

The Development Model of 7 Steps Learning Cycle Using Multiple Intelligences and Metacognitive Techniques in the Subject of Life and Environment, Scientific Education Group, Secondary School, Year 2

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Abstract: This research aims to educate the development model of the 7 steps learning cycle using 3 kinds of multiple intelligences and metacognitive techniques that are: intelligibility, plausibility and wide-applicability. In case of secondary school year 2, the development model of 7 steps learning cycle using multiple intelligences and metacognitive techniques has steps orderly as following: to write a learning management plan perfectly and practically that can be used in each of study periods or hours by using the total of 7 plans, 3 h per each plans, specialists estimate an appropriateness that has quality in the high level, to produce a test form of critical thinking by using conceptual idea of The Watson and Glaser Critical Thinking Appraisal (WGCTA), issue Y.M. in the total of 54 sections: to produce a test form of environmental preservation behavior according to the 5 levels of rating scale in the total of 40 sections. Afterwards, using the developed learning plan to experiment with secondary school students, year 2, 1st semester, for 7 weeks using pre-test and post-test learning with a learning achievement, critical thinking and environmental preservation behavior test forms. Then use the scores of learning achievement test form, critical thinking test form and environmental preservation behavior test to find its qualities and statistically analyze by using percentage, means and standard deviation (paired t-test). The research result has shown as following: the 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques have an efficiency value at the rate of 0.563. The learning achievement test form has difficulty value in range of 0.31-0.75, Item-total correlation value is in range of 0.30-0.69 and reliability value is 0.92, the critical thinking test form has Item-total correlation value in range of 0.23-0.72, reliability value (KR20) is 0.84 and the environmental preservation behavior test form has Item-total correlation value in range of 0.39-0.80 and reliability value (and-Coefficient) is 0.84. Students who learn the 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques have a higher learning achievement value than before class with statistically significant rate of ($p < 0.0001$).

Key words: The 7 steps learning cycle, management plan using multiple, intelligences, metacognitive techniques, critical thinking, environmental preservation behavior

INTRODUCTION

Now-a-days, global situations have been changing so quickly which causing all development aspects as well as environmental and natural resources, especially the global warming effect that we are facing has caused us a human living negatively. For this reason, there is a try of solving the happened environmental problems with possibly scientific and technological methods. Importantly, to solve the environmental problems efficiently would take quite a time and directly to its cause which is us as a human by making them understandable, aware, appreciated of its value and begin to solve environmental problems by themselves. Importantly, there must be a

study of life and environment for everybody with every education background.

Learning cycle is a learning management model that aims to make learners to be capable of using the method of scientific knowledge inquiry approach (Blank, 2000). Knowledge discovery is based on constructivism and knowledge development theory of Piaget which is the 7 steps learning cycle:

- Previous knowledge verification
- Interest stimulation
- Observation and research
- Explanation
- Thinking expansion

- Assessment step
- The step of using knowledge in each teaching stages would be inserted a high grade thinking skill of multiple intelligences theory and metacognitive techniques, in order to help students in looking for knowledge, being able to control their thinking system that related to a learning materials (King, 1991) supporting learners to be aware of things that they know (knowledge about knowledge), thinking about self-thinking and others (thinking about thinking) by using 3 techniques of intelligibility, plausibility and wide-applicability (Erickson and Erickson, 1984) which causes learners to be able to construct knowledge meaningfully and correctly (Hogan, 1999)

The research's purposes:

- To develop a learning model of 7 steps learning cycle using multiple intelligences and metacognitive techniques which affects to the learning achievement of secondary school year 2 students to be in line with the specified standard
- To compare a learning achievement before and after learning with learning sets in the subjects of life and environment, the scientific education group, secondary school year 2 students, Seeharak Wittaya Municipal School 5, Mueng District, Udonrtanee province

MATERIALS AND METHODS

Research method and management plan of statistic experiment: The used population in this research was 178 students from Seeharak Wittaya Municipal School 5, year 2, 1st semester, Buddhist era 2552, Mueng district, Udonrtanee province in the total of 4 class rooms. The used example group in this research was the year 2 students, Seeharak Wittaya Municipal School 5, Mueng District, Udonrtanee province in the numbers of 41 students from class 2/3 and another 41 students from class 2/2 who are acquired from cluster random sampling by drawing lots method. This research is an experiment design by researcher using experimental method in the form of Pretest-Posttest without Control group design.

The used instruments in this research were 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques, the scientific education group, content 2 (life and environment) in the number of 7 plans, 3 h for each plans, the Learning achievement test form, the Critical thinking test form and the Environmental preservation behavior test. The step of 7 steps learning cycle development using multiple intelligences and metacognitive techniques has an order as following:

The production of scientific education management plan:

To write up a conceptual idea for each steps of learning management plan preparation that according to the 7 steps learning cycle using multiple intelligences and metacognitive techniques with teacher's handbook learning and present to the thesis committee by having a frame work of activities comparison management for each steps of learning activities. To study a basic education programme, Buddhist era 2544 which relating to the contents of scientific education group and the science and technology institution's programme, in rage of 3rd step (year 2 student), in order to be understandable with a learning standard of the annually prospective learning result and the measurement and assessment of scientific education content which come from the institution's programme of Seeharak Wittaya Municipal School 5, Buddhist era 2549, content 2 (life and environment) in order to be understandable with programme, learning content, learning standard and learning module production by ordering and specifying a content presentation framework which combining with detail as following:

- Ecology
- Native ecology
- Living lives connection
- Ecological substances cycle
- Population matters
- Biological variety
- Human with environment and resources

To analyze learning content, each subjects of explanation, learning activities propose, learning evaluation and assessment and construct teaching models, activities, techniques and teaching instruments to be accorded to the learning propose. Learning management plan is written by researcher with possibility of teaching usage in each study periods or hours perfectly and practically.

The written and developed learning activities management plan which according to the combination of learning activities management plan is used for presenting to the thesis committee chairman to be assessing appropriately and accordingly to teaching plans and pointing a weakness to be adjusted and developed for the learning activities management plan in order to be more perfectly.

The constructed learning management is brought for thesis advisors to verify and forwarding to 3 specialists in learning management plan in order to get back an adjusted advice and experiment an instrumental quality for assessing a content accuracy by considering the

accordance between teaching plan content and specified propose using the forms of 5 levels of estimated scale assessment. Specialists assess an appropriation by using the standard of assessment score giving of Rikerth which is in a high level.

The learning achievement test production in the form of 4 choices answering totals 60 sections then checked by specialists has shown that 40 sections have been passed. The critical thinking test form production of the Associate Professor Pythoon Sookseengan who produced by using the conceptual idea of The Watson and Glaser Critical Thinking Appraisal (WGCTA), issue Y.M., totals 54 sections and done in 2 h.

The environmental preservation behavior test in the form of behavioral action test that students express themselves with knowledge, understanding, attitude and practice which causes an action for environmental preservation according to the David Hargra whole's conceptual idea which is a Rating Scale combining with 5 operative levels of regular operation, frequent operation, occasional operation and never done operation totals 40 sections.

The experimentation and information collection, researcher has done as following:

Preparation step: Researcher has brought books from university students, Mahasarakham University, in order to get a cooperative agreement from the Seeharak Wittaya Municipal School 5 to use those books for experimenting a learning management plan and information collection. Classrooms were drawn lots to be an experimental group for just one class with 41 students.

Teaching operation step: To have a pretest with the experimental group of students by using a learning achievement test form and have a test result checked and scored. The learning management was brought into a teaching experimentation according to a normal teaching schedule, studying by the use of the 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques during June till July, Buddhist era 2552.

The final teaching step: When the teaching finished determinately, researcher has done a posttest with the experimental group and control group by using the previous Learning achievement test form, Critical thinking test form and Environmental preservation behavior test form and lastly having them checked and scored. Information analysis has steps as following: having the pretest and posttest of learning achievement scores found an efficiency of the 7 steps learning cycle plan using

multiple intelligences and metacognitive techniques. Using the scores of learning achievement test form, Critical thinking test form and environmental preservation behavior test form, to find qualities of difficulty and easiness values, item-total correlation value and reliability value.

Using the received score from the learning achievement test to find means, percentage and stand deviation values. Using the received scores from previous section to find a difference of average score between pretest and posttest by using Paired t-test.

RESULTS AND DISCUSSION

The 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques have an efficiency value at the rate of 0.563. The Learning achievement test model has a difficulty value in range of 0.31-0.75, item-total correlation value in range of 0.30-0.69 and reliability value of 0.92. The Critical thinking test model has each sections of the item-total correlation value in range of 0.23-0.72 whole issue of reliability has rate of 0.84 and Environmental preservation behavior test form has the item-total correlation rate in range of 0.39-0.80 and reliability value (coefficient) has rate of 0.84.

General students and classified students who learned the 7 steps learning cycle using multiple intelligences and metacognitive techniques has more achievement rate than before learning statistically significant rate of $p < 0.0001$. The reason of this research result may has been caused from: the 7 steps learning cycle which emphasizing on intellectual capability development by using Piaget's concept idea of intellectual development theory in the subject of 2 types adaptation which are structurally thinking operation adjustment (Assimilation) and structurally thinking operation rearrangement (Accommodation) and organization which were brought to use in the steps of exploration, explanation and expansion orderly. Moreover, there is an emphasis on students to apply their learning to be efficient for new situations, this appropriately causes students an opportunity of intellectual capability development (Marek, 1990). The learning cycle with inquiry form is an intellectual procedure that emphasizes students to be the one who produce themselves a knowledge and understanding according to constructivism's conceptual idea of making a learning thing to be meaningful by themselves and being able to develop an intellectual capability as well as appropriately increase the learning achievement result more than before learning. Learning and teaching activities management that gives students a scientific skill which means an intellectual abilities causing students to find and learn considerable thinking

skill and solve problems carefully as well as emphasizing on thinking technique which gives students an opportunity to check their thinking and friends' thinking by themselves. This causes a learning efficiency and capability of developing in both of learning achievement and high level thinking greatly (Speece, 1986).

CONCLUSION

The 7 steps learning cycle management plan using multiple intelligences and metacognitive techniques has an efficiency value at the rate of 0.563 and students who learned the 7 steps learning cycle using multiple intelligences and metacognitive techniques have more learning achievement than before learning statistically at a significant rate of 0.05.

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