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A STUDY OF CONTEXT-BASED LEARNING ACTIVITY MODEL ON CHEMICAL REACTION ISSUE FOR SECONDARY STUDENTS AT THE 10TH LEVEL

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Abstract:

The aims of the action research in chemistry learning classroom through the *Context-Based Learning Activity Model* (CBLA Model) on chemical reaction issue for secondary students at the 10th level in second semester in academic year 2016 were 1) to develop the instructional innovative of the CBLA Model lesson plans with the efficiency of the process and the efficiency of the results (E1/E2) with the efficiency at the determining criteria as 75/75, 2) to compare between students' learning achievements and their standardized assessments of the 75-percent criterion level were examined, 3) to compare between gender students of their creative thinking abilities with the CBLA Model. Students' learning achievements of their post and their standardized assessments of the 75-percent criterion level were examined. Administrations with the target group which a sample sizes of 35 secondary students at the 10th grade level in a chemistry class from Jaturapakpiman Ratchadaphisek School under the Roi-Et Secondary Educational Service Area Office 27 with the purposive sampling technique. Students' instructional approaching management with the 9-*CBLA Instructional Lesson Plans* in six weeks in 16 periods was designed. Using the 30-item *Chemical Reaction Issue Test* (CRIT) were assessed. Students learning outcomes of their creative thinking abilities were assessed with the 3-*Creative Thinking Ability Test* (CTAT). Statistically significant was analyzed with the average means scores and standard deviation. The results of these research findings have found that the *Context-Based Learning Instructional Management Plans* indicated that the average quality of 4.53, which the

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quality was a high quality of CBLA Model and can be used to manage the teaching. The CBLA learning plan had a consistency between 0.67-1.00, the discriminative validity ranged from 0.21 to 0.63, the difficulty level was from 0.39 to 0.63, and the reliability as a whole test was 0.85. The CTAT was a three-item essay that identifies creativity as a 3-part creative idea has a consistency between 0.80-1.00. Students' learning achievements were assessed with the CRIT was 23.29 (77.62%) that higher than 75% criterion level. Students' creative thinking abilities of their *Initiative thinking, Thoughtful thinking, and Flexible thinking* were higher due to the duration of the activity, significantly.

Keywords: context-based learning activity model, chemical reaction issue, instructional management plans, creative thinking abilities, secondary students

1. Introduction

The science and technology education under the new curriculum; the Basic Core Curriculum B.E. 2551 (A.D. 2008) and the Basic Core Curriculum B.E. 2558 (A.D. 2015) (Draft) has prescribed a structure of minimum time to be allotted to each subject area for each grade level. This curriculum focuses on learning management so that learners can develop their full potential and be natural to learn, to understand, to combine knowledge, to have a holistic knowledge, to be socially responsible, to see the importance of nature and the environment, and to learn to be universal in accordance with in daily life (Institute for the Promotion of Teaching Science and Technology 2012: 1). Science also involves technologies, instruments, devices and various products at our disposal, which facilitate our life and work. All these benefit from our scientific knowledge, which is combined with creativity as well as other disciplines. Science enables us to develop our thinking skills in various respects—logical, creative, analytical and critical. It also enables us to acquire essential investigative skills for seeking knowledge, and allows the ability for systematic problem-solving, and for verifiable decision-making based on diverse data and evidences. Science is essential to the modern world, which is intrinsically a knowledge society. All of us therefore need to be provided with scientific knowledge so as acquire knowledge and understanding of nature and man-made technologies that can be applied through logical, creative and moral approaches (The Ministry of Education, 2008).

Teaching and learning to achieve the set goals is a challenge for teachers. Thailand is one of the countries with problems with quality education. This is evidenced by the results of the national basic education test in the science subjects of secondary school students. The National Institute of Educational Testing Service (Public Organization) (2016) reported the result of secondary students at the 12th grade level students in academic year 2011-2015 found that the average score was less than 35 percent and was lower and decreasing, continually. Generally, admission to an upper

secondary school is through an entrance exam. On the completion of each level, students need to pass the NET (National Educational Test) to graduate. Students are required to attend six years of elementary school and at least the first three years of high school. Those who graduate from the sixth year of high school are candidates for two decisive tests: O-NET (Ordinary National Educational Test) and A-NET (Advanced National Educational Test). The results of the National Basic Education Test (O-NET) in academic year 2015, with an average science score of only 33.40 points out of a full score of 100 points, may be due to the students have a keen sense in science. Because the learning process is not as interesting as it should be managed teaching focused lectures, describe the contents, principles and theories, do not focus on the process for students to practice and lack of connection with real life (National Institute for Educational Testing, 2016).

Context-based learning, CBL, refers to the use of real-life and fictitious examples in teaching environments in order to learn through the actual, practical experience with a subject rather than just its mere theoretical parts. In the UK, CBL is often referred to as *the Salters' approach* (Campbell, Lazonby, Nicholson, Ramsden, and Waddington, 1994) due to the efforts of the Salters' Company in creating teaching material in the field of chemistry. It can be generalized as: the most important single factor influencing learning is the active engagement of the learner with the material. Obtain this - and teach by whatever models retain this engagement" (Yam, 2013). Context-based learning is a pedagogical methodology that, in all its disparate forms, centers on the belief that both the social *context* of the learning environment and the real, concrete *context* of knowing are pivotal to the acquisition and processing of knowledge. The approach is based on the firm conviction that learning is a social activity that is badly served by most classroom situations due to an inherent misrepresentation of how the mind acquires, processes, and produces knowledge. Learning is a communal activity centered on the interactions between persons with substantial interests and standard classroom structures that do not respond to this may well inhibit the success of learning (Rose, 2013). An approach that challenges students to learn through engagement in a real problem, as well as an influential learning tool used in the teaching of many professions CBL allows students to acquire skills such as decision making, critical thinking, leadership, communication, giving and receiving feedback and information processing.
Context-based learning environments are being developed in various countries to renew science education and create new vital learning environments to fulfill the diverse needs of students, society and science (Osborne and Dillon, 2008). Context-based learning is a learning approach that takes "context," a situation or event around the students, teachers and schools, or the daily experiences of students. The central feature of context-based learning environments is the use of realistic contexts as a starting point and anchor for learning science, thereby giving significance and meaning

to the science-content. This requires that the context provides "a coherent structural meaning for something new that is set within a broader perspective" (Gilbert, 2006, p. 960). A context should be relevant and recognizable for students. Real-life or scientifically authentic situations and activities are used as contexts in classroom (Gilbert, 2006). With this come secondary features such as, more room for the students to make their own educational choices, emphasis on debate and collaboration and on the process of science as well as on the nature of science.

In this research study, the context-based learning environments, contexts are used as the basis for curriculum design and classroom teaching to solve these problems (Pilot & Bulte, 2006). Contexts bring coherence, connection, meaning and relevance by linking to ever-day-life realities and issues in economic life or society. This often leads to integral tasks stretching over various lessons instead of sets of separate tasks as is the case in more traditional lessons (second dilemma). Context-based learning environments also support students in engaging in scientific thinking and practice, thus improving their view on the Nature of Science and prelude possible career choices (Schwartz et al., 2004). Modified the Gilbert's concept, Gilbert (2006) gives four models based on the use made of contexts: *Context as the direct application of concepts, Reciprocity between concepts and applications, Context provided by personal mental activity,* and *Context as involving the social circumstances* to the *Context-Based Learning Activity Model* (CBLA Model) on chemical reaction issue for secondary students at the 10th level in second semester in academic year 2016.

Basically, the school year is divided into two semesters. The general curriculum, which private schools must also follow, covers five main subject areas: Thai and foreign languages, science and mathematics, social studies, arts, vocational education. The general education curriculum includes five subject areas: Thai and foreign languages, science (chemistry, biology, and physics), mathematics, social studies, character development (health and physical education, arts and crafts), work and occupational education. In terms of the Strands and Learning Standards in *Learning Area* of *Science*, which it contains of eight Strands and 13 Learning Standards. In this research study would be selected at the Strand 3: *Substances and Properties of Substances***:** properties of materials and substances; binding forces between particles; changes in the state of substances; solution formation and chemical reaction of substances, chemical equations and separation of substances, and *Learners' Quality for Grade 10-12 graduates* is to understand kinds of important particles that form components of atomic structures, sequencing of elements in the Periodic Table, chemical reactions and writing chemical equations, and factors affecting rates of chemical reaction. In terms of this research study focused on the Chemical Reaction Issue of secondary students at the 10th grade level from the Standard Sc 3.2: Understanding of principles and nature of change in the state of substances; solution formation; reaction; investigative process for seeking

knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purposes (The Ministry of Education, 2012).

Research studies in the field of the Context-Based Learning (CBL) were a teaching method that encourages learners to gain an in-depth knowledge of the subject's chemistry and be able to apply knowledge to solve everyday problems. Discover new knowledge that encourages learners to gain insight into the nature, learning of the learner in the present day, and the contexts. Full of potential so that along with stepping into the learning society in line with the findings of Jinda Brahmshu (2010: 123-128). Nuttarinine Apiwong-Ngam (2011: 114-126) studied the science and science learning achievement of secondary students at the 10th grade level who were taught using contextual basis and learning management, the inquiry form science achievement before learning with the latter learned to use context-based learning for having grades after class was higher than before class assessment.

From as the above, researchers are interested in learning about context-based learning activities and creativity in chemistry learning of for secondary students at the 10th level with context-based learning to encourage students to have a better understanding of chemistry, creativity discover new knowledge can bring knowledge to use and solve daily problems to be aware of the importance and necessity of learning chemistry, which include guidelines for instructors to provide context-based learning in chemistry, and to improve and develop context-based learning activities in other chemistry or other subjects to be effective for using the context-based learning activity model on chemical reaction issue for secondary students at the 10th level was studied.

2. Methodology

The educational achievements of secondary students in the 10th grade level year with learning activities using the context-based learning activity model in chemical reaction issue and to investigate the creativity of students to creative teaching and learning activities are located in a number of places in the chemistry teaching and learning guide. As well as the more detailed teaching and learning activities, there are shorter ideas for teaching and learning was described. Research team was focused on upper secondary school teachers' professional learning activities on chemistry teaching and learning and their impacts on students' chemistry achievement growth. We decided to focus on chemical reaction issue for secondary students at the 10th level were used all of students annually take a state-standardized test and held accountable for the results under the context-based learning activity model that followed as:

2.1 Research Aims

To investigate of the *Context-Based Learning Activity Model* (CBLA Model) on chemical reaction issue for secondary students at the 10th level was modified from Gilbert's concept. The aims of this research study were purposed as:

1. To develop the instructional innovative of the CBLA Model lesson plans was determined the efficiency of the process and the efficiency of the results (E1/E2) with the efficiency at the determining criteria as 75/75 on chemical reaction issue for secondary students at the 10th level.
2. To compare between students' learning achievements and their standardized assessments of the 75-percent criterion level were examined with the CBLA Model on chemical reaction issue for secondary students at the 10th level.
3. To compare between gender students of their creative thinking abilities with the CBLA Model on chemical reaction issue for secondary students at the 10th level.

2.2 Research Procedures

Applying scientific knowledge as a starting point, or encourage students to have better understanding of terminology, concepts, principles, rules, events and things. This research study can also transfer their knowledge to other situations or events by learning activities on each step were followed respectively.

Step I: Modified of the CBLA Model from the Gilbert's Concept

A four dilemma that context-based learning environments touch upon is that students have to be stimulated to take individual decisions on their own learning. Due to this focus on students' individual learning and, at the same time, the need to employ inspiring and realistic contexts, researchers may have to improvise and redesign part of the learning environment from time to time in context-based learning environments; researchers also play a role as designers and implementers of material to the teaching practice. Gilbert (2006) gives four models based on the use made of contexts: 1. context as the direct application of concepts, 2. reciprocity between concepts and applications, 3. context provided by personal mental activity, 4. context as involving the social circumstances to the four states of *Setting focal event, Learning task, Learning key concept, and Recontextualize stages* to the 9-*CBLA Instructional Lesson Plans* of the *Context-Based Learning Activity Model* (CBLA Model) on chemical reaction issue for secondary students at the 10th level.

Step II: Modified of the CTAT Model

Modified the 3-*Creative Thinking Ability Test* (CTAT) was built on J. P. Guilfords' work (Guilford, 1950) and created by Ellis Paul Torrance (1980), the Torrance Tests of Creative Thinking (TTCT), a test of creativity, originally involved simple tests of divergent thinking and other problem-solving skills, which were scored on four scales:

Fluency, the total number of interpretable, meaningful, and relevant ideas generated in response to the stimulus; *Flexibility*, the number of different categories of relevant responses; *Originality*, the statistical rarity of the responses; and *Elaboration*, the amount of detail in the responses. Modified of the *Torrance Tests of Creative Thinking* (TTCT) to the 3-*Creative Thinking Ability Test* (CTAT Model) was assessed students' creative thinking ability.

Step III: Created of the Chemical Reaction Issue Test (CRIT)

A significant amount of funds and resources have been devoted to teacher professional development over the past decade with major initiatives promoted under the Basic Core Curriculum B.E. 2558 (A.D. 2015) from the Standard Sc 3.2. Researchers want to monitor the effect of a new teaching method upon groups of students. Pretest-posttest designs were an expansion of the posttest only design with the target groups, one of the simplest methods of testing the effectiveness of an intervention. In this design, which was given the treatment and the results were gathered at the end with statistical analysis that can then determine the intervention had a significant effect. The 30-item *Chemical Reaction Issue Test* (CRIT) on chemical reaction issue was created by the researcher team of 30 optional items in 4 multiple choice options was assessed.

3. Data Corrections

This research was conducted (Action Research), according to the concept of Kemmis (1988) on educational achievement and creativity of students with the *Context-Based Learning Activity Model* on chemical reaction issue for secondary students at the 10th level.

Step I: Teaching Practice

Using the Action Research Model, this is based on the following four phases of the three cycles:

Planning: Determine the issues that researchers want to study, Context-based learning activities was created, and create a 3-based context-based learning management plan for the 1st-3rd of the CBLA Model.

Action Plan: Conducting activities according to the learning plan created in the planning stage.

Observation: During teaching, researcher, research participant, data collection were observed with the observe student behavior form, the record after learning management, student study's recording form and learning diary.

Reflecting Performance: To bring the information's forms for observing students' behaviors and creativity data in the first cycle.

Step II: Correcting Data

Planning: Improving teaching activities and a creating the 3-based context-based learning management plan for the 4th-6th of the CBLA Model.

Action Plan: Conducting activities according to the learning plan created in the second planning stage.

Observation: During teaching, researcher, research participant, data collection were observed with the observe student behavior form, the record after learning management, student study's recording form and learning diary in the second cycle.

Reflecting performance: To bring the information's forms for observing students' behaviors and creativity data were analyzed in the second cycle.

Step III: Continued the Correcting

Planning: Improving teaching activities and creating the 3-based context-based learning management plans for the 7th-9th of the CBLA Model.

Action Plan: Conducting activities according to the learning plan created in the third planning stage.

Observation: During teaching, researcher, research participant, data collection were observed with the observe student behavior form, the record after learning management, student study's recording form and learning diary in the third cycle.

Reflecting performance: To bring the information's forms for observing students' behaviors and creativity data were analyzed in the third cycle.

4. Research Instruments

A. The 9-CBLA Instructional Lesson Plans

The 9-*CBLA Instructional Lesson Plans* was designed on 9 lesson plans for learning management in 16 hours that composed of *Chemical Reaction, Energy and Chemical Reaction, Measurement of Chemical Reaction Rate, the nature of the substance with the rate of the chemical reaction, Concentration of the substrate and the rate of the chemical reaction, Temperature and Rate of Chemical Reaction, the surface area of the substance reacts with the rate of chemical reaction, Catalysts and reactants, and Chemistry in everyday life* lesson plans.

B. The 30-item Chemical Reaction Issue Test (CRIT)

The 30-item *Chemical Reaction Issue Test* (CRIT) was investigated of curriculum, content, objectives, expected learning outcomes, and lesson plans were created to assess students' learning achievements of their pretest and posttest designs. The CRIT was tried out with another sample group and proved by the professional experts on chemical reaction issue.

C. The 3-Creative Thinking Ability Test (CTAT)

The 3-*Creative Thinking Ability Test* (CTAT) was modified from Guilfords' work (Guilford, 1950) and created by Torrance (1980), the Torrance Tests of Creative Thinking (TTCT), when he noticed that creative people tend to exhibit this type of thinking more than others. Associated divergent thinking with creative, appointing it several characteristics: fluency, flexibility, originality, and elaboration were adapted in this research study.

4.1 Sample Target

Administration of this research study was the upper secondary educational school students who sat at the 10^{th} grade level which sample size of 35 students in a chemistry class in the second semester of academic year 2016 at Jaturapakpiman Ratchadaphisek School under the Roi-Et Secondary Educational Service Area Office 27 with the purposive sampling technique.

4.2 Data Analysis

The observing data of student behavior were analyzed, interpreted, and summarized and reported in lectured style was compiled qualitatively at the end of each cycle and when the loop all cycle ends with average means score, percentage, and standard deviation.

5. Results

This research study focused on a study of *Context-Based Learning Activity Model* on chemical reaction issue for secondary students at the 10^{th} level with the 9-*CBLA Instructional Lesson Plans* in six weeks in 16 periods was designed and evaluated to determine performance criteria with the efficiency of the processing performance and the performance results (E_1/E_2) of the CBLA innovation lesson plans to management to the activity-based learning was approached. The 9-*CBLA Instructional Lesson Plans* were assessed with the appropriability quality to use with the 5-professtional experts. Using the 30-item *Chemical Reaction Issue Test* (CRIT) were assessed. Students learning outcomes of their creative thinking abilities were assessed with the 3-*Creative Thinking Ability Test* (CTAT). Students' learning achievements of their post-test assessing design and their standardized assessments of the 75-percent criterion level were examined with the CBLA Model on chemical reaction issue for secondary students at the 10^{th} level were compared. The results of these findings have found that:

5.1 Validity and Reliability of Research Instruments

A. The IOC Value of the CBLA Innovative Instructional Lesson Plan

The 9-*CBLA Instructional Lesson Plans* were created learning plan offers the counselor to verify the content validity for students' learning activities, teaching materials, and evaluation in the learning management plan was corrected as suggested by the advisors and the 5-professional expert educators who were reviewed and assessed the validity of content, purpose learning with the IOC value (*Index of Item Objective Congruence*). The CBLA Model was administered for learning management indicated that of the IOC was tried out of the average quality as 4.53 that it was the highest quality of learning management plan and can be used to manage the teaching. The 9-CBLA Model plans had a consistency between 0.67-1.00 was analyzed.

B. Validity of the 30-item Chemical Reaction Issue Test (CRIT)

The *Chemical Reaction Issue Test* (CRIT) was designed with the multiple choice test with 30 options for assessing students' learning achievement on chemical reactions after learning with CBLA Model. The discriminative validity ranged from 0.21 to 0.63 and the difficulty level was from 0.39 to 0.63. The Cronbach alpha reliability of the whole test was 0.85.

C. Validity of the 3-Creative Thinking Ability Test (CTAT)

The *Creative Thinking Ability Test* (CTAT) was a three-item essay that identifies creativity as a 3-part creative idea. The CTAT was modified from Guilfords' work (Guilford, 1950) and created by Torrance (1980) from the *Torrance Tests of Creative Thinking* (TTCT), which it several characteristics in four creative thinking abilities of the fluency, flexibility, originality, and elaboration. The CTAT was indicated that the internal consistency (Cronbach alpha reliability) between 0.80-1.00, significantly.

5.2 The Effectiveness of the Processing Performances and the Performance Results (E_1/E_2)

To evaluate the efficiency of the learning activity using the Context-Based Learning Activity Model (CBLA Model) of the chemical reaction issue to enhance students' learning achievements in chemistry class of upper secondary educational students at the 10^{th} grade level with the efficiency of the processing performances and the performance results (E_1/E_2) at the determining criteria as 75/75. This result shows the statistically significant in Table 1.

Table 1 reports of the effectiveness of the problem-based learning management innovative lesson plans on chemical reaction issue in science class of the 35-upper secondary students at the 10^{th} grade level with the CBLA model were responded with the efficiency of the processing performances and the performance results (E_1/E_2) indicated that evidence of 78.42 /77.62, which was higher than with the criteria of 75/75.

Table 1: The Mean, Standard Deviation, Percentage, Total Score for the Efficiency of the Processing Performances and the Performance Results (E_1/E_2) of the PBL Model

Efficiency Types	Total Score	Students' Number	Mean	S.D.	Percentage
Efficiency of the Processing Performances (E1)	100	35	78.42	3.18	78.42
Efficiency of the Performance Results (E2)	30	35	23.29	1.96	77.62
Efficiency of the Innovative Learning Activity Plan (E1 / E2) = 78.42 /77.62					

5.3 Comparisons between Students' Learning Achievements and their Standardized Assessments of the 75-Percent Criterion Level

To compare between students' learning achievements and their standardized assessments of the 75-percent criterion level were examined with the CBLA Model on chemical reaction issue for secondary students at the 10th level. Using the average mean scores of students' learning achievements of their post assessing test and the criteria learning outcomes at 75% with *Context-Based Learning Activity Model* on chemical reaction issue for secondary students at the 10th level were analyzed. Table 2 shows the result of this research study.

Table 2: The Mean, Standard Deviation, Total Score, the Criteria Score of 80%, Mean Different, and Independent Variable t-test for the CBLA Model

Students' Number	Total Score	Criteria 75%	Criteria 100%	Mean 30%	Score mean 100%	S.D.	df	t-test	Sig. (p)
35	30	22.50	75.00	23.29	77.62	1.96	34	1.85	.032*

In Table 2, it was found that the comparisons of mean scores on students' learning achievements later learning management using the CBLA Model formulation as the basis of chemical reaction issue of upper secondary students at the 10th grade level with 75% of the 35 students, using the 30-item *Chemical Reaction Issue Test* (CRIT) as 4 multiple choice, it was found that the mean scores of post-course achievement were 23.29, the standard deviation was 1.96 when analyzing the difference using independent *t*-test statistics (One-Way ANOVA), it was found that the *t*-test indicated that was 1.85 and statistically significant at the level of .05, differently.

5.4 Students' Learning Performances of their Creative Thinking Abilities

The results of the study a study of context-based learning activity model on chemical reaction issue for secondary students at the 10th level on chemical reaction issue after the end of the third learning activity cycle with the CBLA Model, which it several characteristics in four creative thinking abilities of the fluency, flexibility, originality, and elaboration abilities. In this research study, the CTAT was adapted version to the

creative thinking ability components that it obtained in three model for assessing student's creative thinking ability, such as; originality, fluency, and flexibility in each learning activities were selected. Table 3 reports in the results of this study.

Table 3: Average Means Scores of Students' Learning Performances of their Creative Thinking Abilities for the 3-Creative Thinking Ability Test (CTAT) after the End of the Third Cycle

Number of Assessing Cycle	**Originality Creative Thinking**	**Fluency Creative Thinking**	**Flexibility Creative Thinking**
The First Cycle	1.94	1.51	1.57
The Second Cycle	2.43	2.31	2.71
The Third Cycle	2.71	2.89	2.77
Total Average Means Scores	2.36	2.24	2.35

In Table 3, the initiative originality creative thinking component, the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.94, 2.43 and 2.71, respectively. If the student has not an exotic answer the same as their friends, the more points will get of his/her higher than different scores were increased of their initiative. In terms of the initiative fluency creative thinking component, the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.51, 2.31 and 2.89, respectively. Students are able to write the answer as much as possible within the time limit (15 minutes), which students have higher mastery of their scores. Finally, students' responses of their flexibility creative thinking component, the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.57, 2.71 and 2.77, respectively. The criteria for data analysis were determined by the number of groups of responses, which students have higher elasticity.

In Figure 1 illustrates the differences between the 1st cycle, 2nd cycle, and the 3rd of the assessing their creative thinking abilities.

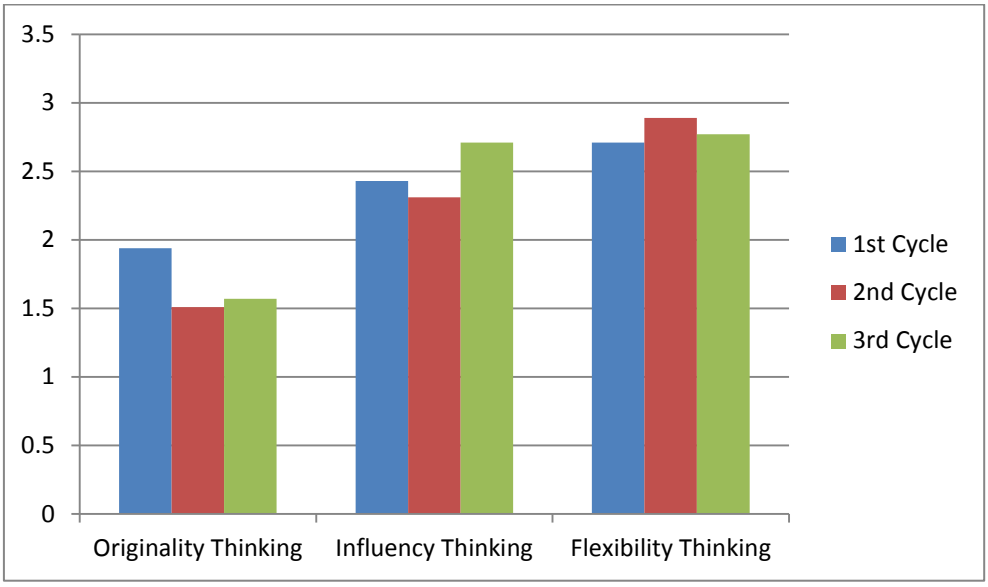

Figure 1: Significant differences between students' creative thinking abilities of their performances scores on the *Creative Thinking Ability Test* (CTAT) in the End of the 3rd Assessing Cycle

The mean differences between students' performances to the 1st cycle, 2nd cycle, and the 3rd ranged from 1.94 to 2.71 to the originality creative thinking component, ranged from 1.51 to 2.89 to influence creative thinking component, and ranged from 1.57 to 2.77 originality creative thinking component for the *3-Creative Thinking Ability Test* (CTAT)**.** In most cases, students' performances of the 3rd cycle are highest than the 2nd and the 1st cycle of the assessing their creative thinking abilities. The results of this study also indicate that using the CTAT helps chemistry teacher to gain a better picture of the learning activities with the CBLA Model and the perceived leaning needs of their students' creative thinking abilities.

6. Conclusions

The aims of the action research in chemistry learning classroom through the *Context-Based Learning Activity Model* (CBLA Model) on chemical reaction issue for secondary students at the 10th level in second semester in academic year 2016 were to develop the instructional innovative of the CBLA Model lesson plans with the efficiency of the process and the efficiency of the results (E1/E2) with the efficiency at the determining criteria as 75/75, to compare between students' learning achievements and their standardized assessments of the 75-percent criterion level were examined, to compare between gender students of their creative thinking abilities with the CBLA Model. Students' learning achievements of their post and their standardized assessments of the 75-percent criterion level were examined. Administrations with the target group which a sample sizes of 35 secondary students at the 10th grade level in a chemistry class from

Jaturapakpiman Ratchadaphisek School under the Roi-Et Secondary Educational Service Area Office 27 with the purposive sampling technique. Students' instructional approaching management with the 9-*CBLA Instructional Lesson Plans* in six weeks in 16 periods was designed. Using the 30-item *Chemical Reaction Issue Test* (CRIT) were assessed. Students learning outcomes of their creative thinking abilities were assessed with the 3-*Creative Thinking Ability Test* (CTAT). Statistically significant was analyzed with the average means scores and standard deviation.

The three instruments selected for uses in this study were the 9-*Context-Based Learning Instructional Lesson Plans*, the *Chemical Reaction Issue Test* (CRIT), and the *Chemical Reaction Issue Test* (CRIT). One of the reasons for selecting these instruments because the researcher team conducted a small project on encouraging chemistry teacher to assess the instructional innovative planning design, to assess students' learning achievements and their creative thinking abilities of their learning activities which could be utilized to improve students' achievements and outcomes. In keeping with these research instruments to establish the validity and reliability were checked. The CBLA Model was administered for learning management indicated that of the IOC was tried out of the average quality as 4.53 that it was the highest quality of learning management plan and can be used to manage the teaching. The 9-CBLA Model plans had a consistency between 0.67-1.00 was analyzed. The *Chemical Reaction Issue Test* (CRIT) was designed with the multiple choice test with 30 options for assessing students' learning achievement on chemical reactions after learning with CBLA Model. The discriminative validity ranged from 0.21 to 0.63 and the difficulty level was from 0.39 to 0.63. The Cronbach alpha reliability of the whole test was 0.85. The CTAT was indicated that the internal consistency (Cronbach alpha reliability) between 0.80-1.00, significantly.

The effectiveness of the problem-based learning management innovative lesson plans on chemical reaction issue in science class of the 35-upper secondary students at the 10^{th} grade level with the CBLA model were responded with the efficiency of the processing performances and the performance results (E_1/E_2) indicated that evidence of 78.42 /77.62, which was higher than with the criteria of 75/75.

Comparisons between students' learning achievements and their standardized assessments of the 75-percent criterion level were assessed. it was found that the comparisons of mean scores on students' learning achievements later learning management using the CBLA Model formulation as the basis of chemical reaction issue of upper secondary students at the 10^{th} grade level with 75% of 35 students, using the 30-item *Chemical Reaction Issue Test* (CRIT) as 4 multiple choice, it was found that the mean scores of post-course achievement were 23.29, the standard deviation was 1.96 when analyzing the difference using independent *t*-test statistics (One-Way ANOVA), it

was found that the *t*-test indicated that was 1.85 and statistically significant at the level of .05, differently.

Students' learning performances of their creative thinking abilities, the initiative originality creative thinking component, and the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.94, 2.43 and 2.71, respectively. If the student has not an exotic answer the same as their friends, the more points will get of his/her higher than different scores were increased of their initiative. In terms of the initiative fluency creative thinking component, the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.51, 2.31 and 2.89, respectively. Students are able to write the answer as much as possible within the time limit (15 minutes), which students have higher mastery of their scores. Finally, students' responses of their flexibility creative thinking component, the mean scores were increased from assessing students' creative thinking abilities in the 1st cycle, 2nd cycle, and the 3rd indicated that of 1.57, 2.71 and 2.77, respectively. The criteria for data analysis were determined by the number of groups of responses, which students have higher elasticity. The mean differences between students' performances to the 1st cycle, 2nd cycle, and the 3rd ranged from 1.94 to 2.71 to the originality creative thinking component, ranged from 1.51 to 2.89 to influence creative thinking component, and ranged from 1.57 to 2.77 originality creative thinking component for the *3-Creative Thinking Ability Test* (CTAT)**.** In most cases, students' performances of the 3rd cycle are highest than the 2nd and the 1st cycle of the assessing their creative thinking abilities.

7. Discussions

The study of context-based learning activity model on chemical reaction issue for secondary students at the 10th level with the 9-*CBLA Instructional Lesson Plans* in six weeks in 16 periods was designed. Using the 30-item *Chemical Reaction Issue Test* (CRIT) were assessed. Students learning outcomes of their creative thinking abilities were assessed with the 3-*Creative Thinking Ability Test* (CTAT) on the originality, fluency, and flexibility thinking abilities.

Context based learning (CBL) is a popular method of teaching and it was no surprise to see that a symposium with three sessions was dedicated to this approach. Context based learning aims to teach chemical concepts by starting with observations from real world contexts and relating them to the molecular and symbolic representations with which we typically describe chemical phenomena. The rationale for this approach is that it is more interesting and thus motivating for students, and it can use the students' prior knowledge so they may build on their scientific literacy. In this research study, while CBLA model has created and acknowledged advantages, the

difficulty is that students have to simultaneously consider the chemical concepts as well as the contextual situation, and thus it may prove more challenging learners and require them to operate at a higher level of thinking. An interesting observation in this regard was that some students were shown the chemical reaction along with the question. These students typically looked immediately for a familiar chemistry concept and used that as a basis to provide an answer. Students were addressing it using a context-based learning activity to approach and looking for the single factual answer. Those students who were not provided with the chemical reaction structure until later on in the task tended to discuss the concepts more broadly. In addition, students tended to use words within the context provided to help structure chemical reaction of their own answer.

The aims of this study were to find out if meaningful educational activities and the use of a the 30-item *Chemical Reaction Issue Test* (CRIT) in those activities might have an impact on student achievements. Using the CRIT as cognitive tools should improve the teaching and learning process, and encourage student reflections on retaining the information. It has been claimed that the usage of the CRIT not only increases student achievement, but also allows them to improve their conceptual understanding and creative thinking abilities. The use of the CRIT can also promote a student to have positive creative thinking abilities.

This research study was completed was an action research project with the 10^{th} grade level one-chemistry class over the course of six weeks. The chemistry subject on chemical reaction issue in 16 hours, which they are required to take a pretest and posttest before they are taught any lessons in that unit. Each unit consists of learning activities. The research was based off of a pretest given the first day, and introduction to the unit using chemical reaction in the nine innovative instructional lesson plans were administered and designed for each three lesson plans and after that a posttest of CRIT assessing cycle were assessed on the third cycle. All students were given the exact instructions on using pattern blocks to understand the relationship of interior angles in various polygons. Students develop the most creative thinking ideas. The second was flexible thinking and the least developed student side was initiative shows that context-based learning activities can develop creativity. This is the ability of a person to express his or her multi-faceted thinking, bringing the experience of the past into the foundation of new ideas. It leads to the invention of new things that are beneficial to human life.

All students were given the same pretest and posttest. Students' learning achievements of their posttest and their standardized assessments of the 75-percent criterion level were assessed. The CBLA model were responded with the efficiency of the processing performances and the performance results (E_1/E_2) indicated that evidence of 78.42 /77.62, which was higher than with the criteria of 75/75. The results of this study revealed that students using the context-based learning activity model improved their

level of achievement, increased their understanding, and promoted a positive creative thinking abilities toward chemistry on chemical reaction issue for secondary students at the 10th level are provided. The researcher team found that if students are given the opportunity to use the Context-Based Learning Activity Model alongside traditional instruction they will learn and understand basic chemistry context of their learning achievements and their creative thinking abilities. The researcher team also recommends that using the Context-Based Learning Activity Model gives students a better understanding of basic chemistry content and seems to hold their interest and help them to enjoy learning.

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