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The Effect of Music and Motoric Movement Intervention to Increase Attention among Elementary School Students in Semarang Central Java

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Abstract

This study was done to determine the effect of the music and motoric movement as an intervention to increase attention among third grader elementary school in Semarang. Quasi Experimental with nonrandomized pretest-posttest control group design was used to achieve the aim of study. Wechsler Intelligence Scale for Children (WISC) – IV digit spansub-test (forward backward) was used to measure students attention. Subjects were divided into three groups, first group was treated with music intervention involved 28 students, second group was treated with music and motoric movement intervention involved 25 students, and 25 students in the control group. The results showed that the attention in group 1 was significantly increased ($MD = -1321, p < 0.05$), in group 2 was not significantly increased ($MD = -0280; p > 0.05$), while subject in control group experienced with decreased attention ($MD = -0443, p < 0.05$). Music intervention could increase attention by 11.7 %, music and motoric movement intervention only increased attention by 0.5 %, and subjects experienced a significant decrease by 13 % in control group. This finding is strikingly unique and perhaps will promote the notion that “two heads are not always better than one”, but clearly better than nothing.

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Keywords: Attention; music; motoric movement; intervention; elementary school students; digit span

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1. Introduction

In the current era of technology, children who live in big cities are threatened by the decreasing attention caused by overstimulation. The number of visual and auditory exposures are suspected to have the potential to lowering children's attention, ranging from television [1], games, and internet.

The ability to concentrate is one of the important factors that may affect student success in learning. Concentration is the ability to be able to devote attention for relatively long time. A Child is said to be able to concentrate if they can pay attention to what they are learning [2]. When someone says they cannot pay attention, it usually means that they cannot stay focus on one thing as long as needed. Attention will increases one's understanding of something being learned [3].

Processes occurring within the attention is an information management process. Information management process is when the child receiving new information through recording the senses (sensory registers) of sight, hearing, touch, smell and taste. After it emerges, the interpretation of the mind will be influenced by attention. The information has already been through lack of attention in the form of inference that stored in short-term memory and repetition which then conducted in-depth processing (linking new information with existing information) until the long-term memory, then that information will be issued (recalled) at any time.

During information management processing (insert new information), children's attention becomes very important. When the child's attention does not exist at that time, then the information cannot be memorized and cannot be recalled. Some ways to gain children's attention are using attractive stimulus (color, large size, use all five senses), putting pressure upon the information entered, and using attractive games before or at the time when stimulus was given [4].

Optimal learning from environment which needed to consider are sound, lighting and temperature, as well as aroma. Several studies have been conducted showing that the study while listening to music will increase the attention of some students [5,6]. Wiebe [7] found that by listening to his favorite music, a teenager who was diagnosed with attention deficit hyperactivity disorder (ADHD) has been, able to increase her attention to learn at school, or while doing homework, improving the ability to recall information, foster a positive attitude toward school work.

Music is entertaining, fostering an atmosphere of fun and exciting for a child. This provides positive supports for children in carrying out their activities [8]. Music refers to a specific combination of voice attribute, divided into six elements, i.e. rhythm, melody, harmony, timbre, dynamics, and form [9]. The use of music in a psychological intervention has been going on since 40 years and able to provide psychological change [10]. Musical activities potentially improving the brain works, interests, activities, social behavior and learning, can loosen the tension, regulate behavior and express motoric movements. Music directly processed through the limbic system (amygdala, thalamus, cerebral hypothalamus, hippocampus). Through the hearing system, sound go into the brain, triggering motoric movemental factors that encourage motivation and willingness to make a choice and make a new sensory pattern [11].

Music intervention will effects in the production of alpha brain waves in children, thus explained that the effect of listening to music in the improving short-term memory, reduce confusion and improving the process of information [12]. Children are more easy to give a physical response to the rhythm of the music, even the relatively spontaneous responses and tend to freely move the body and limbs. Motoric movements which are performed by children has a role in strengthening memory function, helps control and develop self-awareness. Motoric movement according to music can also reduce negative emotion into positive change. If the child is able to control themselves, then the child will be able to focus in learning activities in a longer time. The results of research conducted by Rusmawati&Dewi[13], indicate that the intervention of music and motoric movement in children with ADHD may reduce the frequency of behavior difficulties in elementary school students.

In this study there are hypotheses as follows: a) There is an increase of attention in the experimental group (music group, music and movement group) after a given intervention, b) The music and movement group increase their attention compared to the control group, c) The music group increase their attention compared to the control group.

2. Methods

Subjects were divided into three groups, 28 students in the group 1, 25 students in group 2, and 25 students in the group 3. Group 1 administered music intervention, group 2 administered music and motoric movement intervention, group 3 was control group. Subjects were the 3rd grader of elementary school students in Semarang, Central Java, Indonesia with average age of 8-9 years. Based on the subjects age they were in concrete operational stage of cognitive development, with the assumption that children in this age begin to imagine doing concept and focus on things that are not present in front of the eyes so that it supports the process of attention [14]. The 3rd grader students had also been required to be able to follow the lessons with the discipline.

WISC - IV digit span subtest was used to measured attention. Digit span was a sub category of the working memory test [15] which can measured the subject's ability to recall the auditory information in the correct order [16]. Working memory represented of proficiency in the areas of concentration, attention, and short-term memory. The task of the digit span sub-test consists of the digits forward and digits backward.

Intervention in this study used music and motoric movement, refers to Sheppard [17]. Intervention divided into three conditions, music intervention, music and motoric movement intervention, and no intervention for control group. Music intervention given by playing instrumental music with angklung, played in the early hours of lessons for 15 minutes each day, for 6 days effective school. Music and motoric movement intervention given by playing instrumental music with angklung, played along with a structured motoric movement to the music, performed for 15 minutes every day, for 6 days effective school.

Experimental design used in this study was a quasi-experimental research design with nonrandomized group pre-test post-test group design. The data analysis technique used mixed ANOVA, in which the two sub-analysis combining the within subject and between subject test [15, 16, 17].

3. Result and Discussion

Table 1. Mean comparison between pre-test and post-test condition

| | Group | M | SD | N |
|------|------------------------------|------|-------|----|
| pre | Music | 7.46 | 1.934 | 28 |
| | Musicand Motoric Movement | 7.84 | 1.463 | 25 |
| | Control | 8.60 | 1.354 | 25 |
| | Total | 7.95 | 1.666 | 78 |
| post | Music | 8.79 | 2.455 | 28 |
| | Musicand Motoric Movement | 8.12 | 2.186 | 25 |
| | Control | 7.08 | 3.290 | 25 |
| | Total | 8.03 | 2.735 | 78 |

There was different attention between the two experimental groups compared to control group (Table 1), especially on music intervention group (pre-test 7.46 post-test 8.79), followed by music and motoric movement (pre-test 7.84 post-test 8.12) compared to no intervention in control group (pre-test 8.06 post-test 7.08). The increase of mean in the group 1 (music) is greater than the average scores in the group 2 (music and motoric movement). Standard deviation score in the group 1 (music) is greater than the group 2 (music and motoric movement). It means that there are subjects in the group 1, which have increased slightly and much.

From summary of result (Table 2), it was seen that $F = 11,039$ ($p < 0.01$) means that there was an interaction between time (pre-test and post-test) and group (experimental-control). The interaction indicates that the pre to post-change scores in all three groups (experimental-control) are significantly different. It could be seen that

the difference attentionscore derived from pre-test and post-test measurements, and because of the variations that occur within each group.

Table 2. Summary Result of Analysis of Variance Mix of Attention Score

| | SS | Df | MS | F |
|---------------|--------|----|--------|--------|
| Between Group | | | | |
| Group | 1.075 | 2 | 0.537 | 0.147 |
| Error (group) | 274.91 | 75 | 3.666 | |
| Within Group | | | | |
| Time | 0.029 | 1 | 0.029 | 0.012 |
| Time x Group | 54.076 | 2 | 27.038 | 11.039 |
| Error (time) | 183.69 | 75 | 2.449 | |

Further analysis shows that increased attention in group 1 (music intervention) was significant ($MD = -1321$, $p < 0.05$) while increase attention in group 2 (music and motoric movement) was not significant ($MD = -0280$, $p > 0, 05$), attention changes in control group was significant decreased ($MD = -0443$, $p < 0.05$). This suggests that music intervention was quite effective improving student's attention. The results also showed that music and motoric movement intervention is not quite effective in improving student's scores of attention. In group 1 (music) shows Partial Eta Squared of 0.117, meaning that music intervention can enhance attention 11.7%, while the group 2 (music and motoric movement) only improve as much as 0.5%. Different condition in the control group decreased significantly 13%.

From the result hypothesis 1 is acceptable, especially for group 1 (music). Group 2 (music and motoric movement) increases in the attention but not significant. This result supported similar research conducted by LaGasse [19] that music therapy can improved social behavior and joint attention in autistic spectrum disorder.

Attention is related to memory process. Memory is a process to encode, store and recall information. Encoding is a mental activity when individual received the information by five senses to be converted into a form that can be accepted by the storage systems in the brain. Storage is the process of retaining information during certain periods. Retrieve is the process of taking back the information that has been stored for use. A three-stage model of memory explain some of the stages process of individual memory. The early stages of recording information by entering individual sensory systems, sensory memory, for a short time to save the information. The information then forwarded into short-term memory. The last, information transferred into long-term memory is relatively permanent. The information moves from short-term memory to long term memory depending on the kind and amount of exercise taken to the material.

Specific process which transformed from sensory memory into a short-term memory is still not clear. Some theoreticians argue that such information first translated into graphic representations or images, while other theorists argue that this transfer occurs when sensory stimuli are transformed into words. Nonetheless, sensory memory stores representation of the world and details, short-term memory has an incomplete representational capability.

In fact, the specific amount of information that can be stored in short-term memory has been identified in seven items, or chunks with varied of information. Chunk is a group of stimuli which constitutes a means that can be stored as a unit in the short term memory. According to Miller [18], a chunk can be either single letters or numbers that make an individual can remember 7 digits phone number (i.e. 226-4610) in short-term memory. However, a chunk may also consist of greater category, such as words or other units that have meaning.

Attention affected by capacity and selectivity of a number external stimuli, individual control of stimuli that choices and wants to be noticed, automatic processing because a familiar processes, cognitive neuroscience include the brain and central nervous system which supported anatomical attention, and awareness. It was explained that subject in the music intervention group was able to perform control and selecting stimuli that must be implemented.

Results in the group 1 (music) compared to group 2 (music and motoric movement) can be explained through the theory of screening models developed by Broadbent [20]. The model explains that the information transmitted through certain nerves is distinguished by nerve fibers were stimulated number of generated nerve impulses. When the number of nerve fibers work to generate impulses simultaneously, there are a number of different sensory information that will arrive in the brain simultaneously. Information processing will occur after the signal is processed through a selective filter, which filters information into channels which have limited capacity. Thus it appears that subjects has limited information processing capacity, so they only can focus on one type of impulse.

In group 2, when music and motoric movement presented together there is not significantly changes to increase attention. It can be explained with capacity theory, where will be attention disorders when the amount of attention cannot meet the demand of the two activities simultaneously [21]. When music and structured motoric movement performed simultaneously, this is no longer causes the child to feel relaxed so it makes it more difficult to pay attention.

Hypothesis 2. There are increase attention in the group 2 (music and motoric movement) compared with the control group. These circumstances indicate that an individual can perform to the storage of visual and auditory information (iconic and echoic memory), so that the one can perform complex processing of the stimuli. However, the limitations of the human nervous system results in the one's incapability to record and process all the information that is recorded in the sensory memory, resulting in the selection of the most information.

Thus an one can develop abstractions based on phonetic context (sound) and visual. To optimize the multi-sensory abilities can be developed through listen to music, touch through vibration, through awareness of the meaning of rhythm and motoric movement, so that the memory can be switched easily. This illustrates that the use of music is important. Music and motoric movement to restore the capacity of hearing so that children can learn to focus and capture the desired sound directly to the language centers in the brain. Ear muscles become 'lazy' and not responsive, it can be trained and stimulated to reach normal capacity to improve hearing and organize auditory transmission in the brain. This process will reduce stress and nervous tension, so that the child will be able to follow where the desired sound. At the time that individuals begin to concentrate. Movement is done also to strengthen the function of memory, which helps mastery and development of self-awareness. Eurythmicz[17] says that emotoric movements can be felt through the motoric movements and emotoric movements can also be expressed through motoric movement, voice, posture and body shape. By training movements with music, it will be able to channel emotoricmovemental expression. Motoric movement according to music can also reduce negative emotoric movements positively altered. Physically active will help refine motor skills and coordination body, which in turn smoothes mental reflexes and encourage its development. Should someone be able to control themselves then they will be able to pay attention in learning activities with a longer time. Through hearing the sound system into the brain, triggering emotoricmovemental factors that encourage motivation and willingness to make a choice and make a new sensory pattern. Basically music is a whole brain activity, two brain, which pushed the left brain cognition using the right brain to stimulate the left hemisphere that can work [11].

Hypothesis 3. From the research that has been done then the hypothesis 3 is accepted. That situation can be explained by the theory of Piaget's stages of cognitive development. At the age of 9 years old, children are entering the stage of concrete operational thinking ability, then the they will understand something new to the stage presence of the object in a concrete need to be able to perform information processing, so the shadowing process will be difficult. Through music information processing can be trained. In music there are musical elements such as melody, timbre, harmony and perseveration, tempo. The melody is instinctive communication directly related to the emotoricmovemental state of humans. Erratic melody can create anxiety in the brain, which generally prefers a regular pattern of the song. While harmony as a resource for music therapy has the ability to stimulate the auditory perception, it can be used to strengthen the focus of the hearing.

Perseveration or repetition rhythm is the power behind the beat and the driving force that makes human attention and eventually adapt. The brain receives this repetition as long as needed to get the message, because the message will change through the process of rhythmic music evolution. While the tempo of the music determines the

effectiveness in eliciting emotive/movemental and psycho-physiological sensory responses of music [11]. Through repetition of this process there are attentions which then would activate working memory. The results of this study have the support of research conducted by Hidayat and Maretih [22] whose results showed that classical music can enhance endurance attention of students in learning.

4. Conclusion

From the research that has been done it is concluded that there is an increase in paying attention after a given intervention study in the experimental group. Intervention groups who get music and motoric movement study increased attention compared with the control group who did not receive any treatment. Groups who received the intervention increased attention of music study as compared with the control group that did not receive any treatment

From this research it is known that a given intervention in the form of music can enhance learning attention by 11.7%, while the provision of music and motoric movement improvement intervention study attention can be said to be significant. In the control group who did not receive intervention there was significant decrease in the attention of 13%.

Further research should be used screening procedure before intervention to control individual characteristics (i.e. intelligence level) to match control group and the experimental group. Length of intervention time could be considered to be extended.

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