

Mind Mapping as an Academic Approach to Improve the Multiple Intelligences

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This research is inspired by the importance of elementary school student multiple intelligence capability development. A literature review determined that the research related to academic guidance (teaching and learning) regarding the development of student multiple intelligences is still limited. This study aimed to look at the relative effect on student academic guidance, of using mind mapping as an improvement strategy. The methodology employed was research and development utilizing pre-experimental design and the instruments used were observation sheets and relevant documentation. The study sample consisted of 25 first grade students at one elementary school in Purwakarta Regency. The results showed that elementary school student multiple intelligences could be improved through Mind Mapping as a teaching and learning strategy; with an n-gain score of 0.30 (low). Further, based on the research test results, a p-value (sig.1-tailed) of 0.000 was found meaning that individual student relative multiple intelligence capabilities were initially, significantly different. The further research finding is that development of multiple intelligences through academic guidance using mind mapping as an alternative teaching and learning strategy, develops the diverse potential of students in each educational environment.

Keywords: *Academic Guidance, Mind Mapping, Multiple Intelligences.*

INTRODUCTION

Each student is born to have unique potential, this is described by Dabas & D'Souza, (2015) as each student having 'intelligence'; with this intelligence reflected as the typical weak and or strong multiple intelligences profile of each student. Some experts in Indonesia add a further pillar to the intelligences which is learning to serve (or to worship) Allah SWT. Yet another pillar is the aspect of social capital with the intent in Indonesia to qualitatively create high intelligence capacity and nobility of personality (Halil, 2017). This concept, identifies as Unity in Diversity aims to build an Indonesian society that is civilized, democratic, and respects the diversity of itself as a nation.

Since every student (Musyarrafah, 2019) exhibits multiple intelligences to varying proficiency, it is the teacher's responsibility to map and plan for the development of student multiple intelligences. The teacher's task in the process of both education and mentoring of students (Liu, 2018) is diverse because education is lifelong learning, and the growth of intelligence and ability must be encouraged at all ages. Pakprod (2013), states that the diverse intelligence of each student must be explored by the teacher so that the younger generation's academic knowledge, skills and intelligence are developed to encourage their learning capacity, knowledge expansion and adaptability to become news literate in the context of rapidly evolving technological change. Citizens of the 21st century (Carlín et al., 2013); (Muqodas, 2015) must develop their intelligence from kindergarten so that when students reach the college level, they can use higher order thinking skills.

Each student's intelligence is diverse and students can be proficient in more than one intelligence, demonstrating what is called multiple intelligence. Multiple intelligence was described by Gardner (2013) as a theory that individuals have at least eight types of intelligence: verbal-linguistic intelligence; mathematical; logical; visual-spatial; kinaesthetic; musical; intrapersonal; interpersonal and naturalist. Budiartati's (2007) research added a new type of intelligence, namely spiritual intelligence. Gardner's theory of Multiple Intelligences, according to Kamis et al., (2019), has important implications for educators and teachers must consider the academic needs of all gifted students. The essence of multiple intelligences (H. E. Gardner, 2000) involves a respect for the uniqueness of each individual and includes varied ways of learning, models to assess the intelligences and an unlimited way to actualize them. Based on the above description, multiple intelligences indicate the varied potential of students to solve problems and further self-development.

Since in children, the multiple intelligences have not been developed, the general public typically perceive intelligence as about academic ability. The public also views intelligence as relating to academic success and directly to lessons in school. Gardner (2003), explained that this phenomenon occurs because the tools to measure intelligence are still based on academic criteria. Some intelligences can be less developed in comparison to other intelligence fields. Research by Stanford (2003), indicated that students with learning disabilities often show discrepancies in verbal or logical-mathematical but show strength in

other types of intelligence, such as the musical and visual-spatial, etc. Unfortunately, in common practice, schools emphasize more the verbal and logical-mathematical intelligences.

Multiple intelligences are an important planning criteria for teachers in consideration of their students but this is also an area where parents or early childhood companions can help hone the prominent intelligences: for example, musical intelligence can be developed while also stimulating mathematical or linguistic intelligence. This means that a child's ability needs to be enriched through the development of various types of intelligence. If children have the opportunity to learn by making use of their strengths at optimal level, then cognitive, emotional, social and even physical changes will occur. (H. Gardner, 2003; Widiastuti, 2015). Further, under certain conditions, if multiple intelligences are continually developed throughout the education levels, adaptive life skills will be developed.

Teaching for the multiple intelligences requires a major transformation of the way schools carry out academic professional learning. According to research by Nor (2015), teachers must ensure their practice creates capacity to develop capability in the various intelligences through music, cooperative learning, art activities, role plays, multimedia, field trips, inner reflection and a focus on creative and interactive teaching and learning methods. The process of academic mentoring through a mind mapping model is proposed as a methodology to develop a variety of student multiple intelligences. Academic guidance described by (Ediyanti & Febrianto, 2020) is a professional learning service to develop a teaching and learning environment that is conducive to dealing with potential learning difficulties. Academic guidance scaffolds teachers to provide the foundation (Howard, 2004) and support that helps students overcome the challenges they face during their studies. Receiving academic guidance is a way of learning from others and learning with others is a learning style that develops the interpersonal intelligence.

Yaumi & Ibrahim (2013), reasoned that because interpersonal intelligence is related to the concept of interaction with other people, the interaction in question is not just related to discussion, sharing joys and sorrows, but more deeply about understanding thoughts and feelings and the ability to provide empathetic responses. The essence of academic guidance is an effort in the learning process that intends to overcome difficulties in learning. The academic guidance process in this study specifically uses the mind mapping model. Academic guidance with mind mapping can improve multiple intelligences because, in when mind mapping, students have the opportunity to hone logic and use creativity to explore their brains indefinitely which can improve their mathematical intelligence, sharpen logical pattern forming and strengthen student relationships.

The use of colour and the rhythm of drawing space in mind mapping, will further develop student visual and musical intelligence through mental imagination, space understanding, image manipulation and the use of images and understanding through abstract processes.

Systems thinking in all directions through various points of view in the group process and openness will develop the ability to communicate with others: to distinguish moods; temperament; motivation and skills. This included the ability to maintain relationships with others and the ability to understand various roles in a social group.

Academic guidance through making mind mapping helps students understand what they are learning because they unpack concepts through their mind maps; this will develop student existential intelligence because it makes academic guidance more meaningful. Whether individual mind mapping or in groups, this strategy provides opportunities for student experience of success and social experience with others. Making mind maps according to their needs, desires and creative imagination makes students feel happy. When students feel happy it indirectly fosters their psychological condition that learning is fun, which will also develop intrapersonal intelligence among students, making it easier for them to learn (ST, 2011; Muqodas et al., 2020).

The process of teaching students to make mind map images must be conducted in a real context and in a collaborative way (Yuliyanto et al., 2019). Students will easily relate to the learning process if there is real-life transference in application and when the learning includes visuals. This is consistent with Piagetian theory that at the pre-operational concrete level, between the ages of 2-7 years, the child has entered into the social environment and begins to use mental operations that are rarely and logically inadequate (Dahar, 2011). Academic guidance with mind mapping can improve the multiple intelligence of elementary school students. The problem in this study is whether there are differences in the increased multiple intelligence capability of elementary school students. The purpose of this study is to comprehensively analyse the application of academic guidance through a mind mapping model with the intention to improve the multiple intelligence of elementary school students.

METHODS AND MATERIALS

The purpose of this study is to produce solutions that develop the multiple intelligence of elementary school students. The study utilised a Research and Development (R&D) methodology to producing identified products and test the effectiveness of those products. The study design applied was pre-experimental. The pre-experimental design type used was the One-Group Pre-test-Post-test Design (Sugiyono, 2016). The first step taken was to conduct initial observations as a pre-test to determine student initial intelligence as a baseline. Academic guidance with using the mind mapping strategy introduced themes such as 'animals' to students at the first meeting, 'my profession and ideals' at the second meeting, and 'natural disasters' at the third meeting.

After mentoring was completed, the researcher conducted a further observation as a post-test to determine the level of success after mind mapping guidance. The final step in the research methodology is a comparison of the pre-test and post-test results. The population

of the sample are all elementary school students from Purwakarta, Subang, Karawang and Bekasi, West Java Province. Population selection is based on the consideration of elementary students in each school as accepted through the same entrance selection system. Therefore the researcher considers students in each school to have the same basic characteristics and abilities with: the entrance selection test as the common standard; all school being from the same school with almost the same accreditation and all schools using the same national and local guidance curriculum standards.

The research sample comprised 25 students in grade 1 at the UPI Laboratory Primary School in Purwakarta. The sample selection was made via a purposive sampling technique (Sugiyono, 2016) based on considerations including: representation of the Purwakarta school population; proximity to researcher residence and comparability of characteristics as determined through common entrance test process and school standards for both teachers and facilities. The researcher used an instrument in the form of a student observation format and developed documentation according to multiple intelligence and study achievement indicators.

RESEARCH RESULTS

Improvement of Student Multiple Intelligence as seen from Normalized Gain (N-Gain). The improvement criteria (Meltzer, 2002) are as follows in Table 1 below.

Table 1: *Criteria for Increasing Student's Multiple Intelligences*

Increase Interval	Improvement Criteria
$N-Gain > 0,7$	High
$0,3 < N-Gain \leq 0,7$	Medium
$N-Gain \leq 0,3$	Low

Descriptive Analysis of Student Multiple Intelligence Enhancement

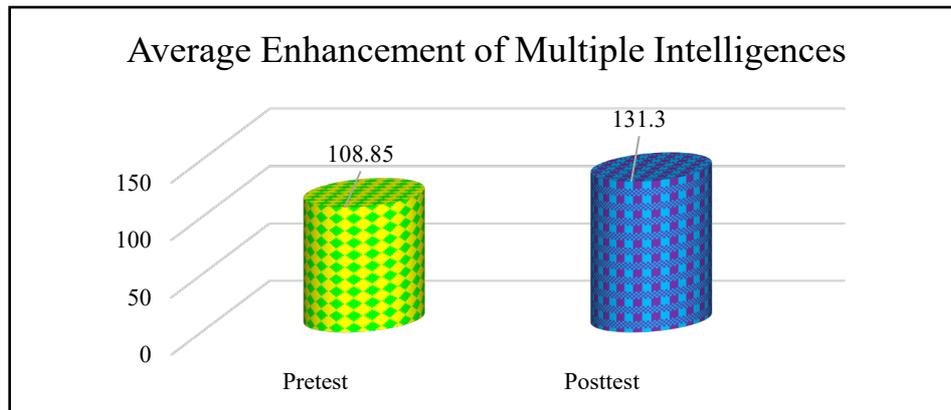
Recapitulation of the results of the initial and final scores of Normalized Intelligence and Normalized Gain (N-Gain) based on learning can be seen in Table 2 below.

Table 2: *Recapitulation of Multiple Intelligence Enhancements based on learning*

Scale	Learning	Score		\bar{x}	Sd	N-Gain
		Min	Max			
Pre-test	Mind	98	121	108,85	8,94	0,30
Post-test	Mapping	125	144	131,30	5,51	

Based on Table 2, the Multiple Intelligences of students who experience academic mentoring with Mind Mapping increased although the qualifications increased less as presented in Figure 1 below.

Figure 1. *Average Enhancement of Multiple Intelligences*



Inferential Analysis of Increasing Student Multiple Intelligence

Descriptively the increase in student multiple intelligence was in the low criteria. To test whether the difference in increase is significant or not, an average difference test was performed. The recapitulation of the results of the test of the average increase in student multiple intelligence based on learning is reviewed can be seen in Table 3 below.

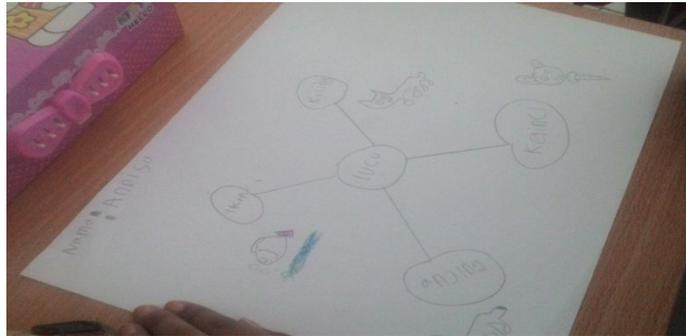
Table 3: *Recapitulation of Test of Difference in Mean Increase in Multiple Intelligences*

t-test	Learning	Average	t count	df	t-table	p-value (sig.1-tailed)	information
Enhancement	Mind Mapping	0,20604	9,116	27	9,142	0,000	Ho rejected

Based on Table 3 it appears that the p-value (sig.1-tailed) for increasing Multiple Intelligence is less than 0.05 and as such H_0 is rejected. It can be concluded that the increase in student multiple intelligence is significantly different. Enhancement of each of the nine multiple intelligences in this study (verbal, logical, musical, visual, intrapersonal, interpersonal, natural, spiritual and kinaesthetic) is measured through between ten and twelve indicators respectively.

Table 2 results describe an increase in the nine multiple intelligences at the low criterion descriptively; and inferentially in Table 3, an increase in multiple intelligence is shown as a significant difference in the average. Thus, learning the strategy of mind mapping potentially develops student Multiple Intelligences. Academic guidance with mind mapping resulted in the development of student verbal and visual intelligence as evidenced in Figure 2 below which is evidence of the results of student mind maps which explore words and images in understanding:

Figure 2. Results of Mind Map Students with 'Animals Around Us' themes



Through the activities that require explanation of the mind map results, students practice describing their findings, in this context with regard to the behaviour of animals. This activity can also develop kinaesthetic intelligence, it is seen in Figure 3 below:

Figure 3. Students gave an example of the animals in the Mind Map



The process of making mind maps in a group can train student interpersonal intelligence through an exploration of materials related to natural disasters by increasing student understanding and allowing them freedom to express the kinds of natural disasters they understand as seen in Figure 4 below.

Figure 4. The results of making Mind Map in groups on the theme of Natural Disasters



These findings are consistent with the results of several studies related to multiple intelligences including research by Dewi et al., (2017) that indicated there are significant differences in verbal-linguistic intelligence before and after the singing method was used with children in the B1 group Kumara Bhuna Kindergarten North Denpasar 2016/2017 Academic Year. Moreover, a study by Maisari & Purnama, (2019) showed the increase in kinaesthetic intelligence through singing while moving for children aged 5-6 years in RA Mujahidin Sungai Purun Kecil Mempawah District. Their research also evidenced increased aspects of flexibility, balance and body coordination including eyes, hands and feet when singing while moving. Suryani & Haryono, (2018) found an increase at the end of cycle two which was higher than the end of cycle one in the category of Very Good Developing Children (BSB) with compote media (collage numbers).

The average spiritual intelligence of 5th class was found to increase according to student assignment results and in the field of music, an increase in musical intelligence of children aged 5-6 years through playing and making music can be seen from an increase in musical intelligence in the first cycle with a percentage of 61.5% and a significant increase in the second cycle which amounted to 89.6% (Rosydiana, 2018). The paired t-test showed that $p = .000$. Research about visual-spatial intelligence showed that through the use of media images, puzzles could improve visual-spatial intelligence for students in class B2 Pertiwi kindergarten 02 Jenengan, Boyolali. This was proved by the results of the first cycle and second cycle as follows: In the first cycle of 13 students, as many as 7 or 53.85% of students achieved a completed grade. In the second cycle, as many as 11 students or 84.62% achieved complete value.

Development in child intelligence is very good development (Ismiati, 2016) and Krobo (2014), states that role-play learning can improve student intrapersonal intelligence. The highest percentage increase in intrapersonal intelligence is achieved by students identified with the initial PJ, AM and FA subjects, at 95.59 %. Sellars (2008), showed that student interpersonal intelligence scores demonstrated significant increase when the profiles compiled in November were compared to those compiled in February for the new type of intelligence, spiritual intelligence, based on the results of identification of the portfolio at Integrated Islamic Elementary School Al-Uswah Prigen Al-Uswah Prigen (Fauziah et al., 2019).

The results of this study indicate that there is an increase in student multiple intelligences achieved through mind mapping guidance because mind mapping provides opportunities for the development of the nine multiple intelligences. The multiple intelligence development evidenced in this study included observing explanations of material that developed verbal-linguistic intelligence; logical-mathematical intelligence developed through student reasoning and formation of linkages between concepts. Making images in the process of making mind mapping was found to hone visual-spatial intelligence, develop kinaesthetic-body intelligence

through the use of hands when drawing and allow practice for interpersonal and intrapersonal intelligence through group process.

When students are given the opportunity to present their mind mapping to peers and rationalize their choices with intelligence in relaying their understanding of material about e.g. natural disasters, this process of observation can incorporate spiritual intelligence development through reflection on learning. This type of learning relates to gratitude for the creator and creation and is its own source of knowledge. Based on these findings, mentoring with mind mapping can be used to develop student multiple intelligences. For maximal improvement, multiple intelligence stimulus is needed to inspire student intelligence through the use of various activities that facilitate all nine categories. To create capacity for students to develop multiple intelligence capabilities then, the teacher, in addition to preparing thoroughly for learning, must also study student uniqueness to compliment intellectual intelligence with multiple intelligence development.

CONCLUSION

Based on the findings and discussion described, there is an increase in student multiple intelligence post academic guidance through mind mapping strategies compared to pre this guidance. It is recommended that further research could investigate the use of academic guidance with mind mapping for other themes and the relative effect on cognitive, affective, and psychomotor skills or other student intelligence. The results from this study regarding the development of student multiple intelligences through mind mapping learning are still relatively limited due to several factors including time management, implementation process, confounding variables, and learning evaluation therefore the researcher recommends further research. This further research could investigate the time spent in specific development of multiple intelligences and their allocation to the curriculum to build student capability. The development of Multiple Intelligences through Academic Guidance Mapping can be used as a solution that facilitates diverse student intelligence in learning, especially for elementary school students in the lower grades.

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