

## Improving Students' Creative Thinking and Achievement through The Implementation of Multiple Intelligence Approach with Mind Mapping

I Wayan Widiāna<sup>1</sup>, I Nyoman Jampel<sup>2</sup>

<sup>1</sup>Primary Teacher Education Department, Ganesha University of Education, Bali, Indonesia

<sup>2</sup>Education Technology Departement, Ganesha University of Education, Bali, Indonesia

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### ABSTRACT

This classroom action research aimed to improve the students' creative thinking and achievement in learning science. It conducted through the implementation of multiple intelligences with mind mapping approach and describing the students' responses. The subjects of this research were the fifth grade students of SD 8 Tianyar Barat, Kubu, and Karangasam. The objects of this research were multiple intelligence, achievement in science and students' response. The research was conducted in two cycles and every cycle consisted of planning, action implementation, observation, and reflection. The data of students' creative thinking were collected by performance test; the data of students' achievement in learning science were collected through questionnaire. After the data were collected, then they were analyzed descriptively and quantitatively. The results of the study showed that (1) the implementation of multiple intelligence approach improved the students' creative thinking and achievement in learning science. The improvement in the students' creative thinking from cycle I to cycle II is 16.56%. (2) The improvement of the students' achievement in learning science from cycle I to cycle II is 11.46%. (3) The students' response to the implementation of multiple intelligence with mind mapping fell into category positive. The students felt happy in learning science through the implementation of multiple intelligences with mind mapping.

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### Corresponding Author:

I Nyoman Jampel,  
Education Technology Departement,  
Ganesha University of Education,  
Singaraja Bali 81116, Indonesia.  
Email: nyoman.jampel@yahoo.com

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### 1. INTRODUCTION

The task faced in the education sector today is to improve the quality of human resources. Hence, education has a strategic position in developing a nation since its target is improvement of the quality of human resources (Tirtarahardja & Sulo [1]; Muharam [2]). The improvement of the quality of human resources has to start from elementary school as the foundation to move on to the next levels. However, the results of some research showed that the quality of education at elementary schools is low. *Trends International Mathematics and Sciences Study* (TIMSS), an institution that measures educational outcome throughout world, reports that the ability of the Indonesian students of elementary schools in Indonesia ranks

33 from 38 countries that were surveyed (Nurhadi) [3]. In mathematics and reading abilities, Indonesia ranks 39 from 41 countries that were surveyed (Indonesian National Education) [4]. The development index for education for all according to UNESCO in EFA Global Monitoring Report 2011 shows that Indonesia ranks 67 from 127 countries that were surveyed [5]. Reflecting on the low quality of education at elementary schools, then it is the critical time for educational theorists and educators, especially at elementary schools to immediately make innovative and creative breakthroughs at elementary schools. Education at elementary schools is the foundation in developing every aspect of intelligence of the students.

Gardner [6] Marlina [7] states that intelligence has seven components. The seven components of intelligence are called multiple intelligence that consists of linguistic-verbal intelligence, logical-mathematic intelligence, spatial-visual intelligence, rhythmic music intelligence, kinesthetic intelligence and interpersonal intelligence. In a further development, Gardner added two more intelligences, namely naturalist intelligence and existential intelligence. Many people think that to reach a high achievement in learning, one has a high Intelligence Quotient (IQ). The assumption is IQ is a potential asset which will facilitate learning and in its turn will produce an optimum ability. However, in reality, it is a low predictor of intelligence since it only measures an individual's linguistic- verbal and logical-mathematic abilities. An individual with a very strong verbal ability (language and humanities and mathematical logical deduction (mathematics and science) maybe does not have interpersonal ability to agree with other people, to develop networks, to communicate, to end a dispute and to encourage others. Maybe he or she does not have intrapersonal ability ( to control oneself) to overcome and learn from a failure to reflect on him/herself and motivate him/herself. Some students are not creative enough, innovative enough to see the future to anticipate a unique problem. This is the most important skill to succeed in any profession (Lewin) [8]. Hence, IQ is not the only factor that determines one's success, since other factors also have an effect on it (Harefa) [9].

Goleman states that IQ contributes only 20% to success, while the rest or 80% is the contribution from other factors, among other things, emotional intelligence or Emotional Quotient (EQ), namely ability to motivate oneself, to overcome frustration, to control desire, to control mood, to empathize, and to collaborate. It seems that IQ is not the absolute guarantee in determining an individual's success, especially in developing knowledge [10]. Currently, people are aware that an individual needs to develop EQ and SQ (Spiritual Quotient) in addition to IQ (Suparno) [11]. Hence, in order to become a person with a good quality, he or she needs to improve the three intelligences in balance. Education plays the role of improving the three intelligences of the students, in order we can improve the quality of education.

In the context of improvement of the quality of education, including that of elementary schools, the government has done various efforts, including to change the curriculum, from content oriented to competence oriented which has now been developed in school-based curriculum. In addition, the government also makes other efforts such as improving infrastructures and facilities, trainings ( PLPG and PPG), KKG (teachers work group), etc.

Those efforts are directed toward teachers because they are the spearheads that move forward to produce quality human resources. Teachers as the major component of education should be able to give the best to their students. Their role is not only as the giver of knowledge, but they have to be able to interact psychologically with the students. Success in the educational process starts with progressive ideas and knowledge which later will support individual's ability to think. In addition, the teaching of moral values has to be done parallel to the individual's development. This is to keep the individual on the right track in conformity with the norms in education, especially in the community in general. If all of the components in education can be synergized and proceed together with creative thinking process , then education can develop sustainably. Hence, education plays a very important role to develop students to become creative with a broad range of knowledge, in order that they can compete in the globalization era.

Creative and anticipative attitude on the part of the teachers are suspected to be less optimal, especially in elementary education. This has an impact on the low quality of the process and product of learning including that in science at elementary schools, that becomes the object of criticism both by educators and educational experts. They state that both the quality and quantity of elementary school science falls into low category (Suparno, 2004). The low quality product of science learning can also be seen from scores for daily evaluation done by the classroom teachers. The lowest score of science daily evaluation of the fifth grade students of SD No. 8 Tianyar Barat , Kubu Karangasem for daily evaluation 1 was 30 and the highest score was 70.50 and the mean score was 58.40. For daily evaluation 2, the lowest score was 58.40 and the highest score was 85.00 while the mean score was 64.

Based on the two daily evaluations scores it seems that the mean score for the daily evaluation was not optimal, since many students (60%) of 20 students had score less than the minimal completeness criterion. One of the causes of the less than optimal learning achievement shown by daily evaluation scores was caused by low students' thinking creativity and understanding of elementary school science.

The low science learning achievement was caused by many factors as follows. First, teacher in the teaching process did not optimally elicit the students' prior knowledge and did not relate concepts or topics to be taught to the students' real world. In addition, the students were not sufficiently guided to connect their knowledge and the implementation of concepts taught. This is the same as what Mariawan states [12]. He states that teachers seldom consider the students' prior knowledge. The effect of the teaching is that the concepts taught are abstract, so that they are difficult to be integrated with concepts that have been structured in the students' minds. On the other hand, when the teachers are able to connect the concepts or materials learned to the students' real life and their environment, this will help them in developing their naturalist intelligence.

Dimiyati and Mudjiono stated that the learning result is the peak of the learning process. Such a learning result mainly follows from the evaluation made by the lecturer, and also constitutes the result of the interaction between the learning act and teaching act [13]. Woodworth and Marquis stated that the learning result is the actual ability which can be directly measured from a test [14]. Nasution stated that the learning achievement refers to someone's mastery of what he/she knows or a particular skill in a lesson, which is commonly obtained from the test-based mark or score provided by the lecturer [15]. Bloom, as quoted by [16], "classified the learning achievement into three better-known as the Bloom's taxonomy, which is made up of the cognitive domain, the affective domain, and the psychomotoric domain". The cognitive domain is concerned with the student's intellectual learning achievement which covers six aspects; they are knowledge, concept, application, analysis, synthesis, and evaluation. The cognitive domain was revised by [16] better known as the Bloom's Revised Taxonomy. Thus, the inferential statistic learning achievement is the cognitive ability which the students of the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education, have after attending the inferential statistic learning within a period of time. Such ability includes the ability to understand, analyze, and apply what is learned.

Secondly, another cause of the low quality of the process and product of science teaching at elementary schools is the fact that some teachers do not pay enough attention to the nature of science as process and product. Learning science involves ability and skill to interpret physical bodies, to transform magnitudes, units, mathematical logic, and numeration ability accurately (Santayasa) [17]. This means that it is not enough to memorize or to learn theories alone, but it also involves the students in direct experiences through real activities.

Thirdly, the teaching tends to use conventional approach. Conventional teaching is the teaching that still stresses on intellectual intelligence only, while emotional intelligence and spiritual intelligence are not given enough attention. According to Gardner, the limitation of conventional way of thinking is corrected by substituting the concept of single intelligence with multiple intelligence [18]. Every student surely has a different profile of intelligences from others. So far, the students who are called the ones with a high intelligence are only those with a high logic-mathematic intelligence and verbal intelligence. This, of course, will cause it difficult for the students without a high logic-mathematic intelligence and a high verbal intelligence to develop (Sumertini) [19]. Every individual certainly will have certain intelligences that are higher than other intelligences. The teacher's role is to help every child to develop at least seven from the multiple intelligence and he or she, of course, should modify materials to fit in these intelligences. The teaching that does not accommodate the students' intelligences will cause a low students' motivation to learn. This is seen in the students who are less enthusiastic to learn, only 5% of 26 students were active in the process of teaching and learning. Thus, there is a need to find a solution by using a relevant teaching approach, to increase the students' creative thinking and understanding.

The relevant approach to this is multiple intelligence teaching approach. Operationally, this approach is analyzed into 5 phases: question possibilities, target improvement, expect quality, more resources, and reflect for growth possibility (Weber) [20]. In the question possibilities, the students are given questions based on topics according to interest and ability, for example, to relate them to their daily life. Thus, they can become more interested and know what they learn. In this phase, the students; naturalist intelligence can be elicited. In the target improvement phase, the students are given a target that they have to

learn thoroughly in learning such as competence standard, basic competences, and indicators. In expect quality, the students are given an evaluation and steps in learning to motivate them in learning. In the move resources, the students solve problems posed in the first phase, for example, to do an experiment, and then analyze it. In this phase, the teacher can elicit logic-mathematic intelligence from analyzing the result of the experiment, linguistic intelligence, in the form of students' kinesthetic intelligence by playing a role and interpersonal intelligence in group and working together. In reflect for growth possibilities phase, the students reflect on themselves by answering problems individually so that the teacher can understand every student's understanding about concepts learned. In this phase the teacher can elicit the students' intrapersonal intelligence. To optimize results, multiple intelligence approach is integrated with mind mapping in every phase. Mind mapping is a technique to record creatively that can optimize the students' intelligence [21],[22]. Furthermore, according to Depotter, et al., [23] mind mapping method can stimulate the mind to think actively. This occurs since mind mapping method is parallel to the principle of the natural working of the mind.

With these phases and the integration of mind mapping, the students are helped in developing their intelligence. Hence, all of their potentialities will easily construct their understanding of the concepts they learn. The students with understanding of the concepts learned will automatically improve their knowledge and this in its turn will lead to an improvement in the students' knowledge and will lead to the improvement of te students' learning achievement.

## 2. RESEARCH METHOD

The subjects of this study were all of the fifth grade students of SD No. 8 Tianyar Barat, Kubu, Karangasem in the even semester in the academic year 2011/2012 with the total number of 20 students. The object of the study consisted of 1) multiple intelligence teaching approach aided with mind mapping, 2) creative thinking skill, 3) science learning achievement, and 4) students' response to the implementation of multiple intelligence teaching aided by mind mapping.

The classroom action research was conducted in two cycles. Every cycle consisted of four phases: (1) planning, action, observation/evaluation and reflection (Kemmis and Taggart) [24]. The planning consisted of (1) collaboration with school principal and the fifth grade science teacher of SD No 8 Tianyar Barat, Kubu, Karangasem, (2) observation of the fifth grade students in the school year 2011/2012, (3) analysis of the problems that were found authentically in the observation, (4) planning the implementation of the Multiple Intelligence approach aided by mind mapping to solve the problems, (5) socializing the multiple intelligence approach aided by mind mapping to the school principal and the fifth grade teacher to be involved in the study, (6) together the fifth grade science teacher decide the learning objectives, (7) writing the instrument items, and (8) planning data collection techniques.

The implementation of the action was done with the steps as follows. (1) socializing the teaching model the Multiple Intelligence Aided by Mind Mapping for topic :” Human Body Organs and Animal Body Organs” to the students. (2) explaining that the teaching is done in groups. (3) Teaching: (a) teacher opens a lesson and lets the students to go to their respective groups, (b) teacher explains to the students about the steps in the teaching that will be followed, that is by using Multiple Intelligence approach aided by mind mapping, (c) teacher explains indicators, learning objectives, and stressing the advantages that will be obtained, (d) distributing student worksheets, and (e) the students work in their groups solving problems in the student worksheet.

The observation/evaluation steps were as follows. (1) observing and evaluating the teaching process by using Multiple Intelligence approach aided by mind mapping. Evaluation of the students' activities was by using mind mapping. (2) evaluating the students' creative thinking by performance test, the students' learning achievement by learning achievement test. (3) evaluating the students' responses to the implementation of the teaching program through questionnaire and interview, and (4) evaluating the constraints faced during the implementation of the action.

Reflection was done at the end of every teaching and the end of each cycle. As the basis for reflection, the observation result, test result, and interview with the students about the difficulties they faced during the lesson. The result of reflection of the first cycle was used as the basis for improvement of the implementation of the action in the second cycle.

In this study three types of instrument were used. They are (1) performance test to collect data about creative thinking skill, (2) learning test to collect data about science learning achievement, and (3) questionnaire to evaluate the students' responses to the implementation of Multiple Intelligence Approach aided by Mind Mapping.

Data about creative thinking skill, learning achievement, and the students' responses were analyzed descriptively and the conclusion was based on the mean score obtained by the students. The criterion of success of the action for the creative thinking skill was that if the students' minimal score falls into category high. The criterion of success of action for learning achievement was if the students got the mean score  $\geq 65$  or Absorption Level  $\geq 65\%$  and Learning Mastery level  $\geq 85\%$ . The criterion of success of the action for the students' responses was if the students' responses fall into positive category.

### 3. RESULTS AND ANALYSIS

#### 3.1. Results

The results of data analysis showed that the mean score for creative thinking of the students was 16.0 with SD = 2.15. Based on the classification of the students' creative thinking skill that was specified before, creative thinking skill of the fifth grade students of SD 8 Tianyar Barat falls into category sufficient. The distribution of the creative thinking skills of the students was: 10% very high, 40% high, 50% sufficient, 0% low and very low. In general, the mean score of the students' creative thinking skill in cycle 1 falls into category sufficient and has not achieved the criterion of success determined. The criterion of the students' success was that the students' scores at least fall into category high.

The result of data analysis showed that the mean score of creative thinking skill of the students was 18.65 with SD = 1.93. In cycle II, the distribution of the students' scores was 8.8% with SD 8.8% with category very high, 20.6% with category high, 70.6% with category sufficient, and 0% with category low and very low. In the end of the implementation of cycle II the mean score of the students' creative thinking skill of the fifth grade students of SD 9 Tianyar Barat falls into category high and has attained the specified criterion of success.

The result of analysis of the students' learning achievement after the action in cycle 1 in the 100 point scale, the scores range from 50 to 80. The mean score  $M = 68.33$ , absorption level  $AL = 68.33\%$ , SD = 4.92. Out of 20 students who took the test it was found out that the score distribution for science learning achievement in cycle I was 70% had mastered the material completely and 30% did not. Based on the mastery level specified for this study this study was not successful yet, since it has not reached the 85% minimal mastery level.

The result of analysis of the students' learning achievement after the action in cycle II in the 100 point scale, the scores range from 60 to 90. The mean score  $M = 76.17$ , absorption level  $AL = 78.89\%$ , and SD = 13.10. Out of 20 students that took the test it was found out that the score distribution for science learning achievement in cycle II was 95% had mastered the material completely and 5% did not. Based on the mastery level specified for this study, the study was successful.

The analysis of the students' responses shows the following results. The mean score for the students' responses was 42.60 with SD = 4.97. The score distribution for the students' responses was positive 55%, sufficiently positive 45%, negative 0% and very negative 0%. Based on the specified classification of the students' responses, the responses of the fifth grade students of SD 8 Tianyar Barat to the implementation of Multiple Intelligence approach aided by mind mapping falls into category very positive. The students said that they liked to learn science through Multiple Intelligence aided by mind mapping.

#### 3.2. Discussion

The results of the study showed that improvements have occurred in creative thinking skill (CTS) and learning achievement (LA). The result of data analysis showed that the students' mean score for CTS in Cycle I was 16.00 with SD = 2.15 (sufficient qualification). The students' mean score for CTS after the action in cycle II was 18.65 with SD = 1.93 (high qualification). The improvement occurred in mean score from cycle I to cycle II by 16.56%. This improvement occurred because of some factors, including the following factors. *First*, the teacher gave a recognition for the effort made by the students, the students' participation, and the students' success in learning by giving them additional scores. This recognition can

lead to the students' self-confidence and their positive perception toward the teaching. *Second*, announcing the scores at the end of a learning activity makes the students more prepared to compete positively in achieving the goal or recognition and in obtaining better achievements in the next session. *Third*, the students started to be familiar with Multiple Intelligence teaching approach aided by mind mapping. Through the model the students could organize knowledge systematically, and make it easy for them to understand the material, and help them easy in presenting the result of their work, in discussion, and in making a conclusion about the lesson.

The students' interaction could run well by giving them opportunities to work and discuss. In addition, at the discussion time, they would exchange opinions based on logical and scientific arguments. This helps the students to be more motivated in searching relevant sources to solve problems and to give better arguments. The learning process in the Multiple Intelligence approach aided by mind mapping improve the students' creative thinking skill to learn better. This makes the students motivated in developing themselves to get new knowledge.

The results of this study also showed that there was an improvement in science learning achievement. The mean score for learning achievement after cycle I was 68.33, the absorption level was 68.33% SD = 4.92 and learning mastery level = 70.0%, which means it falls into non-mastery qualification. On the other hand, the mean score for the students' learning achievement at the end of cycle II was 76.17, absorption level = 76.17% SD = 7.16 and classical mastery level = 95.0%, which means that it falls into mastery qualification. An improvement occurred in the mean score in the students' learning achievement in science from cycle I to cycle II by 11.46%.

The findings above shows that the implementation of teaching in cycle I was not optimal. This was caused by some factors. *First*, the scarcity of books to support the students in learning and this led to limitation of information obtained by the students about the material they learned. *Second*, basically, the students still adapted to the Multiple Intelligence approach aided by mind mapping since their habit of learning through the conventional teaching model. *Third*, the students did not prepare themselves well at home, this was caused by the limitation of sources they had. *Forth*, less effective time management that the teacher used. This was caused by the fact that the teacher had to give guidance to some students who had not been able to understand students' worksheet well which made the implementation of teaching less than optimal.

Related to the factors that caused the less than optimal learning achievement in Cycle I, then in Cycle II some effort were made to the situation as follows. 1) giving guidance more intensively to the students in solving problems in group, 2) giving more motivation to the students and relate the material to the students' real world, 3) giving more help such as a summary of the materials from various sources. 4) guiding the students in writing mind maps. 5) encouraging the students to express their problems through a reflection sheet to be discussed together.

The result of analysis of the students' responses showed that the fifth grade students of SD 8 Tianyar Barat to the implementation of Multiple Intelligence teaching model aided by mind mapping gave positive responses. Based on the result, in general, the students were able to adapt to the implementation of Multiple Intelligence teaching model aided by mind mapping. Through this model the students could develop their critical thinking skill. The model, basically, stresses learning process that provides learning experiences by acquiring knowledge or concepts from their experiences.

The findings are parallel to the empirical evidence from the previous studies. Kusmariyatni & Astawan in their studies found that the implementation of multiple intelligence teaching model can improve the motivation of the third grade students at SD Laboratorium Undiksha in the school year 2010/2-12011 in five subjects in the third grade [25]. Gayatri shows that multiple intelligence teaching model has a better effect than the conventional approach on the tenth grade students' physics learning achievement at SMA Negeri 3 Singaraja in the school year 2008/2009 [26]. Sistiani finds that the implementation of mind mapping can improve students' creativity in writing, The students become creative in selecting topics , more creative in developing main ideas and the writing is more readable [27]. Arin shows that the implementation of mind mapping aided by direct objects can increase the fourth grade students at SD4 Kampung Baru [28].

Learning process through multiple intelligence model aided by mind mapping trains the students in connecting materials to the real world and prior knowledge investigation is a method for finding out to what extent the students have known the prerequisite information and in organizing the information in their cognitive structures. Based on the prior knowledge the students have, the teacher only directs them to study

the problems and to follow the teaching process seriously. Then the students are given the opportunity to present their ability based on the materials learned and then this is continued by the review of the concepts learned to solidify the concepts that they have constructed by themselves from the previous phase.

Conforming to the explanation and discussion above and based on the result of reflection that has been done, the success in the implementation of Multiple Intelligence learning model aided by mind mapping is due to some advantages of the model as follows. (1) The Multiple Intelligence learning model aided by mind mapping is believed to be able to improve the students' creative thinking skill. Through the implementation of the model, the students' minds are stimulated to do imagination, to express ideas, and to facilitate them in expressing concepts/ ideas in their minds. (2) The teacher can take the role of facilitator and mediator in teaching in the classroom more optimally. (3) Through the implementation of the model the teacher is provided with the opportunity to administer student evaluation objectively through observation. Through an evaluation rubric the teacher can avoid subjectivity. (4) The model helps in teaching the students to be more active and able to reflect on their learning activities, so that their minds can concentrate fully on the learning process. (5) Through the production of mind maps the students understand the interconnection of concepts that are learned. (6) Through the implementation of the model, the teaching and learning activities become more oriented and systematized and can focus the students' attention in learning. (7) The model provides opportunities to the students to learn according to what they want through investigation into the experiences they have and to make use of the experiences as the prior knowledge to conduct further learning activities. (8) The model gives opportunities to the students to learn according to their ability, the way to use an interactive process to decide on what the students can do. (9)

The model gives opportunities to the students to be active in learning, to interact both with the material, peers and teachers. (10) The model gives a feeling of comfort to the students when they are not brave enough to ask directly, so that the students can write their problems on the reflection sheets.

Some constraints or limitations encountered during the course of this study by implementing Multiple Intelligence teaching aided by mind mapping are: (1) The teacher could not give guidance fairly to the students due to time limitation. (2) Some topics make it difficult for the teacher to find their contexts. Based on this problem, the teacher is required to be more creative in finding contexts for the topics learned in the daily life. (3) Some students were not used to making mind maps yet. (4) Some students were not used to asking questions, expressing opinions, and discussing with peers.

#### 4. CONCLUSION

Based on the results of data analyses and discussion, the multiple intelligence teaching approach aided by mind mapping can improve the fifth grade students' creative thinking skill at SD 8 Tianyar Barat, Kubu, Karangasem. The creative thinking skill increased from Cycle I to cycle II by 16.56%. The multiple intelligence teaching approach aided by mind mapping could increase science learning achievement of the fifth grade students of SD No 8 Tianyar Barat, Kubu, Karangasem. The science learning achievement increased from Cycle I to Cycle II by 11.46%. The response given by the fifth grade students of SD No 8 Tianyar Barat, Kubu, Karangasem to the multiple intelligence teaching model aided by mind mapping was very positive. They stated that they enjoyed learning science through the multiple intelligence teaching approach aided by mind mapping.

Based on the results from this classroom action research, it can be suggested that (1) It is suggested to the teachers to use the multiple-intelligence teaching approach aided by mind mapping as one of innovative teaching models in the effort to improve the students' creative thinking skill, (2) Further development (for researchers and teachers who would like to conduct classroom action research using the Multiple Intelligence approach aided by mind mapping it is suggested that they pay attention to the results of reflection on this classroom action research. The syntax of instruction should be adapted to the characteristics of the school, classroom and students.

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**BIOGRAPHIES OF AUTHORS**

Dr. I Wayan Widiana, S.Pd., M.Pd. was born in Badung, October 10<sup>th</sup> 1959. He worked as Rector at Ganesha University of Education. He was received Doctor in Educational Evaluation and Research from Jakarta State University. He also as lecturer of statistics, methodology of educational research and evaluation in various departments, including the Department of Early Childhood Education, Department of Primary Education, Department of Educational Technology, and the Department of Guidance and Counseling.



Dr. I Nyoman Jampel, M.Pd. was born in Banjar Sari Tunas Tianyar village, Kubu district, Karangasem regency, Bali Province, on July 5<sup>th</sup>, 1985. He was received Doctor in Educational Evaluation and Research from Jakarta State University. He worked as Lecturer of Statistics, Methodology of Educational Research and Evaluation in Department of Primary Teacher Education at Ganesha University of Education