# Audiovisual-Based Jigsaw Method in Post-COVID-19 to Increase Students' Capacity in Indonesia

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**Abstracts:** Recovery of learning after the Covid-19 pandemic requires all stakeholders to innovate inclusive and quality learning as an option to mitigate learning loss towards learning in the new normal era. Hybrid learning is an alternative learning towards a transitional period in the form of a mix between online and offline learning. This research is to measure the effectiveness of the audiovisual-based jigsaw method in the hybrid learning process to increase the capacity of junior high school students to write scientific papers in Maros Regency, Indonesia. The research was using a descriptive-qualitative approach, namely exploring the learning situation through the application of the J-AV method to measure the students' capacity of scientific papers and the ability to work together in groups. This research found an empirical fact that students were able to significantly increase their capacity to write scientific papers through the jigsaw learning method using audiovisual media on aspects of format, writing, presentation, analysis, synthesis and conclusion. Before using audiovisual media, the average score of students' scientific papers was 71 with a quality of C or medium, but by using audiovisual media in compiling scientific papers, they could increase their average score to be 84 with B or good quality.

**Keywords:** Audiovisual, Jigsaw, Post-COVID-19, Hybrid Learning, Scientific Paper.

## 1. INTRODUCTION

The COVID-19 pandemic has brought a change in the social order of society in the learning process due to the implementation of the lock down. Technological devices have changed the pattern of communication relations between educational agents in closing direct contact during the covid-19 pandemic lock down. Post- COVID-19 learning recovery requires all stakeholders to carry out massive learning innovations[1]. Generation Z which is identified as students during the COVID-19 pandemic era in Indonesia experienced a learning loss experience so they need special learning methods after the pandemic[2]. As an option to mitigate learning loss towards a transitional period due to the COVID-19 pandemic outbreak, students, and parents as agents of change are given the authority to carry out rational learning alternatives. Learners must explore their learning styles by having a high sense of responsibility to receive learning material in a comprehensive manner[3]. The learning alternative towards the transitional period is hybrid learning, namely a mix between online learning or in the internet network (online) with face-to-face or offline classes. Searching for learning materials can be accessed by students using technological devices to overcome direct physical access restrictions in schools, libraries, bookstores, and other public areas[4]. This access can be hybridized with offline learning in the classroom after the COVID-19 pandemic. The use of online learning based on higher-order thinking skills combined with collaboration skills can be utilized by teachers to maximize learning outcomes[5].

Project-based learning (PBL) is one of the learning models recommended by the Ministry of Education, Culture, Research and Technology of Indonesia to direct students to find problems, process information, and express ideas comprehensively, then analyze and evaluate them. PBL is learning that uses real (authentic) problems that are unstructured and open as contexts for students to develop skills, develop problems, and think critically while building new knowledge to fellow students[6]. To disseminate new knowledge, learning methods that are right on target are needed. The jigsaw method is an effective and flexible learning method combined with audiovisual. The audiovisual-based jigsaw method can be an alternative to hybrid learning which can be a solution to easily provide students with an understanding of how to reflect on thoughts and critical thinking processes by presenting original systematic reports. The use of technology in the learning process or Technology-based learning (TBL) is needed to

maintain the continuity of student learning during and after the COVID-19 pandemic in the form of hybrid learning[7]. In addition, students can have the flexibility of thinking in finding alternative solutions to the problems found to achieve the targeted achievements by using technology media such as audiovisual[8]. In the example of the use of technology in learning in Africa, found the fact that students' parents encouraged online learning to continue to be used after the COVID-19 pandemic because this technology produces efficiency and effectiveness in the student learning process[9]. Post-pandemic education policies in Jordan must be able to create learning spaces that encourage students to learn independently with various technological devices, especially in virtual learning environments[10].

This phenomenon inspired the writer to mix the Jigsaw Method with Audiovisual (J-AV) as an alternative in hybrid learning. Audio-visual media is a series of electronic images accompanied by audio sound elements which also have image elements that are poured via video tape[11]. The purpose of implementing the J-AV method is that learning can be implemented properly because audiovisual media is relatively more efficient and can help students obtain, process information, and express ideas well, then analyze and evaluate them. Audiovisual assistance will seem more communicative because the output can be seen visually and also heard auditively making it easier for students to process and analyze data and give meaning systematically to the information obtained. Then, students are helped to reflect on their thoughts and thought processes in a more interesting way by presenting original systematic reports.

Based on this innovative thinking for students' learning strategies after the COVID-19 pandemic, the research team tested J-AV to increase the capacity of junior high school students to write scientific papers with local content themes. This research was conducted in 2023 in two junior high schools in Maros Regency, Indonesia, namely UPTD SMPN 10 Bantimurung and UPTD SMPN 6 Moncongloe. Improving the quality of the intellectual capacity of junior high school students is a socio-economic capital for the future generation of the Indonesian nation in filling job opportunities in the ASEAN countries. In the future, Indonesian workers must be dominated by qualified and educated resources so that they are able to compete with other ASEAN countries[12].

## 2. LITERARY AND METHODS

### 2.1. Literary Review

Audio-visual based jigsaw method research in the post COVID-19 pandemic era aims to increase students' capacity to write scientific papers. This type of research is a hybrid of classroom action research and field study which is carried out using a descriptive-qualitative exploratory approach, namely exploring the learning situation and applying the J-AV method. This method can measure the capacity of scientific papers with the theme of local wisdom that has been produced by students and the ability to work together in groups to provide understanding of the material to other groups. Researchers need to define the jigsaw method, audio-visual media, hybrid learning, scientific paper, and local content as important parts of this research.

### 2.1.1. Jigsaw Method

One learning strategy that needs to be implemented is PBL. It requires learning methods that are right on target as an internal part of the learning process at school. Students need to provide opportunities to learn through their own experiences (self-experiential learning). One of the learning strategies applied in interactive-based learning is the jigsaw method[13]. This method conditions flexibility for teachers to carry out a learning process that is in accordance with the abilities of students (teach at the right level). Jigsaw cooperative learning is a cooperative learning technique consisting of several members in one group who are responsible for mastering the learning material section and are able to teach the material to other members in the group as well as other groups[14]. The teacher's role in the jigsaw learning process is a facilitator who provides the widest possible space for students to express their capacity for knowledge and skills[15]. In the application of the jigsaw type, the teacher pays attention to the schemata or the background of the student's experience and helps students activate the schemata so that the

lesson material becomes more meaningful. In addition, students work together with fellow students in a mutual cooperation atmosphere which has many opportunities to process information and improve communication skills.

The jigsaw method was originally developed and tested by Elliot Aronson and his colleagues at the University of Texas. Then, jigsaw was adapted by Slavin and his friends at Johns Hopkins University into a learning model known as the jigsaw type. Gulo[16] defines a jigsaw as a fuzzle which means pieces of pictures arranged randomly to form a certain object through the cooperation of students in small groups with heterogeneous levels of cognitive and psychomotor abilities. The achievement of learning objectives in this method, students are able to find new and innovative learning objects as solutions. The jigsaw cooperative learning model can be defined as an active and interactive group learning space among heterogeneous students in order to find novelty of innovative objects[17]. In applying the jigsaw type, the teacher pays attention to the schemata or background of student experience and helps students activate the schemata so that the lesson material becomes more meaningful. In addition, students work together with fellow students in a mutual cooperation atmosphere which has many opportunities to process information and improve communication skills. Jigsaw type cooperative learning is a cooperative learning technique consisting of several members in a group who are responsible for mastering part of the learning material and are able to teach the material to other members in the group[14]. The use of jigsaw techniques in collaborative learning is more effective than traditional learning techniques because students can monitor each other in group work and the teacher's role can be more effective and efficient[18]. The results of Rachmah's research showed that jigsaw method has an impact on developing students' motivation in expressing their academic abilities in small learn groups[19].

### 2.1.2. Audiovisual Media

Audiovisuals are assembled from the words *auditive* and visual, namely the method of delivering information sourced from audio or speakers, while to clarify the information, supporting pictures are included whose presentation is linear. Submission of teaching materials using these two media is very effective and can save costs. The use of electronic technology as a learning medium was needed to respond to the needs of interactive learning during the COVID-19 pandemic[20]. Then during the post-pandemic COVID-19 as recovery period, the use of electronic communication is still needed as part of hybrid learning tools in Indonesia which in this study are called audio-visual. Audio-visual media is a way of producing and delivering learning materials using mechanical and electronic equipment to present audio-visual messages. Audiovisual media is very helpful in delivering learning information because it is easier, clearer, efficient, and interesting[21].

Audio-visual media functions as a transmitter of the same authentic information to everyone[22]. The educational function of audiovisual media is a medium for delivering teaching materials that stimulate students to think critically. Audio-visuals can also help develop students' knowledge and ways of thinking in transmitting their knowledge to others. The benefits obtained from audio-visual learning are that it raises curiosity about the material presented because of the attractive visual appearance accompanied by audio, it is not boring because it can be displayed in various types of variations, facilitates delivery and avoids mistakes, and can be viewed repeatedly to ensure understanding. The effectiveness of audio-visual utilization must also be accompanied by operational mastery of increasingly sophisticated communication technology devices[23]. Thus, audio-visuals seem more communicative because the output can be seen visually and also heard auditively.

### 2.1.3. Hybrid Learning

The fact that traditional learning methods experience shifts along with technological advances that continue to change exponentially that cannot be controlled. Hybrid learning is a new way of thinking in the world of education that can be actualized to direct students to acquire knowledge that is developing drastically. The transition period from the COVID-19 pandemic era to the post COVID-19 or new normal era has consequences for the creation of learning innovations that can be alternative solutions. Technology-based education 4.0 in the COVID-19 era, which is characterized by distance learning based on video technology such as zoom, goggle meet, Microsoft's team, and others, causes problems in post COVID-19 because teacher-student psychology also requires direct

communication in an educational environment[24]. Various learning media innovations direct the world of education to transform with various learning media based on electronic learning (e-learning), including the convergence of hybrid learning which refers to combining it with face-to-face learning methods or conventional methods. The transformation of education from the COVID-19 pandemic era to the new normal era must maintain social justice for students in accessing and applying learning technology[25]. The description makes it clear that blended/hybrid is a process of unifying various learning methods that can be achieved by combining virtual physical resources. In this case, the mix of methods, techniques or resources in the learning environment can be interactively meaningful.

E-learning can be website based or audiovisual based. E-learning and audiovisual systems have no access restrictions. Learning activities can be carried out in more time through the use of audiovisual technology. This time efficiency provides an opportunity for students to choose their own study time so that students have sufficient time to develop their knowledge and thinking because the learning design is more flexible and personal. Students who do not follow the learning process in conventional schools can access education through hybrid learning[26]. In addition, there are cost savings and operational efficiency. In this case, the teacher must be more creative in collaborating on conventional learning models with other learning models. This type of hybrid learning allows students to get teaching materials that are more complete than conventional learning. E-learning (audiovisual) can provide the flexibility and convenience of learning while still receiving personal interaction and conventional classroom learning support. The results of research conducted by Gultom, Sundara, and Fatwara shows that the percentage of success in hybrid learning after the COVID-19 pandemic is higher than using online or offline learning media[27].

### 2.1.4. Scientific Paper

Scientific paper, also known as academic writing, is the result of scientific thought in a particular discipline, compiled based on facts, rational, systematic, scientific, logical, and comprehensive. Scientific work is the result of a scientist's thinking which conducts literature, gathers experience, research and is obtained from previous people's knowledge with the aim of developing science, technology, and art[28]. Critical thinking skills based on cultural logic ideas are scientific thinking tools that students must develop in today's modern education[29]. Scientific work is designed in the form of a research plan that includes all components of research steps by considering research ethics and research resources. Scientific work must contain the opinions of experts and relevant theories as well as visual displays. Comprehensive presentation of scientific work can be realized if the stages of a problem or event can be presented sequentially so that it requires audiovisual assistance so that the sections can be described clearly through documented sound and motion displays.

Scientific work data is obtained from literature studies and field studies. Writers of scientific papers must be skilled and thorough in reading and recording the concepts and theories that support their scientific work[30]. Writing scientific papers must be based on accurate data related to facts obtained directly from the research location. In the prototype curriculum, junior high school students are required to produce scientific works as a condition for completing studies. Writers of scientific papers must be skilled and thorough in reading and recording the concepts and theories that support their scientific work. Writing scientific papers is of course based on collecting data from facts about the problem under study. Reality must be based on facts obtained directly from the research location.

### 2.1.5. Local Content

Local content is a curriculum activity that aims to develop competencies that are tailored to regional characteristics and potential. The basis of the local content curriculum is regulated in the regulation of the minister of education and culture number 79 of 2014 concerning local content of the 2013 curriculum[31]. Local content subjects aim to provide students with knowledge, skills, and behavior so that they have adequate insight about the state of the environment and the needs of the community in accordance with the values that apply in their area and support the continuity of regional development as well as national development. Local content that contains local wisdom can be in the form of wise local community (local) ideas that are valuable and rooted and are highly

respected by members of the community for generations.

In general, every ethnic group in Indonesia has local content in the form of local wisdom in each region which contains positive values such as mutual cooperation, tolerance, work ethic, honesty, independence, and so on. Local wisdom is a value that is considered good and true so that it can last for a long time and become institutionalized. The value of local wisdom is human wisdom that relies on a philosophy of values, ethics, ways and behavior that are traditionally institutionalized[32].

## 2.2. Research Method

The implementation of a hybrid of classroom action research and field study was implemented in two cycles. This type of research follows the classroom action research design developed by Kemmis and Taggart [33]. Meanwhile, the flow of the implementation of the action from the beginning to the end of the research can be described in the following chart.
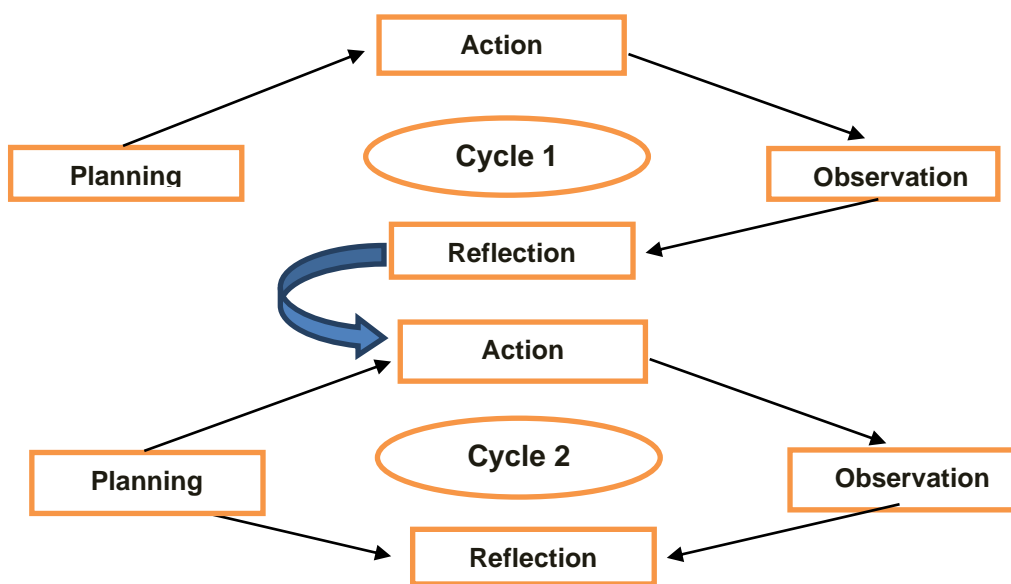


**Chart 1.** Current–voltage curves [33]

The spiral model research consists of 2 cycles with details of Cycle 1 carried out for 3 meetings, as well as Cycle 2. This research procedure consists of two cycles are a series of interrelated activities, meaning that the implementation of cycle 2 is a continuation and improvement of the implementation of cycle 1. The results obtained at the observation stage were collected and analyzed. After being analyzed, reflection is carried out, namely an assessment of the success or failure of achieving temporary goals as a basis for formulating an improvement plan in the next cycle. Furthermore, the planning that will be carried out in the second cycle is the same as the planning in the first cycle. However, there are several things that need to be added in the planning of the second cycle. Reflection is done at the end of the cycle. The results obtained at the end of the cycle were analyzed. After that, an evaluation was carried out and it was proven that the superiority of the method greatly supports improving the quality and quantity of scientific work assigned to students.

The data collection method used is the experimental method. Sugiyono[34] defines the experimental method as a research method used to find the effect of certain treatments on others under controlled conditions. In this case, the experimental method is used to find out the effect of the J-AV method that can increase the capacity of writing scientific papers to achieve high quality and can be a guide for students in driving schools. Assessment aspects are topics, grammar, presentation, analysis, synthesis and conclusions as described in the table 1 and 2. Milles and Huberman[35] illustrate the data analysis procedure which consists of 3 components, namely: (1) data reduction; (2) data presentation (data display); and (3) drawing conclusions (verification).

Data analysis is the process of arranging data sequences, organizing them into a pattern, category, and basic descriptive unit. The technique used in this research to present quantitative data is the exercise of writing scientific papers with a score of 100 for the entire assessment based on the following formula:

$$Score = \frac{total\ score}{max\ score} \times 100$$

The researchers then modify the aspects and parameters of assessing students' scientific writing based on Slavin [36] thinking as listed in tables 1 and 2.

**Table 1. Aspects of Scientific Paper's Assessment [36]**

| Aspects | Assessment | Average Score |
|---|---|---|
| Topic | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is right; | 21 – 25 |
| | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is quite right; | 16 – 20 |
| | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is less right; | 5 – 15 |
| | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is no right | 0 – 5 |
| Format | Paper size, typography, neatness of type, layout, number of pages is right; | 21 – 25 |
| | Paper size, typography, neatness of type, layout, number of pages is quite right; | 16 – 20 |
| | Paper size, typography, neatness of type, layout, number of pages is less right; | 5 – 15 |
| | Paper size, typography, neatness of type, layout, number of pages is no right; | 0 – 5 |
| Presentation | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is appropriate; | 21 – 25 |
| | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is quite appropriate; | 16 – 20 |
| | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is less appropriate; | 5 – 15 |
| | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is no appropriate; | 0 – 5 |
| Analysis, Synthesis and Conclusion | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is appropriate; | 21 – 25 |
| | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is quite appropriate; | 16 – 20 |
| | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is less appropriate; | 5 – 15 |
| | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is no appropriate; | 0 – 5 |

Then the assessment parameters are distinguished into very good, good, medium, poor, and very poor as described in the table 2.

**Table 2. Parameters for Scientific Paper's Assessment [36]**

| Mastery Level Percentage Interval | E – A | Remark |
|---|---|---|
| 90 – 100 | A | Very Good |
| 80 – 89 | B | Good |
| 70 – 79 | C | Medium |
| 60 – 69 | D | Poor |
| 00 – 59 | E | Very Poor |

An indicator that shows the success of the J-AV method in this classroom action research is the acquisition of a mastery level percentage interval above 80 or b in remark good; and upper 90 or in remark very good.

## 3. RESULTS AND DISCUSSIONS

The research activity began with an audience by the Hasanuddin University research team to the Headmaster of Junior High School UPTD SMPN 6 Moncongloe Maros and the Headmaster of Junior High School UPTD SMPN 10 Bantimurung Maros. This meeting discussed the technical implementation of research, namely the determination of activity schedules, research rooms/places, and students as target participants for the practice of writing scientific papers. After the research preparation was completed, the research team immediately carried out research in three stages, namely research cycle 1, research cycle 2, and evaluation of research achievements.

### 3.1. The Research Cycle 1

The cluster of research activities in cycle 1 is divided into three stages, namely data collection, observation, and reflection.

### 3.1.1. Data collection

The data collection method used is the experimental method. It can be interpreted as a research method used to find the effect of certain treatments on others under controlled conditions. In this case, the experimental method is used to find out the effect of the J-AV method that can increase the capacity of writing scientific papers to achieve high quality and can be a guide for students in driving schools. 20 students who became the research sample from the Junior High School UPTD SMPN 6 Moncongloe Maros and 20 students from Junior High School UPTD SMPN 10 Bantimurung Maros, were put into small groups. Each group consists of 5 students.

### 3.1.2. Observation

The research team observed the results of scientific paper in the first phase of the cycle produced by study groups that had been formed in the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros. This observation was carried out to monitor the process of collecting written data by students based on groups using a descriptive-qualitative approach, namely exploring the learning situation and applying the J-AV method as well as assessing the scientific work that has been produced by students and the ability to work together in groups to provide information to other groups.

### 3.1.3. Reflection

The research team reflected on the writing of scientific papers in the first phase of the cycle produced by study groups that had been formed in the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros. This reflection is carried out to evaluate the process of taking written data manually without using audiovisual by students based on groups using a descriptive-qualitative approach, namely exploring the learning situation and applying the J-AV method as well as assessing scientific papers with the theme of local wisdom that have been produced by students and the ability to work together in groups to provide understanding of the material to other groups. Based on the reflection, an assessment score was obtained from the average value of students' writings for the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros as shown in the following table 3.

**Table 3. Assessment Score for Students' Scientific Papers at the Junior High School UPTD SMPN 6 Moncongloe and the Junior High School UPTD SMPN 10 Bantimurung Maros**

| Aspects | Assessment | Average Score |
|---|---|---|
| Topic | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is quite right. | 19 |
| Format | Paper size, typography, neatness of type, layout, number of pages is quite right. | 17 |
| Presentation | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is quite appropriate. | 18 |
| Analysis, Synthesis and Conclusion | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is quite appropriate. | 17 |

| | | |
|---|---|---|
| | **Total** | **71** |
| | **Assessment Parameter** | **C  (Medium)** |

The assessment score indicator from the average value of the writings of the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros students above shows the success of the J-AV method in classroom action research in cycle 1 has not yet reached a minimum score of 80 so it needs to be continued in cycle 2 research procedures with data retrieval based on audiovisual, no longer in manual form.

### 3.2. The Research Cycle 2

The cluster of research activities in cycle 2 is divided into three stages, namely data collection, observation, and reflection.

### 3.2.1. Data collection

The data collection method used is the experimental method. In this case, students' writing capacity is carried out through audiovisual-based data and information collection, no longer manual. The writings compiled by 20 students from the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros still use the title of the paper used in the first cycle with the same group. The data collection in cycle 2 is a repetition of cycle 1 using different methods.

### 3.2.2. Observation

The research team observed the results of scientific writings in the second cycle of field action produced by study groups for students of the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros. This observation was carried out to monitor the process of taking audiovisual data and information on writing materials using a descriptive-qualitative approach, namely exploring the learning situation and applying the J-AV method as well as assessing the scientific work that has been produced by students and the ability to work together in groups to provide understanding of the material to other groups.

### 3.2.3. Reflection

The research team reflected on the writing of scientific papers in the second phase of the cycle produced by study groups that had been formed in the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros. This reflection was carried out to evaluate the process of collecting data and written information using audiovisual by students based on groups using a descriptive-qualitative exploratory approach. The assessment score of the average value of the scientific papers' students of the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros after using the audiovisual method in collecting data and information on scientific papers as shown in the following table 4.

**Table 4. Assessment Score for Students' Scientific Papers at the Junior High School UPTD SMPN 6 Moncongloe and the Junior High School UPTD SMPN 10 Bantimurung Maros**

| Aspects | Assessment | Average Score |
|---|---|---|
| Topic | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is right. | 22 |
| Format | Paper size, typography, neatness of type, layout, number of pages is right. | 20 |
| Presentation | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is appropriate. | 21 |
| Analysis, Synthesis and Conclusion | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is appropriate. | 21 |
| | **Total** | **84** |
| | **Assessment Parameter** | **B (Good)** |

The assessment score indicator of the average value of students' scientific paper at the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros after using the audiovisual method in collecting data and information on research papers showed success with an achievement score above 80 with an assessment parameter of b (good).

## 3.3. Evaluation of research achievements

Data analysis is the process of arranging data sequences, organizing them into patterns, categories, and basic units of description. The technique used in this research to present quantitative data is an exercise in writing scientific papers with a score of 100 for the overall assessment with the formula:

$$Score = \frac{total\ score}{max\ score} \times 100$$

The indicators of the success of audiovisual-based jigsaw method to increase the capacity of students to write scientific works at the junior high schools in Maros Regency, Indonesia can be seen from the data comparison of manual and using audiovisual as shown in the table 5 below.

**Table 5. Comparative Score of Students' Scientific Paper Assessment at the Junior High School UPTD SMPN 6 Moncongloe and the Junior High School UPTD SMPN 10 Bantimurung Maros**

| Aspect | DATA COLLECTION/INFORMATION MANUALLY | | DATA COLLECTION/AUDIOVSUAL INFORMATION | |
|---|---|---|---|---|
| | Assesment | Score | Assesment | Score |
| Topic | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is quite right. | 19 | The suitability of the title with the topic, theme, and content of the paper; the actuality of the topic and the focus of the discussion is right. | 22 |
| Format | Paper size, typography, neatness of type, layout, number of pages is quite right. | 17 | Paper size, typography, neatness of type, layout, number of pages is quite right. | 20 |
| Presentation | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is quite appropriate. | 18 | Creativity of ideas, innovativeness, benefit to society, originality of ideas, clarity of expression of ideas, systematic, application of scientific language variety is appropriate. | 21 |
| Analysis, Synthesis and Conclusion | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is quite appropriate. | 17 | The ability to analyze and synthesize, conclude discussions, predict and transfer ideas to be adopted is appropriate. | 21 |
| | **Total** | **71** | **Total** | **84** |
| | **Assessment Parameter** | **C** | **Assessment Parameter** | **B** |

Based on the comparison of the achievement scores above, it shows a significant increase from the manual method to the audiovisual method of collecting data and research information on the scientific papers of the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros students, from a total score of 71 increasing to 84. The assessment parameters also increased from C (medium) to B (good). This increase can be seen from the aspect of the assessment:
- topic from the score of 19 increased to 22;
- format from the score of 17 increased to 20;
- presentation from the score of 18 increased to 21;
- analysis, synthesis and conclusions from a score of 17 increased to 21.

Based on the research results obtained from the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung, it was found that the jigsaw learning method using audiovisual media was able to increase the capacity of students to write scientific papers. The quality of the written scientific works increased significantly from the assessment parameter C (medium) to B (good) in the aspects of topic, format, presentation, analysis, synthesis and conclusion. Students are more creative, innovative, critical, and enjoy obtaining data using audiovisual media. Students can also document and replay data in various types of variations so that they understand better when reflecting on the data analysis they have done. the average score for scientific

papers of the Junior High School UPTD SMPN 6 Moncongloe Maros and Junior High School UPTD SMPN 10 Bantimurung Maros students before using audiovisual media was 71 with C quality or medium assessment parameter, but the average score increased to 84 with B quality or good assessment parameter after using audiovisual media in compiling scientific papers.

## CONCLUSIONS

The Jigsaw learning method using audiovisual techniques can be an alternative learning in the post Covid-19 pandemic situation or New Normal Era, especially the writing of scientific papers by junior high school students. This study found an empirical fact that students were able to significantly increase their capacity to write scientific papers through the jigsaw learning method using audiovisual media on aspects of topic, format, presentation, analysis, synthesis and conclusion. The success of the hybrid learning system during the post COVID-19 pandemic in Indonesia was determined by three aspects, namely learning media innovations such as the use of audiovisuals, teacher creativity in carrying out the learning process such as applying the jigsaw method, and students' capacity to apply learning communication technology. Improving the quality of the intellectual capacity of junior high school students is a socio-economic capital for the future generation of the Indonesian nation in filling job opportunities in the ASEAN countries.

The effectiveness of using audiovisual media in hybrid learning is being able to increase the capacity of junior high school students to write higher quality scientific papers. Before using audiovisual media, the average score of students' scientific papers of the Junior High School UPTD SMPN 6 Moncongloe Maros and the Junior High School UPTD SMPN 10 Bantimurung Maros was 71 with a quality of C or medium, but by using audiovisual media in compiling scientific papers, they could increase their average score to be 84 with B or good quality. The researchers suggest that this research can be continued with a longer proportion of data collection time, observation, and reflection so that the jigsaw procedure can be understood by students correctly and precisely. Likewise, the use of audiovisual techniques can be applied by students in an innovative and more creative way in collecting research data and processing the data to become scientific papers of A quality or very good.

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