and have negative self-talk (*A1B2*) is 70.29. Thus, it can be decided that the hypothesis is rejected, because $60.82 < 70.29$.

f. $\mu A2B1 > \mu A2B2$: The group of students given monomodal approach and have positive self-talk (*A2B1*) have a higher level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A2B2*).

The results of the overall data analysis with descriptive statistics show that the mean of the group of subjects given monomodal approach and have positive self-talk (*A2B1*) is 64.67, while the mean of the group of subjects given monomodal approach and

have negative self-talk (*A2B2*) is 51.11. Thus, it can be decided that the hypothesis is accepted, because 64.67 > 53.11.

g. There is an interaction effect between the learning model (*A*) and the type of self-talk (*B*) on the level of understanding of students' research methodology.

Based on the results of the hypothesis test with Two-way ANOVA, the interaction effect index is 0.022. At the significance level α = 5%, the index is 0.022 > 0.05; therefore, the decision is that the hypothesis is accepted. Thus, there is an interaction effect between learning approach and self-talk toward the students' understanding on research methodology.

DISCUSSION

The results of the study show that 1) there is no significant difference in research methodology understanding between the group of subjects given multimodal approach (*A1*) and the group of subjects given the monomodal approach (*A2*); 2) there is no significant difference in research methodology understanding between the group of subjects with positive self-talk (*B1*) and the group of subjects with negative self-talk (*B2*); 3) the group of students who are given multimodal approach and have positive self-talk (*A1B1*) have a lower level of understanding of research methodology than the group of students who are given monomodal approach and have positive self-talk (*A2B1*); 4) the group of students who are given multimodal approach and have negative self-talk (*A1B2*) have a higher level of understanding of research methodology than the group of students who are given monomodal approach and have negative self-talk (*A2B2*); 5) the group of students who are given multimodal approach and have positive self-talk (*A1B1*) have a lower level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A1B2*); 6) The group of students who are given monomodal approach and have positive self-talk (*A2B1*) have a higher level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A2B2*); and, 7) there is an interaction effect of learning approach and types of self-talk on the results of learning research methodology.

Based on the results of the study and statistical calculations, it can be seen that of the seven hypotheses proposed, only three hypotheses are accepted and four others are rejected. Hypothesis 1, which proposes that there is a difference in ability in the field of research methodology between group of students taught by using a multimodal approach and those taught by using a monomodal approach, is not proven. This is somewhat inconsistent with the theory proposed in the previous section. As proposed by Wijewantha, the multimodal approach has been identified as a learner-friendly second language teaching strategy because the combination of different materials and learning methods ensures a variety of learning experiences that result in memory retention, increased enthusiasm, motivation and increased understanding that can significantly contribute to student performance (Wijewantha, 2021).

However, the average score of the group given the multimodal approach is still higher than the average score of the group given the monomodal approach. The results of this study are in line with the results of previous studies which show that the implementation of multimodal learning approach has the potential to improve students' reading comprehension skills in terms of analysis speed, vocabulary recognition, and level of understanding. In addition, there is also an increase in students' positive attitudes and the potential to combine this multimodal approach with other learning methods. However, despite the opportunities, there are also several challenges faced, including time management, constraints and limitations of facilities, confusion in designing modes, media, and assignments, and student preferences for conventional learning (Yuniasari et al., 2023).

Based on observations during nine classroom sessions, in the experimental group receiving multimodal literacy reinforcement, researchers observed that the various media used increased student motivation and participation during the learning process. They became more enthusiastic in asking and answering questions and completing various exercises given in class. This finding aligns with several previous studies that generally indicate that multimodal literacy reinforcement can improve interaction and the quality of classroom learning, particularly in higher education. Students reported increased motivation and engagement while interacting with multimodal content. The study provides important insights into how multimodal information affects language competency and proposes practical treatments to improve student learning results (Vergara-Burgos, 2024).

Capello, Wiseman, and Turner, based on their research, developed critical multimodal literacy; it is a framework developed from a synthesis of the research literature to describe the ways that students use tools (e.g., sketches, videos) for personal meaning-making, critique, and agentive learning in classrooms. The framework consists of the following four components: communicate and learn with multimodal tools; re-story, represent, and redesign; acknowledge and shift power relationships; and leverage multimodal resources to critique and transform sociopolitical realities all seen through an equity lens. This critical multimodal literacy framework can promote equitable classroom practices that expand the literacy learning of all students (Cappello et al., 2019). A systematic review examining 34 research articles conducted by Rahmanu and Molnar show that using multimodal approach gives many benefits for learning process. It highlights existing research gaps and outlines potential avenues for future investigation aimed at conceptualizing and assessing learners' skills through multimodal approaches (Rahmanu & Molnár, 2024). These research findings are consistent with the study by Ravelli that theory of meaning operates across different levels of the institution, in relation to different modes, and in relation to subsequent developments in multimodal research (Ravelli, 2024).

Compared to the previous studies, the research findings showing that the implementation of multimodal literacy reinforcement does not significantly affect the students' learning achievement are somewhat different. This fact can be caused by several aspects, among others, the different research subjects, the different learning environment, and different context. Another factor is probably the methodology of the research that the researchers used in which two factors are combined to construct the research. This research is also very rigid in implementing the treatment as well as in analyzing the data; resulted in the detail indexes statistically.

Furthermore, in relation to the second variable, self-talk, many theories state that self-talk is very important in the learning process because it can be a basis for how someone builds themselves and their abilities. However, statistically, the results of this study do not show any differences in ability in the field of research methodology between groups of students having positive self-talk and those having negative self-talk. The results of this study are somewhat inconsistent with the theories propose that positive self-talk has been described as an asset that increases self-esteem, motivation and concentration, while negative self-talk is considered critical, self-judgmental, anxiety-inducing and counterproductive (Johnson, Hrycaiko, Johnson, & Halas, 2004; Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) in (Georgakaki & Karakasidou, 2017).

The previous research shows that self-talk strategies can improve students' speaking skills. This is known from the learning targets in each cycle that continue to increase. So, the researcher concludes that the self-talk strategy can improve students' speaking skills in the learning process (Humairoh, 2022). Another study by Jiaming states that human cognition often interprets self-talk as a form of dialogue, with self-talk inherently possessing certain features of interpersonal communication (Jiaming, 2025).

The results of the study that are not in accordance with previous studies, in which self-talk does not have a significant effect on the students' learning achievement, could be caused by the difficulty faced by the research subjects in understanding their own feelings related to self-talk so that they are less precise in answering the self-talk questionnaire. It could also be caused by different fields being studied, where in this study the learning materials focused on the concepts of research methodology.

Nevertheless, it is still important to strengthen positive self-talk in the learning process with any learning materials because the type of self-talk is very influential in a person's self-development. This is in accordance with the theory proposing that positive self-talk has been described as an asset that increases self-esteem, motivation and concentration, while negative self-talk is considered critical, self-judgmental, anxiety-inducing and counterproductive (Johnson, Hrycaiko, Johnson, & Halas, 2004; Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) in (Georgakaki & Karakasidou, 2017). This theory is proven in hypothesis 6 which states that there is a difference in research methodology understanding between students who have positive self-talk and those who have negative self-talk in the subject group given monomodal approach. Although in general the number of students who have negative self-talk is much greater in this group, the results of the study showed that the average score of students with positive self-talk is much higher.

Furthermore, the acceptance of the last hypothesis which states that there is an influence of interaction between the multimodal approach and the type of self-talk on research methodology competence confirms that both aspects are very important to consider in the learning process. In fact, these results show that the multimodal approach with self-talk reinforcement will also have a good influence on the learning process with similar learning materials that contain a lot of theories. To realize a good implementation, it is necessary to create a more dynamic and interactive learning design with various types of learning techniques and media to make the results more effective. The media used can also be a combination of digital and conventional media; likewise, the learning techniques applied can be a combination of the latest techniques with conventional techniques. The implementation of these aspects is adjusted to class conditions, facilities and infrastructure, institutional policies, and student characteristics.

What distinguishes this study from previous studies is the combination of multimodal literacy variables with self-talk which is a combination of cognitive and affective domains. The research design used is also an experiment with a 2 x 2 factorial design that allows researchers to explore the data of each research cell completely and in detail. From previous studies, it is still very rare for research focused on multimodal literacy to use quantitative designs; most use literature or qualitative studies so that the effectiveness of applying it in learning cannot be measured validly and reliably. However, this study is still limited in developing the various media used for the learning process; either conventional or digital media which are appropriate to teach research methodology subject. The researchers expect that the research findings can be basis for conducting further studies by other researchers and for realizing academic development. Specifically, it is very recommended for other researchers to conduct research and development (R & D) to design and produce learning media which support the multimodal literacy reinforcement. This kind of reinforcement can also be combined with many other psychological aspects, such as interest, attitude, belief, personality, learning style, and others, not only self-talk.

The conditions as described above make the researchers suggest to continue using the multimodal approach in the research methodology learning process. With an active, dynamic, and interactive atmosphere, it is expected that learning the material which is indeed quite heavy and complex can run more enjoyable and not boring. The media and techniques used can be more varied, both modern and conventional. In addition,

strengthening positive self-talk is also important considering that positive self-talk is the basis for building strong self-confidence in doing something. In research methodology learning, self-talk is also very important so that students are more confident in learning. Lecturers and students can work together to strengthen positive self-talk. Furthermore, the suggestion for the institution is to be able to further complete the existing facilities and infrastructure. It is also important to conduct special training on the multimodal approach and strengthening positive self-talk for learning so that lecturers can better understand how to apply it appropriately and effectively.

CONCLUSSION

1. There is no significant difference in research methodology understanding between the group of subjects given multimodal approach (*A1*) and the group of subjects given the monomodal approach (*A2*).
2. There is no significant difference in research methodology understanding between the group of subjects with positive self-talk (*B1*) and the group of subjects with negative self-talk (*B2*).
3. The group of students who are given multimodal approach and have positive self-talk (*A1B1*) have a lower level of understanding of research methodology than the group of students who are given monomodal approach and have positive self-talk (*A2B1*).
4. The group of students who are given multimodal approach and have negative self-talk (*A1B2*) have a higher level of understanding of research methodology than the group of students who are given monomodal approach and have negative self-talk (*A2B2*).
5. The group of students who are given multimodal approach and have positive self-talk (*A1B1*) have a lower level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A1B2*).
6. The group of students who are given monomodal approach and have positive self-talk (*A2B1*) have a higher level of understanding of research methodology than the group of students with the same treatment but have negative self-talk (*A2B2*).
7. There is an interaction effect of learning approach and types of self-talk on the results of learning research methodology.

Although several hypotheses are not proven, observations in the field during the implementation of the treatment in both research groups showed that there were different responses, interactions, and dynamics during the research methodology learning process. Initially, the group that would be given the multimodal approach tended to be passive and less enthusiastic in participating during the learning process. Meanwhile, the group that would be given monomodal approach actually appeared active and enthusiastic during the initial learning process. However, after learning had taken place several times, differences in conditions began to appear in both groups. The experimental group given multimodal approach became more active, interactive, and dynamic than the control group.

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