

Creative Ability and the Ability to Design Lesson Plans that Teach Creative Thinking

Abstract

This paper analyze whether the creativity of the teacher students is correlated to their ability to design lesson plans that teach creative thinking. The teacher students were asked to design lesson plans that teach creative thinking. Separately the Abbreviated Torrance Test for Adult (ATTA) was administered as a measurement of their creative abilities.

The result is creative thinking ability does not appear to be correlated with the ability to design lesson plans that teach creative thinking. It is suggested that a teacher student's ability to incorporate into learning plans the creative thinking components of MI, incubation (as allowed for by TIM three stages of learning), and a creative learning process can be developed by providing the knowledge of the relevant theories, models and frameworks.

The same cannot be said of the teacher students' ability to design teaching activities that stimulate imagination. Without a framework or related knowledge base to generate activity ideas, the teacher students overall did not do well on this component. It would be informative to find out why the ability to design activities that stimulate imagination appears not to be correlated to the teacher students' creative thinking abilities.

1. Introduction:

1.1. About the project

In collaboration with The Faculty of Early Childhood Education at the State University of Jakarta, Indonesia, Credo, a non-profit organization based in Jakarta, designed and taught a course in *Designing Lessons that Teach Creative Thinking* (“the course”). The course was part of a wider project with the goal to prepare teacher students *to be able to teach creatively and ultimately develop the creative thinking of their students*. The course was taught to teacher students in their third year of undergraduate studies in 2011 (“the teacher students”). Throughout the course we taught the teacher students to design lesson plan that will develop creative thinking, from determining teaching objectives to designing teaching activities, in a systematic manner. The lesson plans that teach creative thinking include the following elements: specific teaching objectives based on Bloom’s Taxonomy (Anderson and Krathwohl, 2001), Multiple Intelligences (Gardner, 2006), creative learning process with an emphasis on imagination, and the three learning stages from the Torrance Incubation Model of Teaching and Learning (Torrance and Safter, 1990).

Rationale

The Indonesian Ministry of National Education has already acknowledged the importance of creating a creative generation that has creative ability to think creatively¹. Thus, it is clear that one of the missions of teachers in Indonesia is to encourage the ability of creative thinking in their students. The students of today will be tomorrow’s problem solvers; and they should be the progressive and creative ones -- always seeking new ideas and possibilities, instead of applying what has been done by previous generations.

As the teachers’ goal is to teach creative thinking to their students and nurture the students’ creative ability, we were therefore also interested in the teachers’ awareness and application of their own creative thinking. Teachers are role models to their students, it is therefore essential that the teachers themselves should be able to think creatively in order to be able to achieve their goal optimally.

There are two main reasons why we thought that the teachers’ creative thinking ability might be correlated with the ability to design lesson plans that teach creative thinking:

1. A person needs to master a topic to be able to teach it. Therefore, teachers need to be able to think creatively to be able to teach it.
2. Creative thinking is closely linked with problem solving. As Torrance (1963) noted: “Learning and thinking creatively take place in the process of sensing difficulties, problem, gaps in information; in making guesses or formulating hypotheses about these deficiencies; in testing these guesses and possibly revising and retesting them; and finally in communicating the results.”

¹ Indonesian Ministry of National Education strategic plan 2010 – 2014 page 56

Throughout the course, assignments were given to the teacher students to design lesson plans that teach creative thinking. The assignments can be considered as problems presented to the teacher students that require effective solutions. Based on Torrance's line of thinking, we predicted that teacher students' level of creative thinking would correlate with their ability to design lessons that teach creative thinking.

This study aimed to investigate whether we can assume the presence of teacher students' creative thinking abilities and whether such abilities are correlated with the ability to design lesson plans that teach creative thinking.

1.2. Definitions

1.2.1. What is creativity?

We often hear the word, but what is the meaning of *creativity*? The common notion of creativity is usually linked with artistic or aesthetic matters. However, many experts now believe that creativity can be involved in other fields such as science or economy. For example, Gilhooly (1982) defines creativity to be a product: "a product or a result of something new that has value or is useful, the product can be in the form of a poem, scientific theory, writing or technology." Experts such as Gardner (1983, 1999) and Csikszentmihalyi (1996) define creative products to be results of a cognitive process and are defined by the social milieu. Some definitions of creativity encapsulate more than cognition and a creative product to include attitude and motivation, such as that of Harris (1998), who defines creativity to be the ability to imagine or come up with something new. Harris (1998) wrote that creativity also entailed an attitude for accepting change, the willingness to play with ideas and new possibilities. In addition to this, Harris also described creativity to be a process for idea and solution development that solve problems which result in change. From the many definitions of creativity, Cropley (2001) summarized creativity to include three core aspects:

1. Novelty (a creativity product, course of action or idea necessarily departs from the familiar);
2. Effectiveness (it works, in the sense that it achieves some end – this may be aesthetic, artistic or spiritual, but may also be material such as winning or making a profit)
3. Ethicality (the term 'creative' is not usually describe selfish or destructive behavior, crimes, warmongering and the like)

This paper will adopt Cropley's (2001) aspects of creativity and define creativity to be *a product that is new, effective and ethical*.

1.2.2. What is creative thinking and creative thinking ability?

A person needs to think to solve a problem and come up with effective solutions. However, that person may produce a solution that, although effective, is not novel. Creative thinking is a thinking process that incorporates novelty, effectiveness and ethicality which results in effective solutions that are fresh and original.

For the purpose of this paper, creative thinking ability is *the thinking skill to solve a problem effectively in a new and ethical way*. When a person has creative thinking ability, he/she is able to critically identify the core problem in question, thinking creatively to solve it, a process which

results in the generation of creative products (ideas or concrete objects) as the solution to the problem.

2. Purpose

This study's purpose was to investigate whether a teacher's creative thinking ability is correlated to the ability to design effective lesson plans to teach creative thinking to students. We hope that this study can contribute to informing Indonesian educators and policy makers in finding strategies to help teachers in encouraging and nurturing creative thinking in their students.

3. The research question

Does a teacher's creative thinking ability correlate to his/her ability to design lesson plans that teach creative thinking?

4. Literature Review

4.1. Do teachers need to be able to think creatively in order to teach creative thinking to their students?

As mentioned in section 1.2, teachers can only teach what they know; therefore it is argued that teachers do need to be able to think creatively in order to teach creative thinking. Furthermore, Bandura's (1977) Social Learning Theory underlines the teacher as role model as a tacit/implicit way of teaching students to be creative individuals. Thus, a lack of belief in or awareness of oneself as a creative being is not only detrimental to the future teaching of students but may also inhibit these teacher students' own creative learning in their training to become teachers. Therefore, teachers not only need to be able to think creatively, but also be aware of their ability to think creatively in order to teach creative thinking to their students.

4.2. What might help teachers role model creative thinking to their students?

Davis (2004), in his synthesis and summary of the research conducted in creative personality traits, concluded with the opinion that being aware of one's creativeness was highly important: "In improving our own creativity and in teaching creativity to others, it is the number one trait to develop." (p.87); and Torrance and Safter (1990) pointed out that it takes courage to be a creative teacher as creative teaching behaviours involve risk. This supports the argument that the foremost aspect to teaching creative thinking is teachers' awareness of their personal creativity. With such awareness, teachers will be able to deliberately role model creative thinking habits. In order to have such awareness, teachers need to have knowledge about creative thinking.

4.3. How can a lesson teach creative thinking?

Research has suggested that creative thinking can be nurtured when students are deliberately taught continuously to:

4.3.1. Use divergent and convergent thinking separately during learning.

Divergent thinking is generative thinking and convergent thinking is evaluative and selective thinking. Divergent thinking was first put forth by Guilford as an important cognitive skill (1977). Since then, much research in creativity has focused on divergent thinking as a key creative thinking skill, if not *the* creative thinking skill (Runco, 2007). Over time, some models have been developed that emphasize the role of both divergent and convergent thinking in the creative thinking process. For example, the separation and balance of divergent and convergent

thinking is a feature of the Creative Problem Solving (CPS) model, a creative process model that has benefited from more than 50 years of academic research (Isaken et al 1994; Treffinger, 1995; Miller et al, 2001; Puccio and Murdock, 2007). The National Advisory Committee on Creative and Cultural Education Report UK (1999) stated that it should be the aim of education to help students differentiate and separate generative and evaluative thinking. Based on the CPS model, divergent and convergent thinking are deliberately separated and balanced in the creative process

4.3.2. *Develop their imagination*

The role of imagination cannot be divorced from either divergent or convergent thinking (Puccio and Murdock, 2007) and indeed, *Enjoy and Use Fantasy* (the ability to imagine) was identified as a pertinent creative thinking skill by Torrance and Safter (1999). Of course, in order to make the students able to deepen their understanding on what they are learning, the imagination that the students practice should derive from the topic learnt.

4.3.3. *Be flexible to use different modes of thinking (thinking languages).*

Gardner (1983), in his Multiple Intelligence theory, postulated that intelligence is not one whole entity, but can be separated into different types of intelligences. Individuals have different intelligence profiles with which they apply in thinking or problem-solving. Adams (2001) also wrote that people tend to solve a problem by choosing a thinking language that they are most comfortable with. However, Adams (2001) suggested that our habitual choice of problem solving language is not necessarily the one that is best to solve the problem we face; therefore we should be flexible in using different problem-solving languages or modes of thinking. As creative thinking involves the ability to problem-solve effectively, students should be encouraged to practice multiple intelligences or different modes of thinking in order to widen their problem solving abilities.

4.3.4. *Be curious, dig deeper, continuously thinking about what they have learned.*

Torrance believed that people learn creatively by “exploring, questioning, experimenting, manipulating, rearranging things, testing and modifying, listening, looking, feeling – and then thinking about it – incubating.” (Torrance & Safter, 1990; p.13). He developed a model in teaching – the Torrance Incubation Model (TIM). It aims to enhance incubation within learners and to include the teaching of creativity contents with the teaching of contents from other disciplines. There are two aspects in TIM:

- a. Three stages of teaching (warming up, digging deeper and keeping the learning going). Each stage contains a set of recommended teaching strategies that encourage student thinking and incubation.
- b. A set of 18 creativity skills or creative thinking skills (Torrance, 1979; Torrance & Safter, 1999), one or more of which are meant to be woven into the teaching process.

In summary, creative thinking can be taught in a lesson if a teacher deliberately incorporates one or more of the following into a lesson: (i) the separation and balance of divergent and convergent thinking (ii) stimulation of students’ imagination (iii) development of students’ thinking languages (iv) allowing for students incubation of learning (v) development of one or more of the 18 creative thinking skills from the TIM.

5. Methodology

A group of 60 teacher students at the State University of Jakarta, Department of Early Childhood Education attended a semester long two credit course on lesson planning as part of their undergraduate program (“the course”). The course included the following components to teach the teacher students to deliberately design the teaching of creative thinking into their lesson plans: (i) Multiple Intelligence (MI) (ii) TIM – three stages of learning (iii) Creative Process (CP) (iv) Stimulating imagination (Please see Appendix 1 for details). Throughout the course, the teacher students were asked to design lesson plans incorporating the components they had learned. No deliberate instructions were given to the teacher students to be as creative as they could or to specifically design creative lesson plans.

The teacher students’ creative thinking abilities were measured by way of the Abbreviated Torrance Test for Adults (ATTA) (Goff and Torrance, 2002). The ATTA was administered in the first session of the course before the teaching of any course materials, and a post test was administered 14 week after the final semester examinations.

For the purpose of this study, we define lesson plans that teach creative thinking to be lessons plans that include any one or more of the following (“lesson plans components” – See Appendix 1 for details):

1. Multiple Intelligence
2. TIM – three stages of learning
3. Creative Process (separation and balance of divergent and convergent thinking)
4. Stimulation of imagination

A total of three out of nine course assignments involved the teacher students designing lesson plans (“the assignments”). All the assignments were assessed for their effectiveness, that is, how well the designed teaching activities that include one or more of the lesson plans components converge towards the stated teaching objectives. As the assessment rubrics for all the assignments included grading criteria on the effectiveness of the lesson plans components, the grades awarded for the assignments are therefore good indicators of the teacher students’ ability to design creative lesson plans.

Pearson’s correlation coefficients were used to establish whether the teacher students’ pre course ATTA scores were correlated with their assignment scores i.e. the extent to which their lesson plans teach creative thinking. Three of the lesson plans components (MI, CP, TIM three stages of learning) were compared to the ATTA scores. Because the highest score achievable in ATTA is 106, the assignment scores were scaled to a maximum of 106 for visual depiction and comparison of the two scores.

Twenty-eight teacher students did the pre course ATTA and of these teacher students, 22 returned all their assignments for this study’s analysis. This study analyzed the ATTA and assignment scores of said 22 teacher students.

6. Results

6.1. Multiple Intelligence

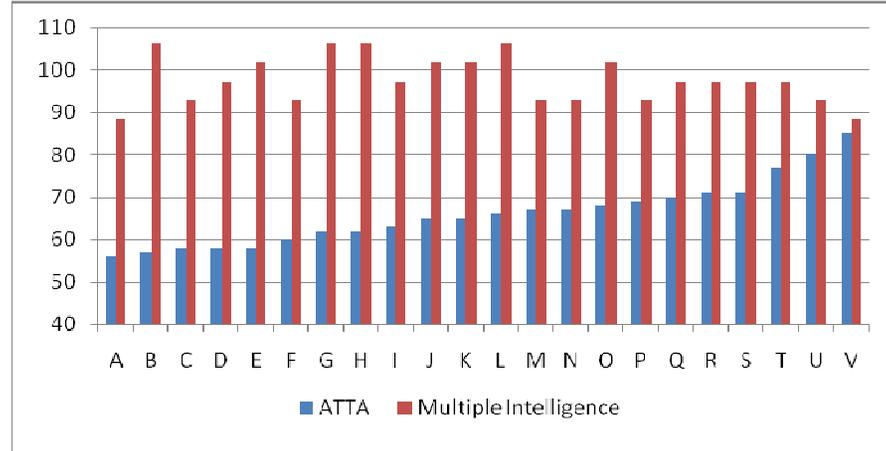
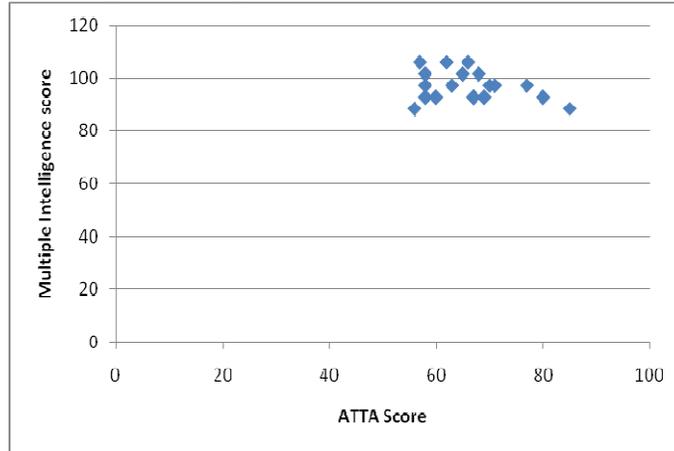


Table 1. ATTA and Multiple Intelligence assessment scores

The scores for the MI assessment are of truncated or restricted range which meant the correlation coefficient of $-0,042308$ may be lower than the estimate population correlation coefficient. In this case, the MI data was distributed in the upper scores level (above 80 out of a total of 106) as is shown in Table 1 above. The results indicate that teacher students were able to apply MI effectively in their lesson plan designs regardless of their ATTA scores.

6.2. TIM three stages of learning

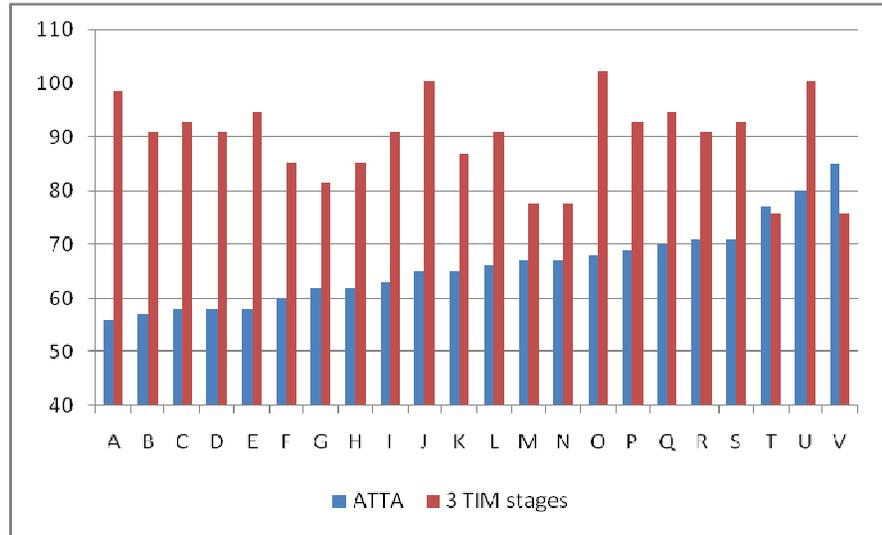
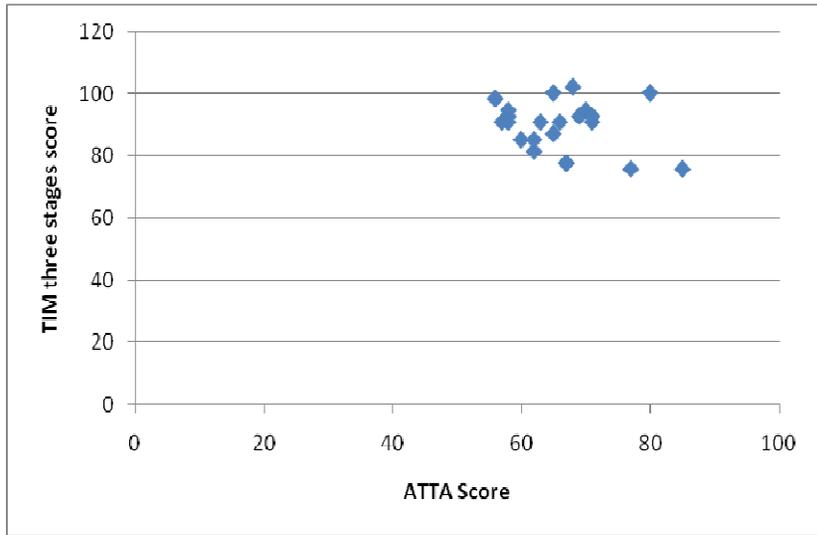


Table 3. ATTA and TIM three stages assessment scores

The scores for TIM three learning stages assessment are of truncated or restricted range which meant the correlation coefficient of -0,26359 may be lower than the estimate population correlation coefficient. In this case, the TIM three learning stages scores were distributed in the upper scores level (above 75 out of a maximum of 106) as is shown in Tables 3 and 4 above. The results indicate that teacher students were able to apply TIM three learning stages effectively in their lesson plan designs regardless of their ATTA scores.

6.3. Creative Process

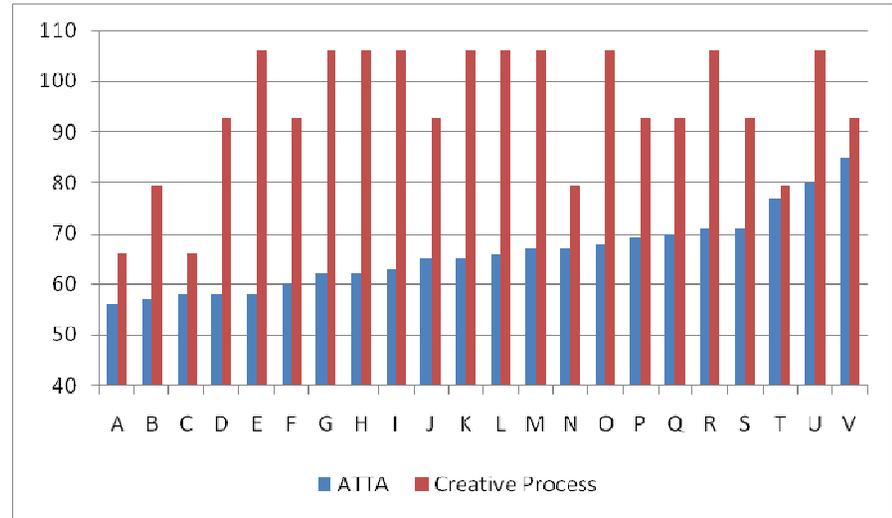
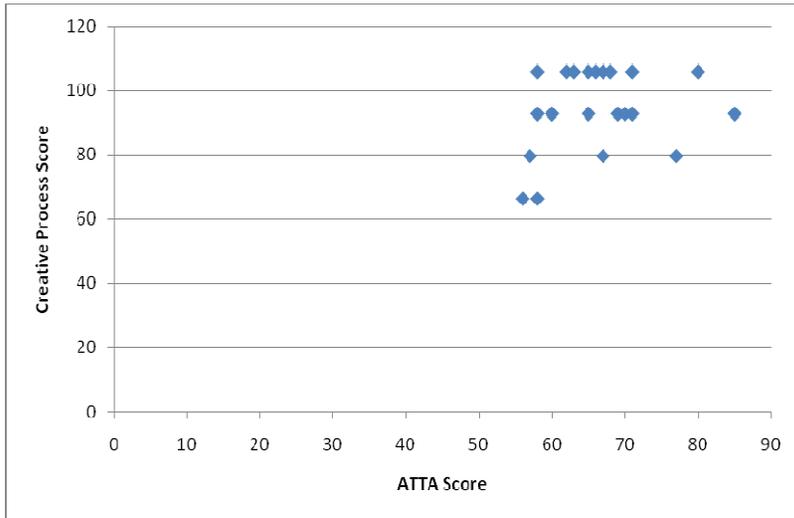


Table 5. ATTA and Creative Process assessment scores

A correlation coefficient of 0.22 indicates a positive but weak association between creative ability and the ability to design lesson plans that incorporate a creative process (CP).

6.4. Imagination

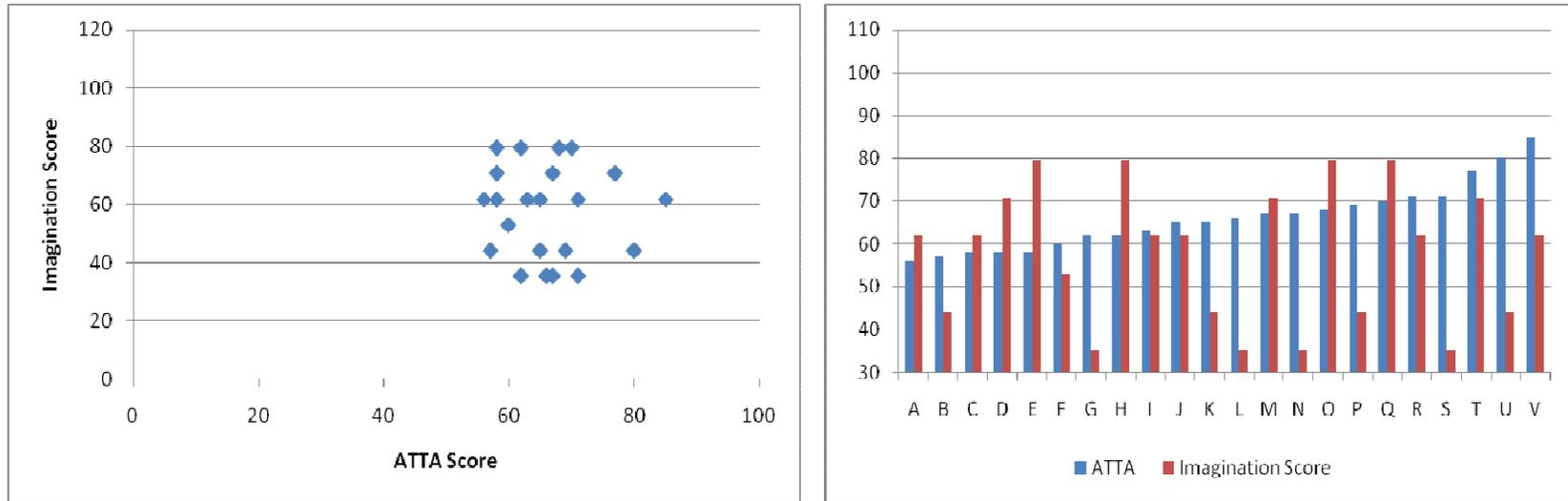


Table 7. ATTA and Stimulating Imagination assessment scores

A correlation coefficient of -0.07 indicates a near absence of association between creative ability and the ability to design lesson plans that incorporate a teaching activity that stimulates imagination. Nevertheless in Table 7, we notice that the stimulating imagination assessment scores were generally low (between 30 to 80 out of a maximum of 106) compared to the other assignments included in this study.

Discussion

The restricted ranges in the high score levels for the MI and TIM three stages assessments do not provide us with a good estimate of the degree of association between creative abilities and the ability to incorporate MI and TIM three stages of learning into a lesson plan design. Given the overall high scores of this group of teacher students, it appears that creative abilities may not be a prerequisite for this group of teacher students to be able to incorporate MI and TIM three stages of learning into teaching activities design. This may be due to the straightforward frameworks afforded by MI and TIM within which the teacher students could work. It may also be that knowledge of the theory of MI and the components of the intelligences is sufficient to design teaching activities based on MI – that is, given enough background knowledge, the generation of new and effective ideas are not necessary in order to develop effective MI teaching activities.

Similar to the application of MI, it may be that knowledge of the TIM three stages of learning also suffice for this component to be applied in a lesson plan. We therefore postulate that sufficient knowledge and the adherence to the frameworks provided by MI and TIM may suffice for teacher students to design lesson plans that develop MI and encourage incubation in students.

A positive albeit weak correlation was found between creative abilities and the ability to incorporate CP in a lesson plan. Perhaps what is of interest is the range of assessment scores found for the CP assessment, which overall, was lower than those of the MI and TIM assessments. This suggests that it was more challenging for the teacher students to design a learning process than to design MI activities or apply the TIM three stages of learning to encourage incubation in learners. This may be due to the fact that the CP involves several elements (knowledge building, knowledge exploration, imagination and expression) and indicates that this group of teacher students found it more challenging to chain together several elements within a learning process.

No correlation was found between creative abilities and the ability to incorporate activities that stimulate learners' imagination in a lesson plan. This is intriguing, as we would expect that teacher students' ability to find new ideas or to imagine are pertinent to the openness of the task of finding teaching activities that stimulate imagination. This is especially so compared to the application of MI and TIM three stages of learning in lesson plan designs because the ability to design activities that stimulate imagination requires the lesson plan designer to be playful with ideas and as is often the case, to be playful with absurd ideas.

Could it be that no framework as such is provided for the teacher students to generate imagination stimulation activities as is provided for MI, TIM three stages of learning and CP? Unlike the application of MI and TIM three stages of learning which provide some framework or structure and knowledge base for lesson designers to work within, thinking up activity ideas to stimulate learners' imagination is a much more open-ended task. This entails the lesson designer to consider *what can be imagined* or what are the new perspectives or ideas that can be stimulated based on the teaching contents. This is unlikely to be attained if a lesson designer is unable to stretch beyond the known or to play around with ideas, hence the postulated need for creative thinking ability (Torrance and Safter, 1999). However, the correlation coefficient does not lend support to this line of reasoning – that creative thinking abilities are associated with the ability to generate ideas for teaching activities that stimulate learners' imagination. The ability to perceive problems from fresh perspectives is considered to be essentially the thinking skill required to think up activities that stimulate imagination in a lesson plan – could this assumption be wrong or could it be that the ATTA scores do not capture this thinking skill?

We do note that overall, this group of teacher students found it challenging to think up teaching activities for stimulating imagination, as indicated by the low range of scores of between 35 and 80. If it is considered to be pertinent that teachers are able to stimulate the imagination of their students, it is essential that we continue to investigate the underlying thinking skills that enable teachers to think up imagination stimulation teaching activities.

Lastly, teaching creative thinking is defined here to include the development of multiple problem solving languages (MI), encouraging incubation (by way of using the TIM three stages of

learning in teaching), application of a creative process that provides opportunities for learners to explore knowledge, and the stimulation of learners' imagination. Overall, this study has found teacher students' ability to design lesson plans that teach creative thinking to be minimally related to their creative thinking abilities. It should be noted that the components of creative thinking in this study are limited. A more complete or advanced course on teaching creative thinking would include components such as the TIM's set of 18 creativity skills (Torrance and Safter, 1999), and the deliberate separation and balance of divergent and convergent thinking (Puccio, Firestien, Coyle & Masucci, 2006). It remains to be seen whether creative thinking abilities might be related to the ability to design teaching activities that incorporate these afore-mentioned elements of creative thinking.

7. Conclusion

Creative thinking ability does not appear to be correlated with the ability to design lesson plans that teach creative thinking. It is suggested that a teacher student's ability to incorporate into learning plans the creative thinking components of MI, incubation (as allowed for by TIM three stages of learning), and a creative learning process can be developed by providing the knowledge of the relevant theories, models and frameworks. The frameworks especially are thought to be helpful for teacher students to use as a guide to design lesson plans, and some knowledge of common teaching ideas appear to suffice for effective lesson plan designs. The same cannot be said of the teacher students' ability to design teaching activities that stimulate imagination. Without a framework or related knowledge base to generate activity ideas, the teacher students overall did not do well on this component. It would be informative to find out why the ability to design activities that stimulate imagination appears not to be correlated to the teacher students' creative thinking abilities. What might be the underlying thinking abilities that would be necessary for teacher students to be able to design activities that stimulate learners' imagination effectively?

8. Limitations / Weaknesses

The small sample size of the teacher students restricts the generalizability of the results of this study. Given the one semester long time constraint to teach the course on designing lesson plans that teach creative thinking, only what were construed to be the basics of creative thinking could be included in the course contents and hence a restricted definition of creative thinking was applied to the course and hence this study.

9. Recommendation

Given the weak assignment scores for the stimulation of imagination assignment and the intriguing result of a near absence of association found between creative thinking abilities and the ability to think up imagination stimulating activities, it would be informative for the development of future lesson planning courses to investigate why this is the case and what might be the underlying thinking skills necessary to think up imagination stimulation activities, and whether and how these thinking skills might be taught.

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Appendix 1

For the State University of Jakarta, we prioritized to teach the three stages of teaching to the teacher students.

A. Creative Process

Creative process is a structure of creative thinking process that is developed by Credo, with specific attention being drawn to the separation of divergent and convergent thinking and the explicit use of imaginative thinking in a lesson. The creative process consists of:

- i. Knowledge introduction:
The stage where the knowledge is introduced and taught to the students.
- ii. Imagination:
The stage to dig the students' imagination based on the topic learnt.
- iii. Expression:
The stage for the students to express their ideas and thoughts that have been generated in Imagination stage.
- iv. Reflection:
The stage for the students to rethink what they have learnt, to extract what experiences and knowledge that they have gained.

B. Imagination

Although imagination is already included in Creative Process structure, we analyze it separately because we would like to see if the teacher students' lesson plan assignments that were given before the Creative Process was taught have already encourage the students' imagination.

C. Multiple Intelligence

There are 8 Intelligences that were taught to the teacher students: linguistic, logical-mathematical, musical, kinesthetic, visual, interpersonal, intrapersonal, naturalist (Gardner, 1999).

D. 3 TIM Stages

Torrance believed that people learn creatively by "exploring, questioning, experimenting, manipulating, rearranging things, testing and modifying, listening, looking, feeling – and then thinking about it – incubating." (Torrance & Safter, 1990; p.13). He developed a model in teaching – the Torrance Incubation Model (TIM). It aims to enhance incubation within learners and to include the teaching of creativity contents with the teaching of contents from other disciplines. There are two aspects in TIM:

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- b. A set of 18 creativity skills or creative thinking skills (Torrance, 1979; Torrance & Safter, 1999), one or more of which are meant to be woven into the teaching process.

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I work as a researcher at a non-profit organization which promotes and teaches creative thinking and teaching to teachers and teacher students from all socio-economic backgrounds. With that has been said, I hope I can contribute to make a better Indonesia.

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