

# Improving Students' Metacognitive Ability Through Multisensory Learning in Primary Schools

Sigit Dwi Laksana<sup>1\*</sup>, Ayu Wulansari<sup>2</sup>, Lilis Sumaryanti<sup>3</sup>

<sup>1,2,3</sup> Universitas Muhammadiyah Ponorogo

\*Email: [sigitciov@gmail.com](mailto:sigitciov@gmail.com)

## ABSTRACT

Elementary school-age children experience a phase called formal operations, as stated by Jean Piaget in his theory of child cognitive development. Where at this stage the child begins to learn thoroughly involving all his five senses, and in the learning process the child needs something concrete and clear, therefore multisensory learning can improve students' metacognitive abilities. Multisensory learning is an approach in learning that is focused and maximizes the five senses possessed by students. The purpose of multisensory learning that involves various senses in lessons, such as touch or sound, is that students will better understand and retain information. This strategy can be especially useful for students with learning disabilities, such as dyslexia. This type of literature review is an integrative review in which there are assessments, criticisms, and synthesizing literature on research topics so that new theoretical frameworks and perspectives can emerge. The result is that learning becomes more focused and the focus of the material content can be conveyed well to students.

**Keywords:** *Metacognitive Ability, Multisensory Learning, Primary Schools.*

## 1. INTRODUCTION

Process Learning is a process in which it involves teachers and students who are doing it activity academic that leads to learning goals. In the learning process, some components cannot be separated, namely teachers and students, these two components must be in place so that there is a transfer of knowledge between teachers and students.

One of the objectives of learning is a broad understanding of the material being taught, and this is an important value of education [1]. Broad understanding requires several actions taken by the teacher, one of which is by designing learning as interesting as possible, so that makes it easier for students to understand the material holistically, but we cannot deny that understanding also depends on increasing previous conceptions to the level awareness and new in-depth analysis of previous knowledge or understanding [2].

The main purpose of the analysis of learning objectives is to find out what learning outcomes students can obtain after studying certain parts of the subject matter, such as knowledge, skills, and so on. There are many ways to categorize learning objectives,

and it requires a classification framework. Bloom's Taxonomy is a classic classification framework that is customary to analyze to achieve learning objectives [3].

Learning if viewed from the competency dimensions to be achieved, three competencies are the center of learning from teachers, according to Bloom, these dimensions include cognitive, affective, and psychomotor domains. These three things are components that are very influential on a person concerning the learning experience.

The cognitive domain includes intellectual skills and knowledge processing, which are the main focus of most traditional education and are often used to structure curriculum learning objectives, assessments, and activities. The affective domain represents goals related to attitudes and feelings. The psychomotor domain concerns what that is your students may do physically.

In this case, the focus of the study is learning by focusing on the cognitive domain because it is directly related to the learning experience, although it does not deny the other two domains as well. Influence the learning experience. The cognitive domain includes many things including Learning experiences for memorizing activities, for example using memory

bridges. Types of learning materials that need to be memorized can be facts, concepts, principles, and procedures. Learning experiences for the level of understanding are carried out by comparing, identifying characteristics, generalizing, concluding, and so on.

The application-level learning experience is carried out by applying the principles to real cases that occur in the field. The synthesis level learning experience is done by combining various elements or components, composing a building, composing, painting, drawing, etc. Experience learning at the experience assessment level can be done by providing an assessment of an object of study with predetermined criteria. This is in line with what was conveyed by Bloom who divided the cognitive domain into two, namely Knowledge and Comprehension.

Knowledge deals primarily with the ability to memorize and remember certain facts. Comprehension involves the ability to interpret, and demonstrate students' basic understanding of ideas [3].

The cognitive domain explains that the knowledge of how much students' cognitive abilities are not sufficient to become the basis for developing ideal learning. It takes a much higher cognitive study to determine the extent to which students learn, namely by examining the ability of students to regulate their cognitive processes. This ability is better known as metacognition[4]. Metacognitive is the ability to use knowledge to regulate and control cognition. Cognitive control is intended for awareness of understanding and learning performance [5].

Metacognitive ability is the knowledge that includes (beliefs, ideas, theories) about various cognitive functions, such as memory or thinking, about what can be done and how to do something, for example, metamemory, meta attention, and others. It also includes knowledge of the knowledge validity criterion, the so-called 'epistemic cognition. One thing that can be used as an argument is that theory thinking is also an enhancement of metacognitive knowledge[6].

Metacognitive abilities are important for students to have, there are several reasons, including if students have metacognitive abilities in the learning process, these students can have the ability to control the learning process [6]. Students who have high metacognitive skills will also show high critical thinking skills. Students who have metacognitive abilities will be able to control and organize their learning activities[6] Efforts to improve students' metacognitive abilities can be done with several strategies, one of which is by using a multisensory learning strategy. Multisensory learning is a learning theory that uses neuroscience to reach students. By involving a variety of senses in your lessons, such as touch or sound, students may be more likely to understand and retain information. This

strategy can be especially useful for students with learning disabilities, such as dyslexia.

Multisensory learning managing the classroom for effective teaching and learning involves a lot of the senses. Multisensory learning can also be referred to as multimedia in-class learning meetings. It is assumed that multisensory learning is a gateway to the knowledge we all have to learn and assimilate new information [7]. The use of multisensory learning strategies can collaborate with several approaches. In a multisensory learning article collaborating with games, the results of the study suggest that multisensory have the potential to improve performance, user engagement, intensify the role of presence, and trigger specific emotional responses in educational play[8].

In addition, the multisensory learning method can also be collaborated with music. There is a difference between voice and musical notation. The problem lies in the main features of musical notation that must be mastered if music is to be written and read. This is followed by an indication of some of the difficulties experienced by students. Given the obstacles in the implementation of music learning, it is necessary to pay attention to how to concentrate / pay attention to the parallels between teaching and music literacy, teaching literacy, and teaching mathematics. Before carrying out the three, it must precede a discussion of notation; students must be shown regularities and patterns, and the approach must be multisensory[9].

The discussion above shows that students' cognition can be improved by using one of the strategies, namely multisensory learning appropriately and in accordance with the correct learning procedures. One of them is that the results of this study indicate that the results of this study indicate that the use of multisensory learning can be more effective in maximizing learning. Through this learning, teachers can actively involve students in the learning process

## **2. THEORETICAL REVIEW**

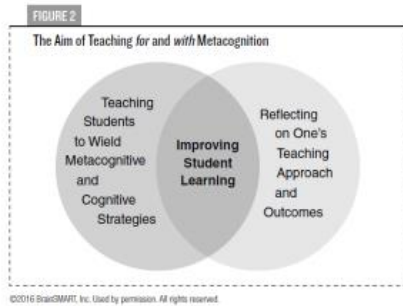
### ***2.1. Metacognitive***

Metacognitive is knowledge and belief about a person's cognitive processes and his conscious effort to be involved in mental processes (thoughts) and emotional processes (behavior) thereby enhancing learning and memory thought. Metacognition is a major component in lifelong learning (long-life education) in general and science education in particular, metacognitive engagement is the key to developing a deeper conceptual understanding of science as well as ideas.

Metacognition is an important, but often overlooked, a component of 21st-century education that teaches students how to learn. Flavell describes metacognition in more detail such as (a) knowledge of people's

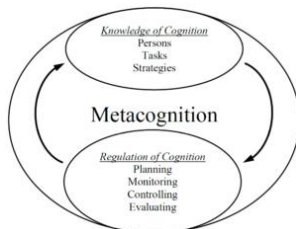
cognition, (b) knowledge of cognitive tasks, (c) knowledge of strategies applied to different solutions to tasks, and (d) skills to monitor a person's cognitive activity [10].

Many experts share understanding about metacognitive into categories, as noted by Jacob and Paris note that researchers generally surround the problem of defining metacognition by referring to two broad classes of metacognition: knowledge of cognition, which includes declarative knowledge ('about'), procedural knowledge (how to), and conditional knowledge ('why' and 'when'), and regulation of cognition, which includes planning, evaluation, and monitoring[10] Donna Wilson in her book says that the application of metacognitive is increasingly opening our eyes to the tremendous potential for enhancing the teaching and learning process by applying key aspects of cognitive neuroscience in educational settings.



**Figure 1.** The Aim of Teaching for and with Metacognition[11].

Metacognition involves thinking about a person's thinking, or cognition, to enhance learning. Metacognition refers, inter alia, to active monitoring and consequence of regulating and regulating processes. Usually, it explaining some concrete goals or objectives. More simply, metacognition involves being knowledgeable about and controlling a person's cognitive abilities[11]



**Figure 2.** Conceptual Framework of Metacognition

Like the arrow in Figure 1 shows, metacognition is cyclical. We use our current metacognitive knowledge as we engage in metacognitive regulation. As a result of our metacognitive regulation, there is feedback to broaden and improve our metacognitive knowledge. One's knowledge refers to knowing how thinking and learning work for people in general and how we tend to,

and prefer to, specifically process information. Task knowledge includes such things as the cognitive demands of the task, objectives, difficulty, complexity, and context. Knowledge of strategy includes general learning and problem-solving strategies, as well as specific task strategies[12].

**3. METHOD**

The design of this research is Literature Review or literature review. Literature research or literature review (literature review, literature research) is research that examines or reviews critically knowledge, ideas, or findings contained in the body of literature academically-oriented literature[13], as well as formulating his theoretical and methodological contributions to specific topics, The nature of this research is descriptive analysis, namely: regular decomposition of the data that has been obtained, then given understanding and explanation so that it can be understood well by the reader.

Search for publication articles on Scopus, Springer, Google, Google Scholar, and research gate using selected keywords, namely: Metacognitive, Multisensory learning in English and Indonesian.

Articles or journals that meet the inclusion and exclusion criteria taken for further analysis. This literature review uses literature published in 2015-2020 which can be accessed in full text in pdf format and scholarly (peer reviewed journals). The journal criteria reviewed are research journal articles in Indonesian and English with Metacognitive subjects.

**4. FINDING AND DISCUSSION**

**4.1 Improving Students' Metacognitive Ability Through Multisensory Learning**

Multi-sensory consists of two words, namely multi-sensory. The word "multi" means many or more than one, and "sensory" means the five senses. Two senses are more than one of the five senses. Approach multisensory can be applied to early childhood, children with special needs, children with dyslexia or children with mental disabilities, and also to children of primary school age.

The multisensory learning approach uses several sensory devices owned by students, including visual, auditory, kinesthetic (movement), smell, gustatory (tasting), tactile (touch). The multisensory learning approach states that children learn best when children use several senses (five senses). The senses that are often used, namely kinesthetic stimulation (motion), and touch (touch) which are caused by the visual senses (sight) and the sense of hearing (hearing) [14].

Several principles use multisensory learning in the classroom, including: (1) The atmosphere in the classroom is pleasant and comfortable. If students feel happy and enjoy, they will easily accept learning from the teacher, (2) Individual principles, meaning that each child is a unique person so that each child has a different intelligence and acceptance of the subject matter. (3) The principle of continuity, which means that the application of the approach multisensory one continuously. Through the principle of continuity, children will become familiar with the lessons that have been taught.

The principle of sustainability, meaning that if the child has mastered the material that has been taught, the student will learn the material at a later stage[15]

besides, that multisensory learning can also help children in solving problems in learning mathematics, helping children in reading skills [16] Teaching using multisensory learning is very effective for all students. In general, this means conveying all information or material to students through three sensory modalities, namely: visual, auditory, and kinesthetic. Overall, applying the approach multisensory to teach is not difficult many teachers use such an approach. However, it is important to be aware of the three sensory modes both advantages and disadvantages, and plan to integrate them. So that it can increase the capabilities of metacognitive students even more so if we integrate with multisensory learning

Elementary school-age children experience a phase called Operationalformal, as stated by Jean Piaget in his theory of children's cognitive development. Where at this stage the child begins to learn thoroughly involving all five senses, and in the learning process children need something in their nature concrete and, therefore, therefore multisensory learning can improve students' metacognitive abilities if done correctly and in accordance with the learning steps.

The process of processing information in this multisensory learning is by integrating sensory to get information through the five senses, then without the previously acquired knowledge in the form of information and memories stored in the brain to make meaningful responses[17].

## 5. CONCLUSION

Every teacher longs for the learning process to run smoothly, creating a pleasant and meaningful learning climate, this is actually so that the learning objectives are achieved. But we often encounter the learning process that is still not optimal due to the lack of learning patterns used, so that it affects children's cognitive, which will also further affect metacognitive child, where there is no balance Among six levels in the realm of cognitive so that an approach is needed that can improve these metacognitive abilities. One of them

is by implementing multisensory learning. This is an approach to learning that is focused and maximizes the five senses possessed by students. There are many advantages obtained, one of which is learning to be more focused and focused on the content of the material can be conveyed well to students.

## REFERENCES

- [1] C. M. Reigeluth, Ed., *Instructional-design theories and models*. Hillsdale, N.J: Lawrence Erlbaum Associates, 1983.
- [2] R. N. Ronau, C. R. Rakes, and M. L. Niess, Eds., *Educational Technology, Teacher Knowledge, and Classroom Impact: A Research Handbook on Frameworks and Approaches*. IGI Global, 2012.
- [3] J. Y. Ronghuai Huang, J. Michael Spector, *Educational Technology A Primer for the 21st Century*. Singapore: Springer Singapore, 2019.
- [4] A. G. C. Wicaksono, "PERBANDINGAN KEMAMPUAN KOGNITIF DAN METAKOGNITIF MAHASISWA DENGAN GAYA BELAJAR YANG BERBEDA," p. 12.
- [5] G. Schraw and R. S. Dennison, "Assessing metacognitive awareness," *Contemporary Educational Psychology*, vol. 19, no. 4. pp. 460–475, 1994, doi: 10.1006/ceps.1994.1033.
- [6] W. N. Jannah, "PENTINGNYA KEMAMPUAN METAKOGNITIF SISWA SEKOLAH DASAR SEBAGAI GENERASI EMAS," p. 8, 2018.
- [7] N. Aja, S.N., P.I.Eze, D.I. Igba, E.C. Igba, Chika C. Nwafor, "Using Multi-Sensory Instruction in Managing Classroom for Effective Teaching and Learning," vol. 12, no. 24, p. 7, 2017.
- [8] A. Covaci, G. Ghinea, C.-H. Lin, S.-H. Huang, and J.-L. Shih, "Multisensory games-based learning - lessons learnt from olfactory enhancement of a digital board game," *Multimed Tools Appl*, vol. 77, no. 16, pp. 21245–21263, 2018, doi: 10.1007/s11042-017-5459-2.
- [9] T. R. Miles, "Musical notation and multisensory learning," *Child Lang. Teach. Ther.*, vol. 7, no. 1, pp. 61–78, 1991, doi: 10.1177/026565909100700104.
- [10] Z. R. M. D. R. B. Yehudit Judy Dori, *Cognition, Metacognition, and Culture in STEM Education*, vol. 24. Cham: Springer International Publishing, 2018.
- [11] D. Wilson and M. Conyers, *Teaching students to drive their brains: metacognitive strategies, activities, and lesson ideas*. 2016.

- [12] “<https://skillful-learning.org/theory/>.” 2020.
- [13] H. M. Cooper, “Organizing knowledge syntheses: A taxonomy of literature reviews,” *Knowl. Soc.*, vol. 1, no. 1, pp. 104–126, 1988, doi: 10.1007/BF03177550.
- [14] R. D. Suryaratri, E. H. Prayitno, and W. Wuryani, “The Implementation of Multi-sensory Learning at Elementary Schools in Jakarta,” *jpud*, vol. 13, no. 1, pp. 100–113, Apr. 2019, doi: 10.21009/10.21009/JPUD.131.08.
- [15] Z. P. B. Juliane Krueger Fister, Ryan A. Stevenson, Aaron R. Nidiffer and M. T. Wallace, “Stimulus intensity modulates multisensory temporal processing,” *Neuropsychologia*, 2016.
- [16] P.-L. P. Rau, J. Zheng, and Y. Wei, “Distractive effect of multimodal information in multisensory learning,” *Comput. Educ.*, vol. 144, p. 103699, 2020, doi: 10.1016/j.compedu.2019.103699.
- [17] S. Prasannakumar, “Improving Working Memory in Science Learning through Effective Multisensory Integration Approach,” *Int. J. MIND, BRAIN Cogn.*, vol. 9, no. 1–2, p. 11, 2018.