



The Implementation of Multi-sensory Learning at Elementary Schools in Jakarta

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ABSTRACT: This research aims to identify the implementation of multi-sensory learning at elementary schools in Jakarta. The method used through surveys to 50 elementary schools' teachers in 5 schools. Data was collected by using questionnaire that revealed the implementation of multi-sensory learning. The result of this study showed that the use of multi-sensory learning could be more effective in maximizing learning. Through multi-sensory learning, teacher can involve students actively in the learning process and facilitate all students with different learning styles. Multi-sensory learning can be used in all lesson that integrated with curriculum and has significant implications in the real-life learning. The obstacle in implementing this learning model is founded about the lack of using of audiovisual technology and many schools do not implemented the multi-sensory learning.

Keywords: Multi-sensory learning, Elementary School, Audiovisual Media.

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1 INTRODUCTION

Audio-visual thematic learning technology in improving early childhood multisensory has never developed in elementary school. The implementation of thematic learning generally uses conventional learning. The learning technology that will create in this design a combination of audio and visual or can call the media of view and hearing which makes it easy for students to learn so that it very possible for two-way communication between the teachers and students in the processes. This media can stimulate multisensory children ranging from sight, hearing, smell, taste, and taste. This learning technology will vary according to the themes in the curriculum. Learning technology that made adjusted to the grade level and the relevant themes. Also, it is also adapted to children's learning styles, namely auditory style, kinesthetic and visual.

Multi-sensory consists of two words, namely multi and sensory. The word "multi" means many or more than one, and "sensory" means the five senses. The two senses are more than one of the five senses. A multisensory approach can be applied to early childhood, children with special needs, children with dyslexia or mentally retarded children.

Basically, every child is a multisensory learner. For example, when you are 1 year old, all of his curiosity about something he has assumed by Donut then he does not directly eat it. He will hold, lick, squeeze and can also be taken after being satisfied with his curiosity so he will eat it (better parents prevent it).

This multisensory learning approach uses sensory devices, including the visual, auditory, kinesthetic (movement), olfactory, gustatory (tasting), tactile (touch). A multisensory approach is a statement that children learn well when children use multiple senses. The senses are often used, namely kinesthetic (motion), and tactile (touch) stimulation caused by the visual senses (vision) and auditory (auditory) senses. The multisensory approach is assisted with concrete media. The multisensory approach includes tracing activities (listening), listening (auditory), writing (movement), and seeing (visual). For that, the implementation of this method requires tools (media) cards, flour, lines and letters made of fabric panels, and other tools that are palpable (concrete) (Matusz, Wallace, & Murray, 2017).

The principles used in using multisensory are:

1. The atmosphere in the classrooms is pleasant. If your child's feelings are happy, he will easily receive learning.
2. Individual principles, meaning that every child is a unique person, so each child is a different intelligence and acceptance of the subject matter that provides education services becomes a priority that must be considered.
3. The principle of continuity, meaning that the implementation of a multisensory approach is carried out continuously and is not expected to be expected by the expected bias of the results. Through the principle of continuity, children will be familiar with the lessons that have been taught.
4. Sustainable principles, meaning that if the child has mastered the material that has been taught, then students learn the material at the next stage (Krueger Fister et al., 2016).

Learning often depends on a child's vision to see text and images and read information. It also depends on the child's hearing to hear what the teacher is saying. Teaching multisensory is not only limited to reading and listening. In contrast, multi-sensory teaching uses all the senses. Each lesson will not use all the senses of the child (taste, smell, touch, vision, hearing, and movement). But in most multisensory lessons, children understand the material by involving more than one method. For example, say when a child is studying oranges. Children can examine, touch, smell, and taste apples visually, not just read and listen to the teacher explain how oranges will grow. Then he might hold the orange split in two and count the number of seeds in it, one by one. That's one example of multisensory teaching. that is teaching by conveying information through things like touch and movement or part of touch and kinesthetic as well as vision and hearing.

Multisensory learning is one of them done to help to teach reading. Multisensory reading uses vision, sound, movement, and touch to help children connect language with words. In addition, multisensory teaching can also be used for teaching mathematics. Multisensory teaching in mathematics can use manipulative objects (small objects such as interlocking cubes or beam shapes) to help children do mathematical applications.

Teaching science can also be done with a multisensory approach where children carry out experiments, write down the steps and report their findings, is a multisensory learning experience. Even singing that teaches things like days of the week or country names is an example of multisensory learning.

All children can benefit from multisensory teaching, both children who have no learning barriers or children who have learning disabilities. If a student learns something using more than one sense, the knowledge gained will continue to stick in his memory. Multisensory learning can be very helpful for children with learning and attention problems. For example, these children may experience problems with visual or auditory processing. These obstacles make it difficult for them to learn information just by reading or listening.

Using many senses gives these children (and others) more ways to connect with what they learn. This type of direct learning can make it easier for students to:

1. Gather information
2. Make connections between new information and what they already know
3. Understanding and overcoming problems
4. Use nonverbal problem-solving skills (Morin, 2019)

Multi-sensor instructions help children use their learning power to make connections and shape memories. And that allows them to use various ways to show what they have learned. Multisensory teaching notes that children have different ways of learning from each other. This can help meet the diverse needs of all children, not just those who have learning and attention problems. And by providing many ways to learn, it gives every child in the class a chance to succeed (Morin, 2019).

When in the classroom, the task that must be done by the teacher is all students who have the same opportunity to learn successfully. Learning seems so easy for some children, but not for

others. by asking the teacher to generalize students who are trying to learn. In addition, the teacher must learn the material presented can be accepted by the child's brain that varies.

Barriers to meeting the needs of all students:

- How do teachers know what each child's talents are?
- How can the teacher teach lessons that are tailored for each student?
- How will the teacher spend time in the day planning and spending extra?
- How can the teacher get teaching materials that work with each type of learner?

Good learning can be done by optimizing the five senses. Because the senses act as a pathway to the brain. This is the main pathway to the child's brain:

- Auditory - through the sense of hearing
- Visual - through the sense of sight
- tactile - through the sense of touch
- Kinesthetic - through body movements

Multisensory lessons will really involve students at all levels simultaneously. Multisensory teaching is very important because it does not pay attention to the learning excellence of every child (be it auditory, visual, tactile, or kinesthetic), a multisensory lesson will benefit the excellence of learning for all students at one time.

Children who are very good at a hearing can not only hear lessons learned; Can be done by looking, holding or feeling. Auditory type of children benefits from repeating hard new content. They benefit from using hearing, so they can hear themselves more clearly. They benefit from reading aloud. Auditory students will benefit by explaining what they have to convey to other students or to their peers.

Visual type of children not only need to see what they need. They benefit from graphics or images that contain subject matter in a logical way from all activities. Visual children really like to see well-organized material that allows them to find patterns. What they get. Visual learning by equating symbols with known objects. Their strength is not given to repetition and memorization. They prefer organized content so that they can take pictures stored in the brain and are easily recovered. Visual abilities are most often excluded by tactile or kinesthetic abilities. The results of the multisensory visual learning facilitation are shown in the figure below:

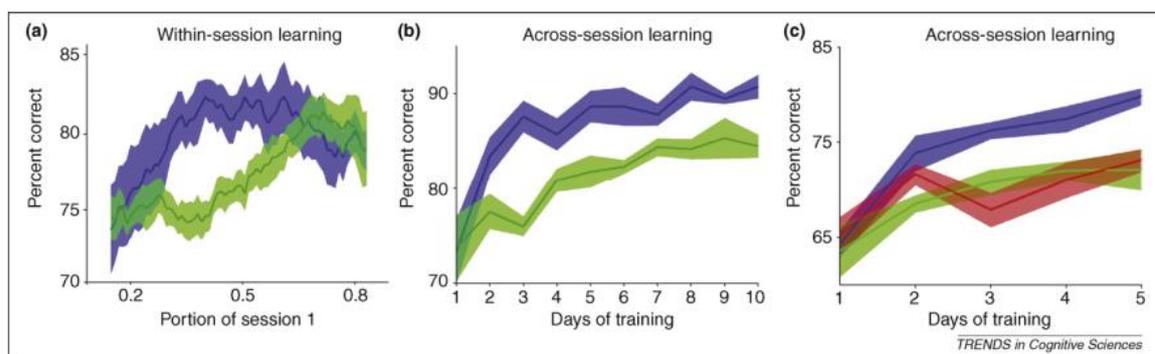


Figure 1. Results of multisensory facilitation of visual learning. Congruent (blue) auditory-visual training results in, (a) faster within-session learning and (b) greater across session learning, compared to (c) unit sensory training (red). Incongruent (green) training does not show same benefit as congruent training (blue). Data in all plots is for trials

containing only visual signals. Shaded regions indicate within subject standard error. Parts (a) and (b) reproduced, with permission, from Ref. Part (c) adapted from Ref

Children who learn with must have the opportunity to use their hands to learn. This exceeds paper and pencil learning. Tactile type children make meaning by moving things, by manipulating objects that represent the concepts they get.

Examples of good tactile materials are math calculation coins and fraction shards. Jam with moving needles and real money to calculate is also very beneficial for tactile type children. When learning to read words, cards that show words through simple pictures and words on the opposite side are far more effective than a list of words that must be memorized.

Children with kinesthetic types must move to focus and learn. They also benefit from moving in a way that changes the concept they get. Perfect examples include body movements that reflect the meaning of the new word they are correcting.

Body movements that reflect the letters of the alphabet greatly help children who learn to get the names of letters with their symbols and sounds. Children with kinesthetic types are usually also a type of visual child. Children of this type will be very happy to receive help from the teacher to move to issue donations and materials from the material to be delivered (Child1st, 2019).

Learning a cognitive activity that originates in the human brain (Matusz et al., 2017). Humans have unlimited brain abilities and ready to developed (Jansen, 2000). Teachers need to understand how the brain works especially when they learn. An understanding of learning styles strongly related to the learning process. Research related to brain-based teaching results in that learning that fun can improve learning outcomes of elementary school students (Yufiarti, 2016). The learning process can define as a process: (1) receiving information, (2) understanding and (3) remembering it.

Sensory

Sensory is the process of detecting the presence of a stimulus from the outside environment through the senses (exoreceptors) (Nidiffer, Stevenson, Krueger Fister, Barnett, & Wallace, 2016). In humans there five sensory systems, namely: (1) the visual system (vision); (2) auditory (hearing); (3) somatosensory (palpation); (4) olfactory (olfactory); (5) and gustatory (tasting) (Gorjian, Hayati, & Barazandeh, 2012). The sensory system regulated by the brain in the sensory cortex region which consists of three different types, namely in the section: (1) primary sensory cortex, a system that includes the sensory cortex region that receives most of the input directly from the thalamic delivery system; (2) secondary sensory cortex, a system that includes areas that receive input from primary sensory cortex or other secondary sensory cortex; and (3) the cortex of the association, which an area that receives input more than one sensory system. The interaction of the three types of cortex characterized by hierarchical principles, functional segregation, and parallel processing.

A multisensory process defined as the influence of one sensory modality on activities produced by other modalities. However, most of the terms “multisensory” identical to the term “bimodal” (describes neurons that can activate by independent stimuli that more than one modality). Therefore, in the study of multisensory connections, bimodal identified as the first area or neuron in response to different sensory stimuli.

Multisensory techniques are often used for children with different learning styles. Techniques and strategies discuss multi-sensory. They encourage students to use part or all of them to:

- Gather information about a task
- Link information to ideas that they already understand and understand
- Logical thinking is involved in solving problems
- Learn problem-solving
- Utilizing nonverbal punishment skills
- Understand the relationship between concepts
- Save information and save for later storage

Using multisensor techniques means helping children learn through more than one sense. Most techniques are performed using vision or hearing (visual or auditory). Child's vision is used in reading information, viewing text, images or reading information based on the board. Indonesian is used to listen to what the teacher asks. The vision of children who can be approved by difficulties is approved or arranged visually. Sometimes a child's hearing may be weak. The solution to these problems is to involve the use of more children's senses, especially the use of extra (touch) and movement (kinetic). This will help the child's brain to develop tactile and kinetic to survive, as well as hearing and visual.

Students with learning difficulties overcome difficulties in one or more fields of reading, spelling, writing, mathematics, understanding listening and expressive language. Multisensor techniques allow students to use their personal area of strength to help them learn. They can choose from simple to complex, depending on the needs of students and assignments that depend.

Some researchers theorize about many students who have a field of sensory learning, sometimes called learning styles. This researcher discusses students who use techniques that learn with their style, they learn more easily, are faster and can maintain and use concepts easier to learn in the future. Most students, with difficulty or not, can enjoy a variety of acceptable multisensor techniques.

Now we can use several multisensor techniques that can be used to help students in their learning. Visual learning techniques can use the following tools:

- Text and/or images on paper, posters, models, projection screens, computers or flashcards
- Use of colors to move, information or image
- Graphic organizer outlines the parts
- Students create art, images, text, images, and videos
- The techniques agreed to above are resolved using visual approval methods and strategies.

Audio learning techniques can use the following tools:

- Books on tapes, peer-assisted reading, paired reading and computerized text readers
- Video or audio accompanying movies
- Music, songs, instruments, speech, poetry, songs and language games

Multi-sensory techniques that involve the use of touch senses are called touch methods. Tactile methods include strategies such as:

- Sand trays, raised line paper, textured objects, cat fingers, and puzzles to enhance fine motor skills

- Modeling materials such as clay and chisel material
- Using small materials called manipulatives to represent numerical values to teach math skills

The multi-sensory method of using body movements is called the kinesthetic method. This involves fine and rough motor movements.

- Games that involve jumping rope, clapping hands or other movements paired with activities while counting and singing songs related to the concept.
- Any major movement activity for students that involves dancing, throwing bean bags, or other activities involving concepts, rhythm reminders and academic competitions such as quizzes, flash card races and other learning games (Praveen, 2019).

Multisensory experience with objects and people in a child's environment the main thing to build children's understanding of their world (Krueger Fister et al., 2016). Children naturally interested in using their senses to explore the world, by touching, pinching, feeling, licking, chewing, kissing, watching, and listening to things. Children learn to use their senses appropriately so that they become more environmentally conscious and use reason to construct concepts (Shams & Seitz, 2008). Information received by children from the surrounding environment and distributed by the five senses/multisensory useful to develop various ideas for organizing actions and managing emotions for their environment (Finotti, Migliorati, & Costantini, 2018).

Multisensory experience is a starting point for concrete learning and by the stages of development and memory of children (Heikkilä & Tiippana, 2016). Sensory relationships with perceptions, feelings, thinking, and concepts produced (Shams & Seitz, 2008) can see in table 1.

Table 1. Sensory relationships with perceptions, feelings, thinking, and concepts

Sense	Perception	Feeling	Thinking	Concept
Visual	Look	Enjoy	Compare	Color
Auditory	Listen	Marvel	Contras	Tone
Tactile	Touch	Joy	Analyze	Texture
Olfactory	Smelt	Happy	Classify	Scant
Gustatory	Teste	Amazed	Describe	Flavour

Benjamin Franklin once said, "Tell me and I forgot. Teach me and I remember. Involve me and I study." Whether Franklin realized it or not, he understood what was called multi-sensory learning. Multi-sensory learning is just that - learning while using various senses.

Most learning is only visual (vision) and hearing (hearing). We read what is in our textbooks and we listen to our teachers. For some people, that is enough because of the way they learn best - by seeing and listening. But for some people, visual and auditory learning is not enough.

To question something, people must experience it. Some students need more experience than there is because of the way their brain works. There are many benefits to learning, namely kinesthetic or touch. By releasing various senses, students can discuss material in more than one way. There are better opportunities than students who will only discuss material but save it for the future. This is an example of multi-sensory learning.

Multi-sensory learning has proven to be very effective in students with different learning. First developed in the 1930s, Orton-Gillingham's approach to learning was developed specifically to help children with superior learning disabilities in reading, writing, and spelling. Over the years, educators have recognized that the same multi-sensory approach is as effective as individuals who have no learning differences. Multisensory learning seems like a lot of work - more planning, more lessons, more assessment. But, designing multi-sensory learning is easier than thought.

Humans, including children, live in a multi-sensory world. Most of what we experience, whether it's a walk in the park, our daily work in the office, and even a trip to the mall, excites more than our two senses. But that doesn't happen with education. At least, most of the time. Traditional learning usually attracts only one or two senses: vision (by reading, writing, doing written exercises, etc.), and listening (listening to the teacher and students). But, as successful as this model, it may not be the most effective when it comes to correcting new concepts and skills in the minds of students.

By involving more senses makes knowledge longer attached. By turning lessons into real experiences, it is often useful to help students develop stronger memories and to achieve a more complete understanding. It is not the same thing to hear or read about a event rather than live it, or, at the very least, experience it more comprehensively. In short, history lessons can be easily highlighted by including objects that are included in the period being studied, which can be touched and felt by students. By incorporating stronger stimuli, such as simulation settings using a VR helmet, or interactive recordings projected on the wall, the teacher can create real experiences, which are not only more memorable for students, but also more interesting and entertaining.

And history is not the only subject that can benefit from a multisensor approach. Even more abstract subjects such as algebra and even calculus can be taught by this approach, by creating meaningful examples and exercises that are more easily understood by students, and which help them use mathematics as a method for understanding real-life phenomena. Some teachers even started experimenting with Augmented Reality technology to help students develop spatial visualization skills, which are very important in various sciences such as language, mathematics, geography, history, and so on.

Another advantage of multisensory learning is more effective for all students. While 65% of people process visual information better, this is not true for everyone. Some people store information better compiling them through the auditory canal; and others need to be "approved" of the experience, or play it out, to maximize their chances of maintaining it. By developing what appeals to all - or mostly - reason, the teacher can ensure all students, and not only those who are gifted with a special way to process information that benefits from their learning.

Multisensory lessons are usually more interesting, and help students maintain attention for a longer period and become more involved in learning. Meanwhile, seating can still be tiring after a few hours, and attracting more senses can make the whole experience more stimulating and enjoyable.

Like many techniques and other challenges that increase the efficacy of education, technology provides new and more accessible tools for teachers to develop multisensory lessons. But, like

promoting, it's not only an important tool but how professionals use ways that improve the results of their efforts.

2 METHODS

This research uses of survey on teachers in elementary school Jakarta. Collecting data uses a questionnaire that revealed the implementation of multisensory. Respondents in this study were 50 teachers from 5 schools. Data analysis used descriptive in graphs and percentages.

3 RESULT AND DISCUSSION

3.1 *Teacher's Preparation to Thematic Learning Based on Multisensory*

Based on the interview results with teachers in elementary school it could be concluded that the teachers are ready to implement thematic learning with audio-visual assisted. This implementation have been going since two years ago with the application of "KURTILAS" curriculum (Kurikulum Tigelabas). Learning thematic is implemented for first graders until fourth grade students. This year the learning thematic will be socialized to the fifth graders and the sixth graders. Based on instrument results on 50 teachers in elementary school concluded that all the teachers have a bachelor degree. Furthermore, there were 26 teachers who have less than 10 years of experience. Next, the teachers who has experienced less than 20 years as many as 12 teachers and teachers who have more experience than 30 years as many as 12 teachers (see Table 2).

Tabel 2. Education * Experience Crosstabulation

Count		Teaching Experience			Total
		0-10	11-20	>20	
Education	S1	26	12	12	50
Total		26	12	12	50

Furthermore, information about media training concluded that 3 teachers attended training and 47 teachers had never get training media audiovisual. They have received the KURTILAS trainings but not how to use the audiovisual media (see Table 3).

Table 3. Training * Experience Crosstabulation

Count		Experience			Total
		0-10	11-20	>20	
Trainin g	Never	26	9	12	47
	Ever	0	3	0	3
Total		26	12	12	50

3.2 *Availability of Children's Audio-Visual Media*

Based on the results of the questionnaire about the media in the school, it can be concluded as follows: Type radio media there 48 teachers who have radio media at school. However, the rarely use the radio in the class (see table 4).

Table 4. Availability of Radio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid- ity	0	2	4.0	4.0	4.0
	1	48	96.0	96.0	100.0
	Total	50	100.0	100.0	

Next speaker there 12, a teacher who has one speaker media at school and 38 teachers who has two speaker media. This media used when the ceremony held at the school.

Table 5. Speaker Availability

		Frequency	Percent	Valid Percent	Cumulative Per- cent
Validity	1	12	24.0	24.0	24.0
	2	38	76.0	76.0	100.0
	Total	50	100.0	100.0	

Furthermore, the availability of the projector concluded that there are two teachers who did not have a projector and 38 teachers who have projectors in their schools and 10 teachers who have more than one projector. Use of projectors rarely used in class. Generally, it only used for teacher activities and meetings with the community.

Table 6. Projector Availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2	4.0	4.0	4.0
	1	38	76.0	76.0	80.0
	2	10	20.0	20.0	100.0
	Total	50	100.0	100.0	

Television media at school generally available, only one teacher said he did not have a television. However, this media never used in class, television is in the teacher's room.

Table 7. Television Availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	2.0	2.0	2.0
	1	48	96.0	96.0	98.0
	2	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

3.3 Implementation of Multisensory Learning Method

Based on results data collection from 50 teachers concluded that teachers elementary school, in general, have applied to learn multi-sensory to students, but it was still not optimal for media usage especially television and radio.

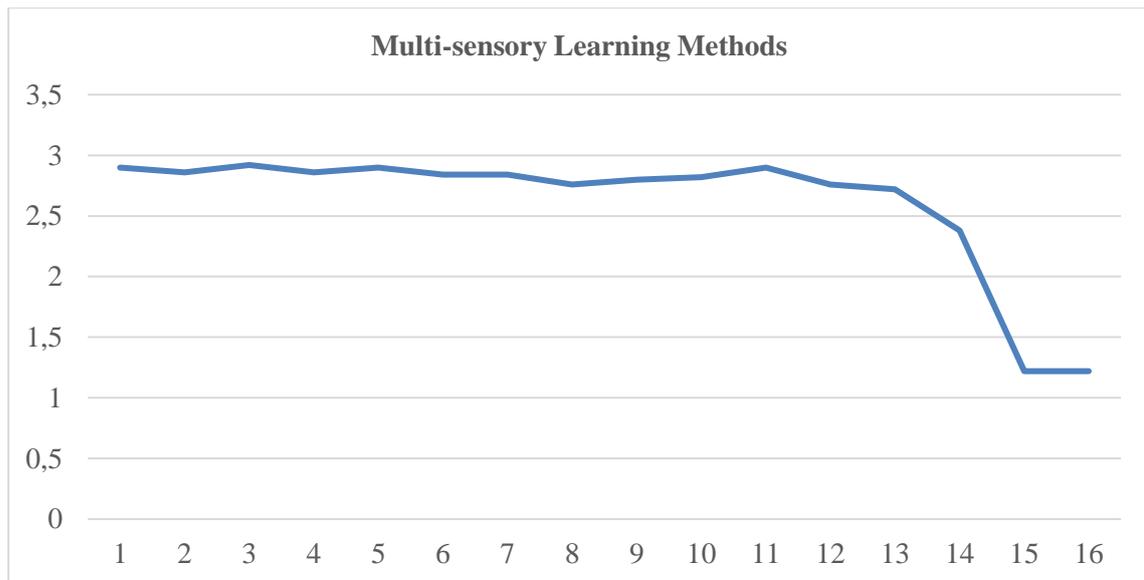


Figure 1. Multisensory Learning Method

Discussion

Multisensory learning that involves all senses can optimize all aspects of a child's development. Children can be given the same opportunity to receive learning material. Multisensory tracking can be more effectively used than just using one session. Multisensory learning can be more effective than not using sensory at all (Shams & Seitz, 2008). So, it can be concluded that multisensory learning is more effective than just using one sense.

Multisensory learning by using various media such as projectors, speakers, television, and radio allows students to learn subject matter not only with one sense. So that it allows students to learn something in a fun way. For example, when learning to read, students not only see paper, but also hear the word in the paper on the speaker or read while moving the body to the rhythm on the projector. This method is done to allow for an association between hearing, vision and touch so that it makes it easier for the brain to work to recall letters (Komalasari, 2005).

Through multisensory learning, it allows students to see and hear more using different media, such as hearing from the teacher, from the speaker, from the radio. To see, students can see from the styles, from paper, from the projector, from television. So that more and more see and hear, allowing students to more quickly understand the material presented. This is reinforced by the opinion Rose Collin and Nicholl (2002) which suggests that more and more seeing, listening, saying and doing something is easier to learn (Olivia, 1992, p. 192)

Children will be easier to understand the subject matter if introduced to concrete media. But sometimes, not all concrete media can be done. With the advancement of technology, teachers can present concrete situations and media like the original through video shows. For example, when teachers teach about dolphins, teachers can provide videos about dolphins. From the video, children can see, hear, and share as if in a dolphin's native habitat. Children are easier to receive learning information when the child is introduced to a concrete learning perspective or in accordance with the child's life in the environment (Nurjanah, 2017). The real environment as a media can make learning more interesting.

The use of diverse media will enable students to actively participate in learning. Students are more involved in learning when they are given the opportunity to use all their senses. The use of a variety of different media will provide motivation for students. Students assume that learning is not a boring activity, but a fun activity. Watching videos through a projector gives the impression that learning is like getting entertainment. Multisensory learning is a powerful tool that can be used by students to learn like entertainment (Jurban, 2011). Learning like getting entertainment will motivate students to be more enthusiastic about learning.

Multisensory learning through audio visual media can help children in the process of learning to read. Children can associate between sound letters with visual letters. The process of learning to read multisystem makes children feel comfortable and does not make children feel difficult to learn. Audio and visual processing in the reading process will be done in a unique way so that children can read easily (Blomert & Froyen, 2010). By using audio-visual media, learning to read in children can be more easily done because it uses multisensory in the learning process.

Learning media such as computers, projectors, television, and radio are media that utilize technology. Technology can be used integrated into learning. So that the learning patterns applied by teachers are modern. The use of technology enables better engagement and improved learning outcomes as they enable students to learn with their chosen learning styles. With this media makes learning fun and allows students to connect to real-life situations (Taljaard, 2016).

The multi-sensory approach involves the use of different media, methods, and strategies in the learning process. To improve the effective teaching and learning process in the classroom, optimization of the three main visual, auditory and physical senses must be more sensitive. so that media learning becomes an integrated part of learning that is fun. In addition, audio media must have some volume and a unique sound. Media diversity and multisensory approach will increase students' active participation, understand and remember the subject matter delivered.

Teaching and learning are a process of the activity. Thus, teachers and students must consider the design of activities as part of the strategy to be included in the teaching and learning process. The teacher presents the learning topic then tells the students to summarize what they have been taught to identify what they know about the material presented (Aja et al., 2017). Activities like this will ultimately improve students' long-term memory, remember the information being studied and give students the opportunity to fully control what is taught.

4 CONCLUSION

Results of the study concluded that the use of multisensory could more effective in maximizing learning. Teachers can use skills from all disciplines and multi-sensory fields that integrated with curriculum and has significant implications in real life learning. Through multisensory learning, the teacher can involve students actively involved in the learning process. The teacher can also facilitate all students with different learning styles. With multisensory learning, students get the same opportunity and learn through experience using multisensory. However, the obstacle the lack of maximum use of audiovisual media, and not all schools carry out multi-sensory learning.

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