Improving Students' Creativity Through Instructional Development Interventions: A Case of Computer Subject Primary 4

Wipawan Thongsan

An Action Research Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Management
in Organization Development and Management
Faculty of Graduate School of Business
Assumption University
Academic Year 2016

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By	Wipawan Thongsan
Major	Master of Management in Organization Development and Management (MM.OD & M)
Action Research Advisor	Sirichai Preudhikulpradab, Ph. D.
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The Graduate School/Faculty of Graduate School of Business, Assumption University, has approved this action research as a partial fulfillment of the requirements for the Degree of Master of Management in Organization Development and Management.

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Abstract

This research has the following objectives. 1. To describe the current situations of primary 4 in terms of student's creativity 2. To design and implement the appropriate IDI's to improve student's creativity 3. To compare the differences between before and after IDI's. The sample used in this study was the 78 students for grade 4 in computer subject, 6 teachers from computer department and one teacher from art department of Assumption College Ubonratchathani. This research selected sampling by using purposive sampling method since the number of students was not huge and it was limited.

The researcher conducted the Appreciative Inquiry Interview with the teachers to gain insight and ideas for developing teaching and learning activity that can be used for developing student' creativity. After that the IDI was conducted by inter coding of key theme from AI interview. The researcher implemented the IDI with the seventy-eight students and then analyzed the data of creativity assessment before and after IDI. The data collection process took about six weeks. The process started with creativity assessment on students' creativity. Then, the researchers implemented IDI and gave students creativity assessment again. The researcher analyzed the data provided in between pre and post IDI.

The results showed that most of the sample was the students' creativity was different in pre and post IDI. The post IDI result was better than in pre IDI. The students' creativity was higher in all four areas after implementing of IDI. Moreover, the IDI or teaching activities in this research could motivate students to participate in the classroom as well as to work group.

Acknowledgement

The success of this independent study would not have been successful without the support of these people who give me advice, guidance, and encouragement to achieve this meaningful goal. So, I would like to take this opportunity to express my gratitude to these wonderful people who made this possible.

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I also thanks to my students for their cooperation in classroom activities. It's great to be supported and involved. They provided me with useful information to complete my education.

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Wipawan Thongsan

Table of Contents

Contents

Contents

List of Tables

Page

List of Tables

Page

List of Figure

Page

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Computer is important. This gives students more disciplined and more creative thinking. (Computing at school working group, 2012: p.3) This is important for the economy. From now on, digital technology and technology will become a part of the work. (Computing at school working group, 2012: p.3) So students can adjust their knowledge in education and careers in the future. With these important factors, the curriculum is being developed in all school curricula to teach students from kindergarten to M. 6 level.

The results of the research would not only develop a model of creative teaching in computer subject but it would also develop the students' creative thinking skills for creating more effective and creative tasks so that the students were able to apply with their future study and also in their daily life.

Students nowadays learn their computer skills at home and in school. This is the subject most students study. In computer science, many lessons require students to use their creative skills for a given task. The problem here is that most of the assignments are poor and lacking in creativity. Therefore, it is necessary for the teacher to develop more creative activities to apply in computer subject in order to improve students' creativity and solve the problems of low qualitative works. The results of the research would not only develop a model of creative teaching in computer subject but it would also develop the students' creative thinking skills for creating more effective and creative tasks so that the students were able to apply with their future study.

1.1.1 Global context

Global competition made many firms turns to develop their creativity (Amitabh & Kleiner, 1995). The reason was that creativity was ability to indicate what problems an organization had faced as well as showed the ways to solve them. Therefore, it was an important tool for an organization to develop and owned this ability (Amitabh & Kleiner, 1995). Geravan and Deegan (1995) stated that due to the rapid changes in technology, business or lifestyles, the education needed to change its tradition need to catch the universal norm. Therefore, the aim of education nowadays is for create new approaches to thinking to improve the skills of students to meet the needs of their future employers.

In the U.S education system, creativity has been added to be one of the criteria and competencies developed for students (Engle et al., 2014). This is because these skills lead to other competencies such as innovative and problem solving skills (Engle et al., 2014). In the U.S, innovative is very important that is put in favorable context such as political stability, business rules, laws, regulations to safeguard poverty, access to finance, and human capital. Therefore, it was one of six gifted talents (Beghetto, 2010). Creative skills introduced by Dr. Simontonmay come from ongoing practice and take at least ten years to become a domain expert. (Simonton, 2000). Sternberg and Lubart (2000) pointed out in their article "The Investment Theory of Creativity" that creativity played an important role to develop success. There was evidence that great investor of nowadays buy low stocks and sell high ideas. These people are such as Mark Zukerberg, and Steve Jobs. These skills are considered to be the most important skills required for a school to make students succeed for their future.

In England, there has been integration of health, welfare, and development of six areas includingcreative school-aged children from childhood to diploma (Selfon, 2008). Nowadays, the concepts of teaching integrated with art and design education and professional education in creative thinking reflects the student's contribution to development. The course (Barz, 2008) Bernett (2000) mentioned that "creativity has become a driving force of economic growth in information society and a key resource or individuals and societies (Smith, 2006).

In Australia, creativity is considered an essential skill which can improve critical thinking in children (Nilson et al, 2013). In addition, the 21st century curriculum in Australia tends to focus and concentrate on development to improve the creativity and imagination of students (Ewing R., 2010). Additionally, the skills and creativity also involves other skills such as art, literature, calculations (Ewing, 2010). Dallas (2015) pointed out that to create creativity requires creative teaching. Australian education goes in the direction which creativity is a valuable asset that will benefit socio-economic engagement (Lassig, 2009). Therefore, creativity has become priority criteria to set curricular in Australian schools (Lassig, 2009).

1.1.1 Reginal Context

In Asia, the majority of leaders in the region are more creative than in Europe, accounting for only 54% (Lagerberg, 2014). Since 2004, Japanese government has enhanced creativity in order to increased competitive advantage (McCreedy, 2004). Other countries such as China has emphasized on "Developing a spirit of creativity and being able to perform" as an education "key priority" while Korea has added the new element to the 7th curriculum which is called "creative learning activities".

Singapore is one example of a country that is focused on developing students' creativity. The Board of Education, announced by Henry (2015), "Our priority should

be to make our students enjoy learning, enhancing communication and developing creativity and bonding." It is evident that countries around the world change their educational system strategies to develop and promote their students' creativity, and this skill has set to be priority to focus on.

1.1.2 National context

In Thailand, there is no creative teaching comparing to in Europe or in America. However, creative teaching is a tool for developing students' creativity and abilities.

However, Boonkoum (2014) states that creativity is a tool for creating new things. In keeping with this change, Thailand National Education Department has set a student-centered learning framework for learning. Seeking self-learning by investing facts, developing lifelong creativity and raising awareness and cultural pride (Wiwat & Wichit, 2010)

TIMSS (3rd International Mathematics and Science Study) found that most of Thai students could not write critically because of teaching and learning process that is currently focusing on critical thinking and creativity development. These reasons, make students, lack of creativity in developing their tasks (Educational Communications and Technology Kingmongkut's Institute of Technology, 2014). Therefore it is necessary to focus on developing of creativity for students.

1.2 Organization Background

1.2.1 The School's Profile

Assumption College Ubonratchathani is located in Ubon Ratchathani province. It is one of Saint Gabriel Foundation School. The school is focus on raising students' potential in various area especially technology and languages. The school's mission and vision are as following:

Vision

"Saint Gabriel Foundation Thailand is an organization which aims to provide educational service in international level"

Mission

1. Promote teaching and learning development among Saint Gabriel Foundation schools.
2. Support scholarship for people of the foundation as well as all people.
3. Coordinate with other educational organization for public help.
4. Develop the organization management for the most effectiveness and efficiency.
5. Promote professional skills among the people.
6. Promote human rights, fairness, and peace among Saint Gabriel Foundation and the schools.

1.2.2 The Department's Current Situation

The Computer Department's Missions:

1. Develop teachers' ethics to response to societies and environment to enhance teachers' and students' capability, especially to apply technology to increase and develop skills. Moreover the department aims to provide better IT service with high technology devices in order to promote teachers' and students' potential.
2. Develop management system to be more effective.

The Computer Department's Vision

"Computer and IT Center promotes ACU students to be full of disciplines and meet international standard. The main purpose of technology is to provide high

quality service as well as to distribute the highest potential of stuff members, teachers, and students. So they can value and gain benefit of technology"

The Computer Department's goals:

1. Students who complete their courses in IT has the excellence knowledge and skills as well as great intention to learn by apply technology advancement for more advance level.
2. The service provided is easy and convenience to use.
3. The management system is vital and focuses on gaining the most of technology application.

Type of service

Computer Department has four main duties as following;

1. Information and Application Development consists of internet providing and developing of program to school management
2. PC support and maintenance includes installing software computer and maintenance
3. Network Administration is to take care of network security and server management
4. Academic development is to support teachers to organize computer class.

Key Performance

The KPI of Computer department consists of 30 points from 4 areas including quality of learners, quality of teachers, quality of measurement and assessment, and quality of learning management process. The requirement percentage is above percent. Each teacher has to pass 80 percent of evaluation of all 24 criteria.

Computer teacher must provide knowledge to student and meet external and internal evaluation criteria such as O-net and other test. Moreover, she/he must be

able to work as a team. These are main KPIs for computer for more information please see Appendix A.

People, Culture, and Norm

There are 6 teachers and staff members in IT Department. Most of the teachers are Thai. The department has different responsibility. There are head of IT center that is charge of IT center. The culture is the department is diverse. The dominate culture is Thai so mostly people work with Thai style. There is not much culture difference awareness because each member has his/her own tasks. The norm of the department is classified into standard which everyone is equal in working. Moreover, they have to work according to the tasks given by their superiors.

1.2.3 Analysis of current situation

Table 1.1: SWOT/AR Diagram

Strength • One student one computer • Advance technology • Sufficient and effective teaching materials • Experimental and knowledge teaching	**Weakness** • Sixty percent of low quality work • Twenty percent lack of basic skills
Opportunity • Ability to apply skills • Better self-development enhancement • Master support for better performance	**Threats** • Unmatched of curriculum and current needed computer skills • Discontinued teaching-learning activities
Aspiration • Eighty percent of students submit assignment on time • Eighty percent of students reflects creativity on their works	**Result** • The students demonstrate creativity and happy learning.

The researcher analyzed the current situation of school and computer instruction. The sources of this analysis were selected based on the past teaching experience of researchers and access to records, including the records of colleagues in their teachings. Moreover, this analysis was also gained from the Career and Technology department meeting. The results show that the school has a standardized and adequate content to support computer learning. However, the problems occurred when students' ability to create high value task was very low. The finished assignment were normally poor quality and lack of creativity, the skill that necessary in computer subject.

Strength: In term of strength, the school provided one student per one computer. This shows that the school is focused on technological change and its impact on the future situation of students. Nowadays, technology plays an important role in almost every area of our society, from home to work, so advanced technology learners need better and better skills in the future. One of the strengths of the school is that it provides sufficient and effective instructional content so teachers can improve their experimental skills and gain instructional knowledge easily.

Weakness: Concerning to weakness, researchers found that sixty percent students yielded low quality work. This is because they lack creativity. In addition, 20 percent of students also lack basic computer skills. The researchers analyzed the problem and found that the student was not interested in this.

Opportunity: The researcher's opportunity was that students could use their computer knowledge and skills in their daily routines, inside and outside school. Moreover, the knowledge that students gain can enhance them to learn better in other subjects to develop themselves. There is also an opportunity for teachers to provide core support to outstanding students to improve their skills.

Threat: Threats that affect instructional processes are similar to those needed to develop today's computer skills. Moreover, discontinued teaching-learning activities were one of biggest challenge since the teaching-learning activities were usually interrupted by other schools activities such as sport days, seminars, and etc.

Aspiration: Ambition is the eighty percent of students delivering on time. This is the development of their responsibilities. Moreover, the researcher aimed to get eighty percent of students reflects creativity on their works. This is very important aspiration because in computer subject it is necessary for students to be creative since the competition is very. Therefore, the development of young students' creativity will affect their competitive advantage in future technologies.

Result: The result that the researcher aimed to have was that the students demonstrate creativity and happy learning. Moreover, their assignment must show their creativity and be unique.

1.3 Research objectives

1. To describe the current situations of primary 4 in terms of student's creativity.
2. To design and implement the appropriate IDI's to improve student's creativity.
3. To compare the differences between before and after IDI's

1.4 Research Statement

The focus of the study is to improve student's creativity through IDI's. This is a case study of computer subject primary 4.

1.5 Research Questions

The research's questions need to be answered are as following:

1. What is the current situation of student's creativity in computer subject primary 4?

2. What IDI's could be designed and programed for improving student's creativity of primary 4?
3. What are the differences between before and after IDI's?

1.6 Research Hypotheses

H01: There is no improvement in student's creativity before after and IDI's in computer subject primary 4.

Ha1: There is improvement in student's creativity before after and IDI's in computer subject primary 4.

1.7 Definition of Terms

Creativity	refers to the qualities of the learners to analyze, conceptualize, drive results and engage in tasks or activities given
Learning	refers to the process that design to change in behavior due to experience.
Conceptualization skills	refer to the ability to visualize ideas, generate ideas, interrelate idea, and communicate ideas.
Analytical skills	refer to the ability to observe, pay attention, search information, and understand ideas, problems, or things.
Engagement skills	refer to the ability listen, accept, support, and take part.
Result- Orientation skills	refer to the ability to complete task, manage time, manage accuracy and manage details.

1.8 Significance of the study

The research findings can results in contribution of:

Students

Students' development on creativity in term of conceptualization, analytical tasks, engagement, and result- orientation skills

Teacher

New model of teaching and learning activities to specialize in develop creativity in term of conceptualization, analytical tasks, engagement, and result - orientation skills in computer subject for student in this age.

The School

The school can implement this teaching – learning activities with other subjects which aim to develop students' creativity.

1.9 Scopes and limitation of the research

1.9.1 Scopes of the Research

This study aimed to analyze the current situation of students' creativities in computer subject. The researcher tended to focus on improving students' creativity through IDIs': a case study of computer subject primary 4.

1.9.2 Limitation of the Research

This research was conducted the IDI as teaching - learning activity to develop students' creativity in computer subject of Assumption College Ubonratchathani. The target group who involved in this study were primary four students consisting of consisting of 78 and computer teachers in computer and art department which were total of seven teachers. The study took approximately 9 months to complete and the researcher spent six weeks to experiment the IDI and data collection process.

CHAPTER 2

LITERATURE REVIEW

In this chapter, the researcher aims to study literatures relating to child development, learning theory, creativity development in children, and creativity assessment. The researcher has found essential information to develop instrument and design the research as following:

1. Child development Theory: Bloom taxonomy
2. Creativity development
3. Creativity assessment
4. Previous research on improving of creativity in children.

2.1 Theories of Creativity

2.1.1 Definitions

Findley and Lumsden defined "creativity" as "the constellation of personality and intellectual traits shown by individuals when given a measure of free rein, spend significant amounts of time engaged in the creative process". This definition focuses more on personality as mention by Amabile (1988).

Another definition given by Roger (1954, cited by Robinson, 2009) which was considered as process- oriented definition said that "creativity is the emergence in action of novel relational product, growing out of people, or circumstances of his life on the other".

Stein (John, 2015) defined "creativity" in relevant to product-oriented that it is "novelty that is useful".

Moreover, Amabile (Zhang and Junsheng, 2013) gave other product - oriented definition of "creativity" that is "the production of novel and useful ideas by an individual or small group of individual working together".

Lastly, Sternburg (2006) defined it in a very simple way that was "creativity is a habit".

In early age, children do not inherit creativity, but these it rather develop from experiencing various kinds of situation from their surroundings. O'Connor (2012) stated that creativity is developed from many factors. These factors are engagement to play, risk tasking, imaginative thinking or pretending, and experimenting new things.

Writght (2010) and Robinson (2009) indicated that "creativity is the ability to produce through imaginative skill something new." Simister (2007) mentioned that in order to develop creative skills, children have to experience and absorb certain information (critical thinking) which later will lead them to develop and transform knowledge to generate new ideas. This can be said that two important elements lying here according to Wright, Robinson, and Simiter statements are critical thinking and creative thinking.

Therefore the researcher has developed definition of creativity which refers to the qualities of the learners to analyze, conceptualize, drive results and engage in tasks or activities given"

2.1.2 Components of Creativity

2.1.2.1 Conceptualization Skills

Conceptualization skills refer to the ability to visualize ideas, generate ideas, interrelate idea, and communicate ideas.

2.1.2.2 Analytical Skills

Analytical skills refer to the ability to observe, pay attention, search information, and understand ideas, problems, or things

2.1.2.3 Engagement Skills

Engagement skills refer to the ability listen, accept, support, and take part.

2.1.2.4 Result- orientation Skills

Result - Orientation skills refer to the ability to complete task, manage time, manage accuracy and manage details.

2.1.3 Creativity Assessment

John Munro's creative assessment aims to assess the potential of individuals in some areas. (John, 2015). Nowadays, creative assessments tend to look at the potential of people rather than creativity. Creativity potential can be categorized into 6 areas that are flexibility, fluency, originality, elaboration, abstractness, and persistence to the closure (John, 2015) as showed in Figure 2.1. The results were considered in various cognitive assessment tools and found that the most appropriate method for assessing students' creativity in this research is the Modes of thinking in young children (Wallach & Kogan, 1965, cited by John, 2015) Measure game creativity, such as context without limits. According to Wallach and Kogan (Zhang and Junsheng, 2013) this method consists of three elements that is instance, alternate uses and similarities) and two subtests pattern meanings and line meaning.

John M. (2015) stated that there are many type of creativity's assessment which measure criteria of creativity by counting the number of responses and uniqueness, flexibility, and rate answers on 7-point scale (not original - very original). Assessing

usefulness is to evaluate the task if it is practicality and relevance to reality and rate answers on a 7-point scale (not useful - very useful). These scales has high validity and reliability which can be use in education evaluation"

Table 2.1: Creativity Criterion

Creativity Criterion	Ability	How it is scored
Fluency	Produce a large number of ideas in words, figural images or action	Total number of relevant responses
Flexibility	Produce a variety of kinds of ideas, draw in relevant ideas from a variety of domains, shift between domains easily	Number of different categories of relevant response
Originality	Produce ideas that are less obvious, i.e., the frequency of the response but that are uncommon, unique responses	
Elaboration	Develop, embellish or elaborate ideas	Amount of detail in responses
Abstractness	Sense the essence of a problem or an issue, its level of abstraction	Level of abstraction
Resistance to premature closure	Keep an open mind, unanswered questions, unresolved issues and to work on informatopn from a variety of perspectives	Total number of unanswered questions unresolved issues

John (2015) evaluated creativity and concluded that, as showed in Figure 2.1. From figure 2.1, we can see that each assessment techniques have different ability to measure students' creativity in varieties of disciplines and appropriate for different educational levels.

Table 2.2: Assessment of Creativity

	GIFT	GIFF1	ASCT	CAP	CCT	CBT
Rating by self or others						
Curiosity	/			/		/
Originality						
Independence	/				/	
Flexibility						
Risk taking	/			/		
Fluency						
Elaboration			/	/		
Imagination, fantasy						

Preference for complexity					/	/	
Ingenuity							
Resourcefulness						/	
Positive self-referencing							
Contact							/
Consciousness							

Grade level for use	P	S	P S	P S	P S	P S
Internal consistencies	m-h	m-h	M		h	
Test-retest reliability	m-h	m-h				
Teacher ratings of the creativity of student outcomes	l-m		l	m	m	m
Score on creativity potential scale						

GIFT: The Group Inventory for Finding Creative Talent O (Rimm $ Davis, 1980)
GIFF1: Group Inventory for Finding Interests (Davis & Rimm, 1982)
ASCT: Abed-Schumacher Creativity Test (O'Neil, Abed & Speil Berger, 1994)
CAP: Creativity Assessment Packet (Williams, 1979)
CCL: The Creativity Checklist (Johnson, 1979)
CBI: The Creativity Behavior Inventory (CBI 1 for grade 1-6 and CBI 2 for grades 7-12) (Kirschenbaum, 1989)
Measurement of reliability and correlation: low = l, moderate = m, high = h
Primary school years = P, Secondary school years = S

2.2 Creative Learning

2.2.1 Learning Definition

There are many psychological perspectives on aspects of learning. Gregory A Kimble's first definition of learning as it is "a relatively permanent change in behavioral potentiality that occurs as a result of reinforced practice". Oxford definition of learning is "the acquisition of knowledge or skills through study, experience, or being taught". Moreover, Lachman (1997), also states that "definitions of learning refer to learning as a change in behavior that is due to experience".

From above definitions of learning, all of them tend to describe learning into practical perspectives; therefore, in this study learning is "the process that design to change in behavior due to experience".

2.2.2 Bloom's taxonomy

Bloom's learning theory is one of famous theory many researchers apply in their study. Bloom's taxonomy of learning objective pyramid were used in the development of children learning cognitive. According to Sukanya (2014) this method aims to develop students' success in learning new things and developing three dimensions that are cognitive, affective, and psy motor.

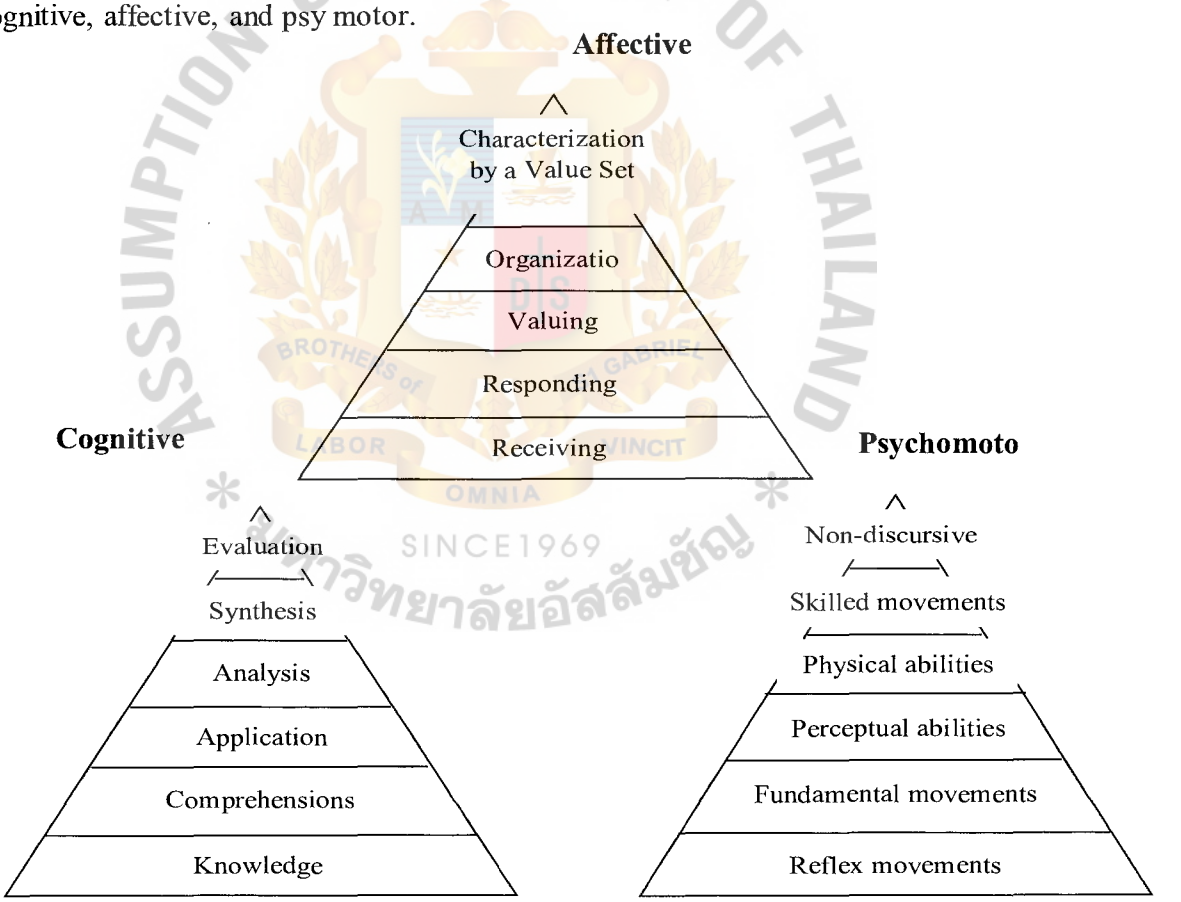

Figure 2.1: 3 Domains of Bloom'saxonomy

According to Sukanya (2014), this domain that has been applied in teaching-learning activities was cognitive domain.

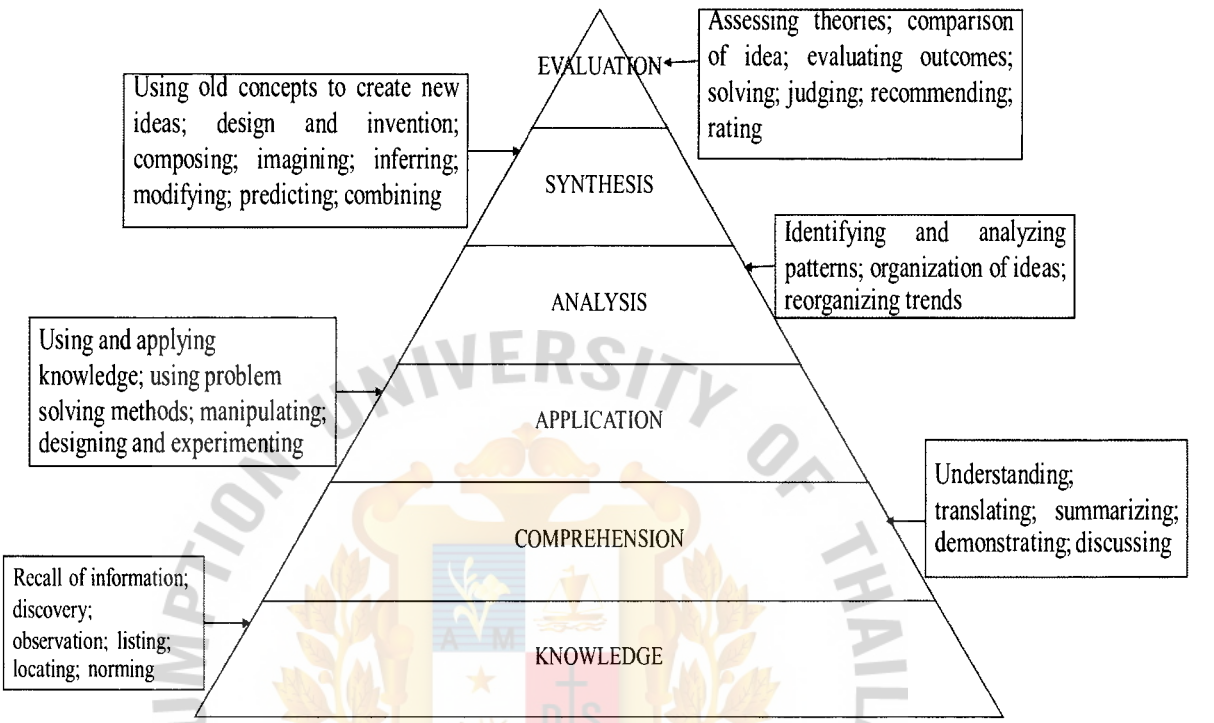

Figure 2.2: Bloom's Taxonomy (Sukanya, 2014)

This is the domain based on brain's function where many ideas come from. The development of this domain will affect in high creativity and effectiveness of cognition. The levels of cognitive domain are as following (Sukanya, 2016):

1. Knowledge is the ability to differentiate experiences and recall those memories accurately.
2. Comprehension is the ability to tell what important things are and be able to translate those situations and conclude the main points.
3. Application is the ability to apply principles, rules, and process to solve problems in reality.
4. Analysis is the ability to divide things into sub division or category.

5. Synthesis is the ability to combine sub division in to one to see the whole picture and be able to develop those into better or more effective things.
6. Evaluation is the ability to evaluate or decide to take action by determining if the results meet target goals.

2.3 Appreciative Inquiry (AI)

Appreciative Inquiry (AI) was developed by Cooperrider, the Fairmount Minerals Professor of Social Entrepreneurship at the Weatherhead School of Management, Case Western Reserve University (Zone Positive, 2012).

According to Charles (2002), appreciative inquiry or AI is "both a process and a philosophy. As a process, AI has a number of steps, phases, or cycles that an AI practitioner follows in working through the process with an organization". The term Appreciative Inquiry came from;

- "Appreciate: valuing; recognizing the best in people and organizations"
- "Inquiry: the act of discovery, exploration, examination, looking at, investigation, and study" (Charles, 2002)

According to David Cooperrider and Diana Whitney, there were four steps in the AI cycle which was called four D's. The four Ds process was consisted of Discovery, Dream, Design and Destiny (Cooperride & Whitney, 1980 cited by Charles, 2002).

1. Discovery refers to "Inquire into the best of the past and the present. Choose the positive as the focus of inquiry."

2. Dream refers to "Use the findings and stories from the Discovery phase to create a compelling, memorable: and ambitious picture of the desired future. Locate themes that appear in stories and select topics for further inquiry."

3. Design referred to "Create shared images of a preferred future. Determine what should be."

4. Destiny referred to "Determine what will be. Find innovative ways to create that future."

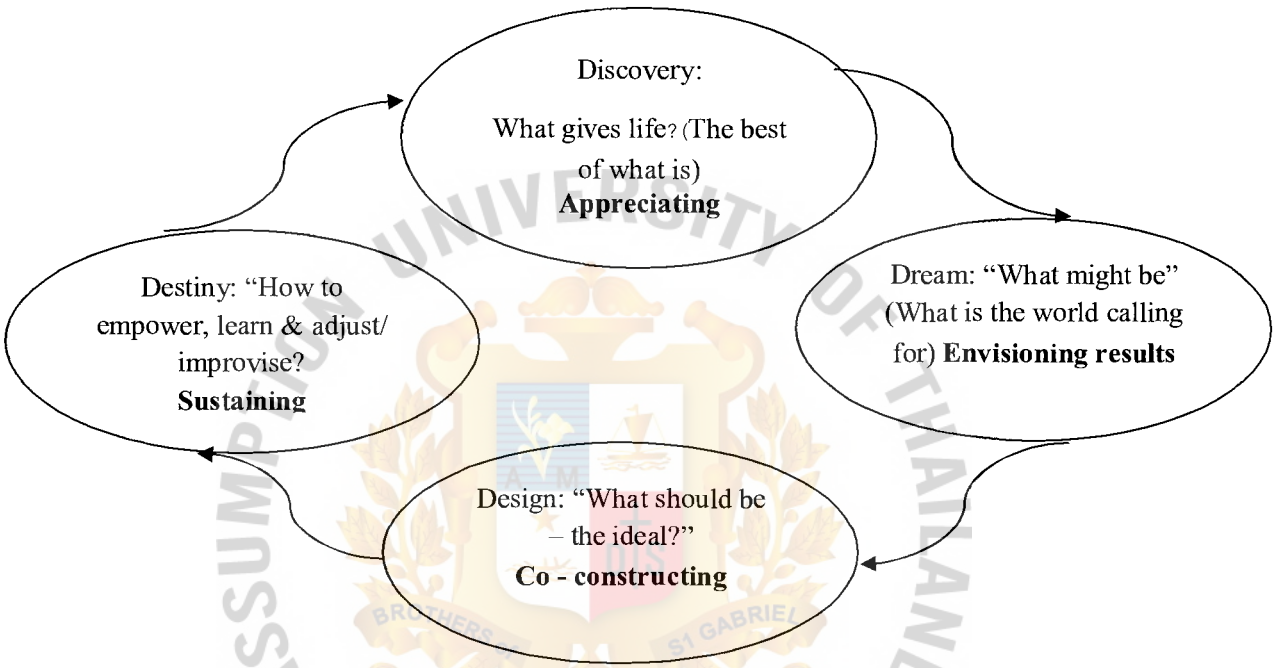

Figure 2.3: AI 4Ds Process (Muhammad Z. I., 2016)

2.4 Related Studies

Amitabh & Brian (1996) stated that "with increasing global competition it has become of utmost importance for organizations to address business issues creatively. Creativity is best defined as the degree to which an employee demonstrates new ideas or applications for activities and solutions at work". However, this skill still needed to be developed. The new ideas of developing creativity were to develop brain skills. Also, playing game in small group could help the creativity (Amitabh & Brian, 1996)

Run Zhang and Junsheng (2013) determined factors why computational thinking must be taught in computer teaching in universities. The finding indicated that this is the mire effective way to improve the teaching quality among teacher. Also, it created better learning environment for students.

Ridgway & Quinones (2012) suggested in their study "*How do Early Childhood Students Conceptualize Play-Based Curriculum"* that played based- learning could enhance young age students to develop their conceptualized skills. With this learning method, students could develop their understanding by experimenting what they play.

According to National School Climate Center (NSCC, 2013) suggested that in order to enhance students' engagement there would be to develop following dimension that are; 1) enable students to value their experience and perspectives in school, especially, for early age, 2) provide high quality teaching materials foe using with students and allow them to express their opinions on the provided materials, 3) organize professional training for students' engagement to teachers, staffs, and relating section to students' development, and 4) involve parents to joy school's experience of their young kids (Cardillo, 2013).

2.5 Conceptual Framework

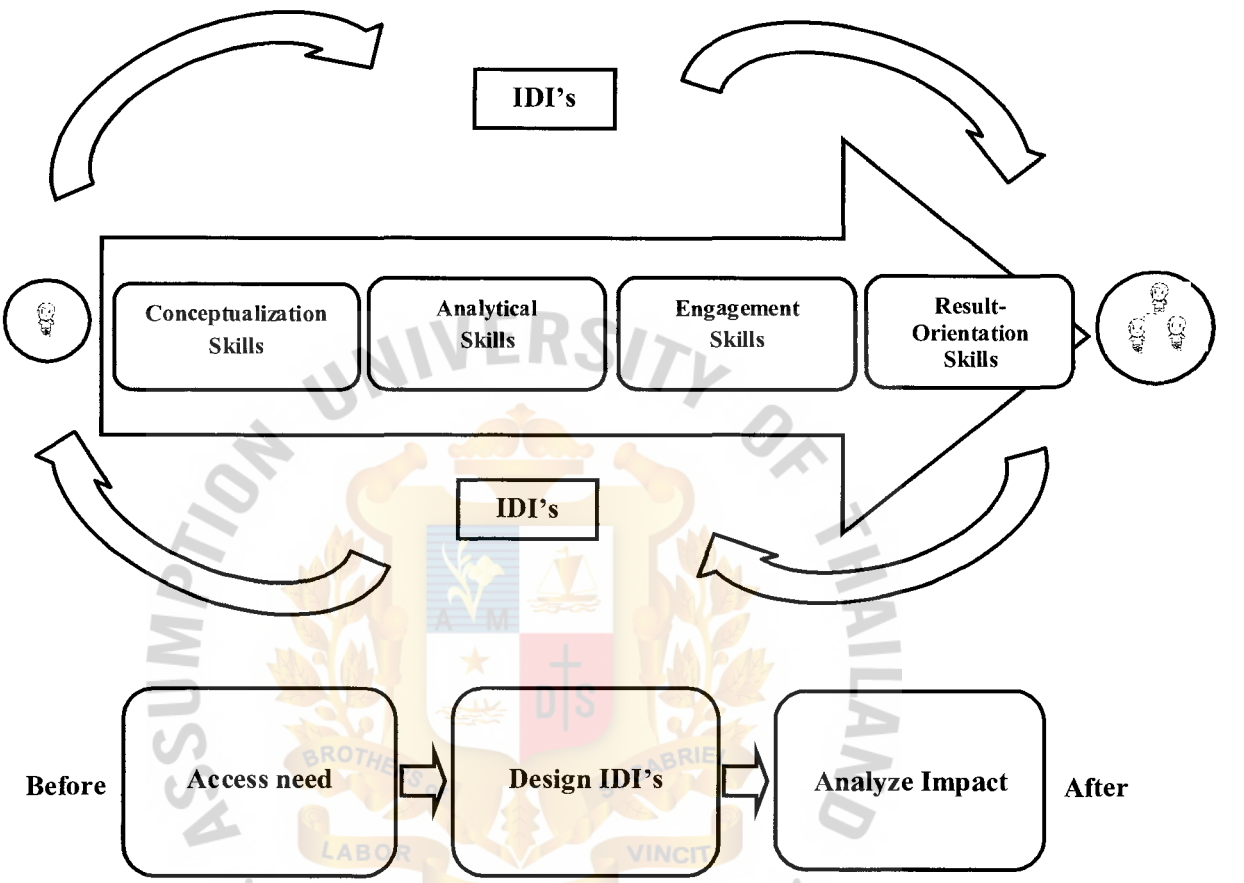

Figure 2.4: Conceptual Framework

According to the conceptual framework above, the IDI's process consists of access need, design IDI, and impact analysis. This process aims to develop 4 skills of creativity from conceptualization, analytical, engagement, and result - orientation.

2.6 Action Research Framework

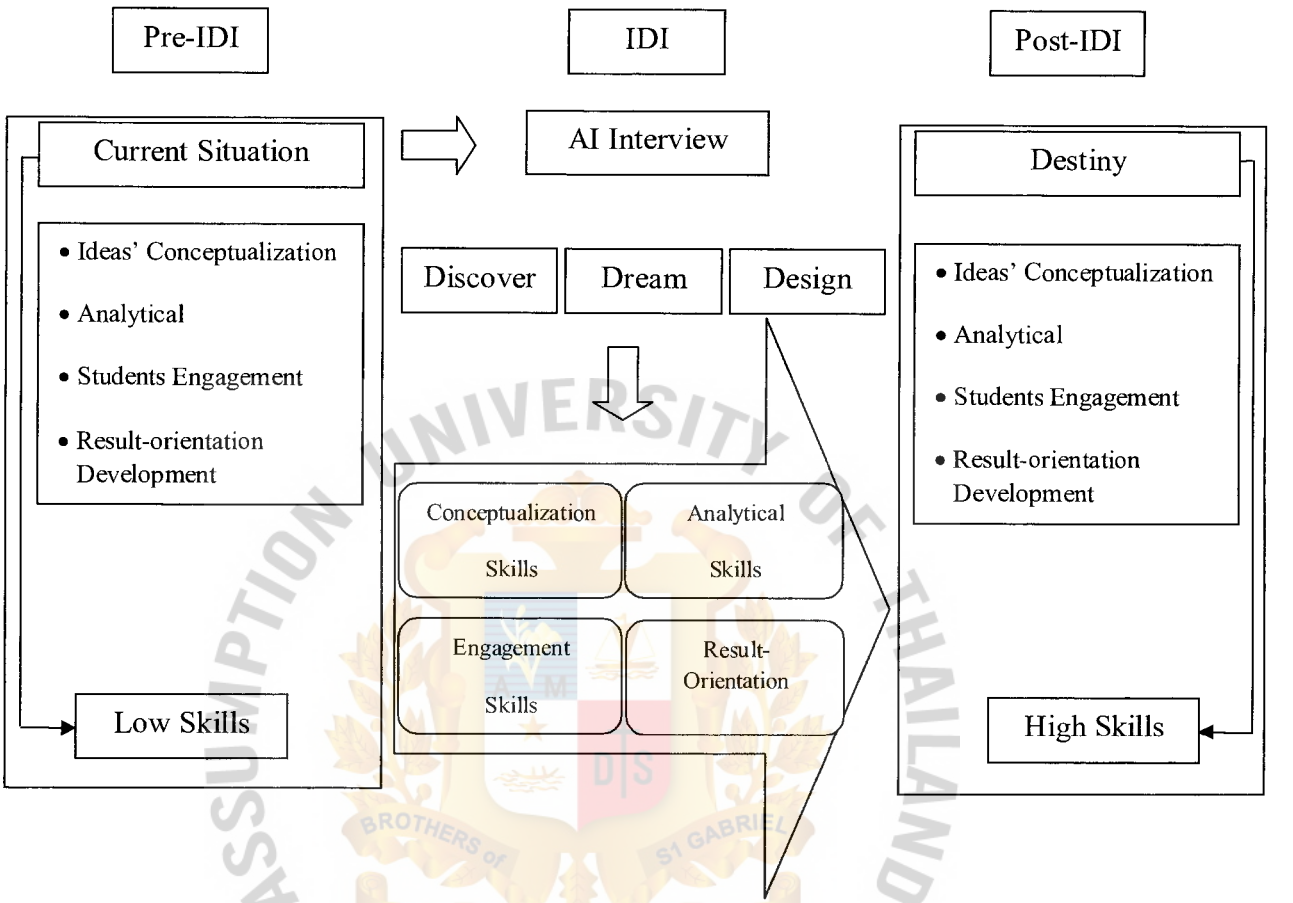

Figure 2.5: Action Research Framework

This research was aimed to improving students' creativity in term of conceptualization, analytical tasks, engagement, and result- orientation. The researcher developed teaching-learning activities by interviewing teachers with Appreciative Inquiry checklist. The research did the inter-code by approval of experts and then designed the appropriate teaching-learning activities. Before implementing IDI or in this case was the developed teaching-learning activities, the researcher made students did the creativity assessment before IDI and after IDI implementation the students had to do the assessment

again to compare their creativity in four areas of the study. The researcher compared the results and summarized IDI.

CHAPTER 3

RESEARCH METHODOLOGY

This research is a Quantitative research. Research for describe the current situations of primary 4 in terms of student's creativity, design and implement the appropriate IDI's to improve student's creativity and compare the differences between before and after IDI's of Assumption College Ubonratchathani. The research methodology is as following.

3.1 Research Design

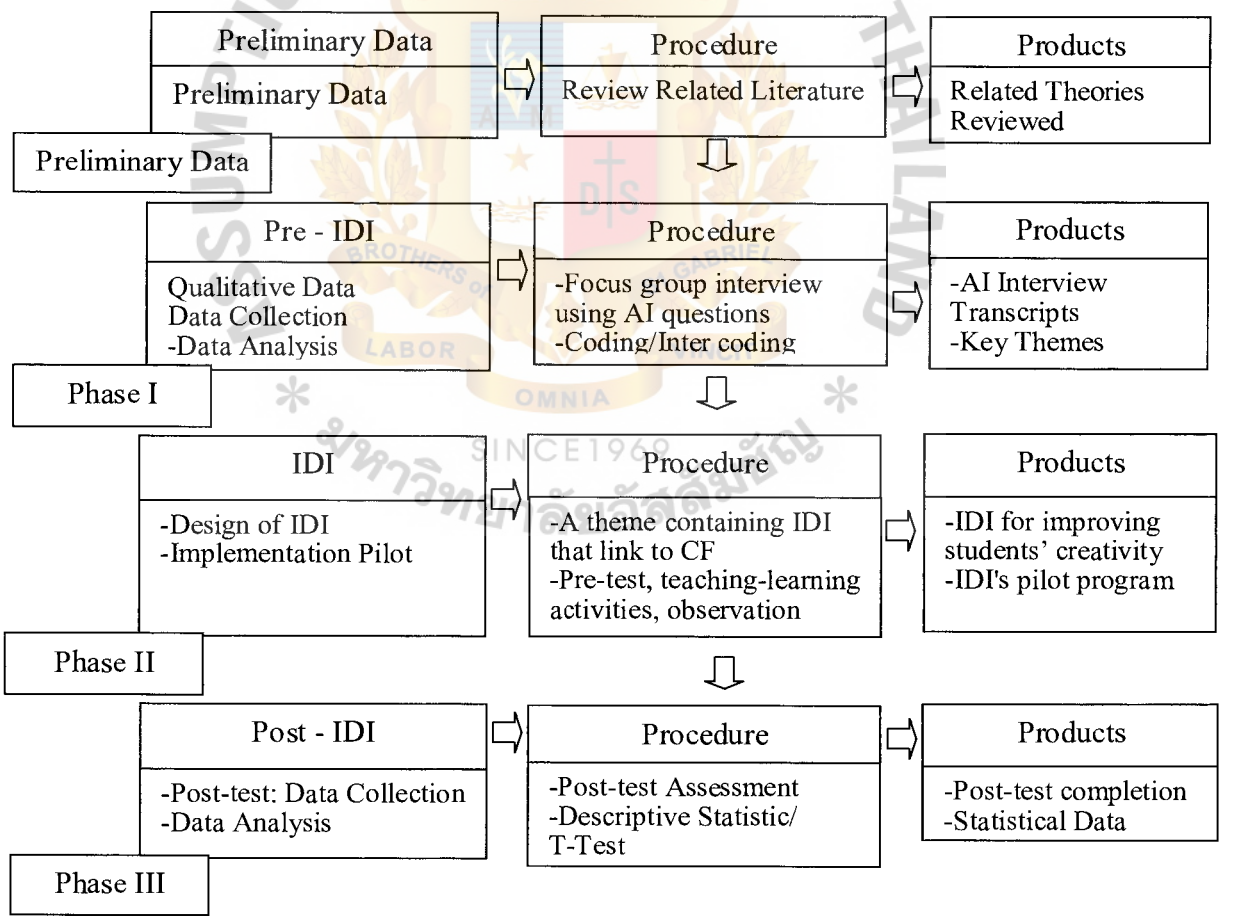

Figure 3.1: Procedural Diagram

The research design consists of four phases ranging from; preliminary, pre IDI, and IDI, to post-IDI.

Research Question 1: Preliminary Data and Pre Instructional Development Intervention

Preliminary phase: This process reviews the literature to provide a theoretical insight into the key variables of literary studies, ranging from learning theory, child development, and instruction - learning activities, creative theories, and theories. Development for evaluation.

Phase I Pre-IDI: In this section, the researcher developed data collection tools which were consisted of AI questionnaire to acquire current situation on teaching - learning activities relating to creativity development, observation forms, and pre-test and post-test design. The second phase during pre-IDI phase, the focus group interview was conducted to gain insights of teaching - learning activities from teachers who taught in computer department. The researcher categorized the theme by coding variables relating to creativity's development by the suggestions and approves of three experts. Later, the researcher designed the teaching-learning activities which focus on creativity improvement

Research Question 2: Instructional Development Interventions (IDIs)

Phase II IDIs: This phase, the researcher designed learning and teaching activities by using the theory of creativity development which was consisted of four skills; 1) conceptualization skills, 2) analytical skills, 3) engagement skills, and 4) result-

orientation skills. The analyzed data from AI interview was utilized in designing teaching-learning activities.

Research Question 3: Post Instructional Development Intervention

Phase III Post IDIs: The fourth step is the post- IDI. In this step, the researcher gave students pre-test on creativity skills. Then, the researcher applies teaching - learning activities from previous step with students. The researcher asked other teachers to assist in observing of students' behaviors in accordance with the activities organized by the researcher. After that, the students did the post-test to compare the results of teaching-learning activities.

3.2 Target Population, Sample, and Sampling Procedures

The target population was the students in the grade four consisting of 78 students. The population samplings were class 4/1 and 4/2, and 4/3. Another group of population was a group of teachers from computer and art department due to the topic of the teaching which the researcher should apply Microsoft Paint, therefore, the art teacher involved to this for better development of IDIs. Table 3.1 showed the description of target population.

Table 3.1 Description of Target Population

Participants	4/1	4/2	4/3	Total number of participants
Students 4/1,4/2,4/3	28	17	33	78
Teachers	-	-	-	7

3.2.1 Target Sample and Sampling procedures

The sample was selected purposively since the study was to develop students' creativity of primary four students. According to Cohen, L., and Manion, L. (1989), purposive sampling is the selection of sampling where population is limited and researchers use their own judgement to choose.

3.3 Research Instruments

The research instruments for this study comprised of AI interview questions, observation form, and pre /post assessment.

Table 3.2: Research Instrument Structure

Research Instrument	No. of Items	Target Participants
AI Interview checklist	4	Teachers
Assessment before and after IDI	12	Students
Observation Checklist	16	Students

3.3.1 AI Interview Questions Checklist

The AI checklist consists of four questions. The questions cover four areas of conceptualization, analytical, engagement, and result - orientation skills. The AI questions focused on collecting insights from teachers who participated in this study on teaching-learning activities that improve students' creativity.

3.3.2 Assessment before and after IDI

The pre and post assessment were applied to measure students' creativity before and after IDI's implementation. The test was consisted of 12 questions for students to do and four items for teachers to evaluate their performance.

3.3.3 Observation forms

The observation forms was consisted of four parts with 16 questions, covering four skills which were conceptualization, analytical, engagement, and result- orientation skills. The observation form was applied by three observers during teaching process. The three observers were the head of primary section, the head of Career and Technology department, and on computer teacher. The observation form was aimed to assess student behavior on instructional activities developed through interviews with AI, interview could make students improve the four skills or not. Moreover, the observers also gave some reflection of the teaching- learning activities in term of its advantages and disadvantages in order to make the teaching process become more effective in the future.

3.4 Data Collection Procedures and Data Analysis

The following table shows the data collection procedures and data analysis.

Table 3.3: Data Collection Procedures and Data Analysis

Research Instrument	Data Analysis	Procedure
Interview Questions	- Inter-Coding by three experts	- Three experts inter code for key theme and make conclusion

Table 3.3: Data Collection Procedures and Data Analysis

Research Instrument	Data Analysis	Procedure
Assessment (Pre-Post)	- Raw Score - Average percentage - T-test	- Students do assessment before implementation of IDI - Students do assessment after IDI
Observation	- Frequency - Percentage	- Two teachers observe during IDI implementation

The data collection procedures were as following:

Interviews

The interview process was conducted by informing the seven teachers about the focus group discussions. Researchers interviewed 7 teachers by AI. The researcher recorded and noted important information from the interviews. After the interview was over, the researcher sought for three experts to inter-code for key theme and the conclusion.

Assessment (Pre and Post)

The assessment was given to students before and after implementation of developed teaching-learning activities.

Observation

The observation was implemented during the try-out of proposed teaching and learning activities. There were there observers who analyzed students' behavior. The observation consisted of 16 items divided into 4 areas of skills that were conceptualization, analytical task, engagement, result-orientation as seen below.

Table 3.4: Observation Checklist Structure

Variables	Number of Items
Ideas' Conceptualization	4
Analytical Tasks	4
Engagement	4
Task-Orientation	4
Total	**16**

3.5 Research Timeframe

The table below illustrates how IDI was carried out- dimensions of IDIs teaching method and duration

Table 3.5: The Dimension of IDI

Dimension of IDI	Teaching Method	Duration
Assessment before IDI	Individual Test	1 hour
Conceptualization Development	Class activities by applying of IDI	1 hour
Analytical Tasks Development	Class activities by applying of IDI and individual assignment	1 hour
Students Engagement Development	Group activities by applying of IDI	2 hour
Result Orientation Development	Individual Assignment	1 hour
Assessment after IDI	Individual Test	1 hour

Table 3.5 demonstrated the dimension of IDIs. The first dimension was assessment before IDI which lasted for 1 hour by individual test. Then, the researcher applied teaching methods in four areas for five hours of class activities. Lastly, the assessment after IDI was implemented which lasted for 1 hour.

Table 3.6: Duration of Research

Process	Duration of Research			
	Jan-Mar	**Apr-Jun**	**Jul-Sep**	**Oct -Dec**
Preliminary: Literature Reviewed				
Phase I : Pre IDI				
Phase II : IDI				
Phase III : IDI				
Paper Submission				

Table 3.6 showed the durations of research for each phases. The research process was studied for 1 year from January to December to be completed.

CHAPTER 4

PRESENTATION AND ANALYSIS OF DATA

This chapter comprises of research findings which were statically analyzed by using of the set of statistical package. The levels of data presentation consisted of pre-IDI, IDI, and post-IDI, based on the research questions. The researcher implemented the following process to analyze the data for this study.

Phase I Pre IDI: Analysis of the current situation of students' creativity among grade 4 students in computer subject

The data was collected from a creativity assessment. The results showed that the students' creativity was in low level and need to be improved. Moreover, there was also the unmotivated teaching activities which did not encourage students to learn which the research aimed to design the more motivating teaching method to develop students' creativity.

Phase II IDI: The design and implementation of teaching and learning model to improve students' creativity in computer subject

In this session, the results of the interview from seven teachers were presented. The interview was aimed to discover the best experiences of the teachers in teaching which the researcher would apply those activities to design the most effective and appropriate teaching and teaching activities for computer subjects with the students in this age. The interview questions are designed and implemented based on the Appreciative Inquiry (AI) Theory. The researcher applied AI 3D Cycle to obtain important information to develop the teaching and learning activities. After the interview

was approved by three experts, the researcher presented the Proposed Instructional Development Intervention which would later be implemented to develop students' creativity.

<u>Phase III Post IDI</u>: The difference between the pre and post implementation of IDI

This part presents the comparison of students' creativity in computer subject basing on creativity assessment results between before and after implementation of IDI. Moreover, the researcher also presented the t-test result that was applied to compare the result of pre and post IDI which had led to hypothesis testing.

4.1 Participants' Profile

Table 4.1: The participants' profile and percentage

Participants	Total number of participants	The involvement	Percentage of participants
Students from class 4/1-3	78	IDI process	100
Teachers	7	IDI process	100

Table 4.1 presented the participants' profile with consisted of two groups. The first group were the grade 4 students from three classes (4/1, 4/2, and 4/3) accounted for 76 students who study in Assumption College Ubonratchathani in 2016 academic year.

The second group consisted of six teachers from computer departments and one teacher from art subject so it was seven teachers in total. The researcher decided to choose the computer teachers to involve in the interview session since the research related to computer teaching. Moreover, the art teacher was chosen because the topic to

be taught was Paint program. Therefore, art teacher shared good ideas how to teach students to express their full potential of creativity. The sampling used in this research was 100 percent participants' participation for both groups.

Phase I Pre IDI: Pre Instructional Development Interventions

In this phase, the researcher represented the current situation of students' creativity in computer subject in the response of the first research question.

Q1: What is the current situation of students' creativity among grade 4 students in computer subject?

4.1.1 Current Situation of Students' Creativity

In this section of pre - IDI, the researcher focused on finding the current situation of grade 4 students' creativity. The researcher investigated the data by testing students' creativity with creativity assessment in four areas; Idea's conceptualization, Analytical tasks, Students' Engagement, and Result-orientation development. The students accounted for seventy - six people from grade 4/1, 4/2, and 4/3. The result of the assessment indicated that the students had low creativity level as showed in table 4.2.

4.1.2 Pre-IDI Results

According to table 4.2 the students' creativity of pre - IDI in Conceptualization indicated that the average score of three classes was 17.80 out of 73 points in total. The class with highest average score was 4/3 (18.76). The second was 4/1 (17.82) and 4/2 came the last with lowest average score of 16.81. The average percentage of 3 classes was 24.85 percent.

Table 4.2: Pre-IDI of Creativity Assessment Result

Class	Conceptualization		Analytical Tasks		Engagement		Result-Oriented		Average score and percentage by Class	
	Total (73)	%	Total (4)	%	Total (4)	%	Total (84)	%	Total (165)	%
4/1	17.82	24.41	3.39	84.75	3.18	79.50	26.11	31.08	50.50	30.61
4/2	16.81	23.03	3.63	90.75	2.81	70.25	23.18	27.60	46.43	28.14
4/3	18.76	25.70	3.06	76.50	2.36	59.00	25.76	30.67	49.94	30.27
The average percentage by creativity dimension	**17.80**	**24.38**	**3.36**	**84.00**	**2.78**	**69.58**	**25.02**	**29.78**	**48.96**	**29.67**

In Analytical tasks, the result showed that the average score was 3.36 out of 4 in total. The class with highest average was 4/2 (3.63), 4/1 (3.39), and 4/3 (3.06) consequently. The average percentage was 84 percent which was considered in high level. The Students' engagement result was 69.58 percent on average. The class with highest score was 4/1(3.18), 4/2 (2.81), and 4/3(2.36) accordingly. The last skill was task-orientation development. The result was that 4/1 had highest score. 4/3 was second with 25.76 and the lowest was 4/2 (23.14). The average percentage for all 3 classes was 29.78.

The assessment showed that in 4 areas the students had the average score of 48.96 or 29.67 percent. Class 4/3 had highest overall score of 50.50 or 30.61 percent. Class 4/3 was the second with 49.94 or 30.27 percent. Class 4/2 was the lowest with average total score of 46.43 or 28.14 percent.

The statistics presenting in table 4.2 made the researcher realized that students had low skills in Idea's conceptualization and Result-Oriented. While they had quiet satisfying result in Engagement. Surprisingly, the ability of students in analytical work is very high. However, since the overall performance, only 29.67 percent, it was considered in low level of creativity.

Phase II IDI: Instructional Development Intervention.

In this phase, the researcher developed the IDI tools to implement in improving students' creativity. The researcher designed the teaching-learning activities by applying AI 3Ds interview with 7 teachers in order to answers to this question;

Q2: What IDI's could be designed and programed for improving student's creativity of primary 4?

4.2 Instructional Development Intervention (IDI)

The researcher conducted the interview with seven teachers from computer and art department. The interview consist of four questions with four sub-questions each. The results of the interview were showed at table 4.3

Table 4.3: The Participants' Answers in AI 3Ds Interview

Questions	Answers	Creativity Criteria Coding
Part I: Discover 1.1 What was your best experience with your	imagination on the tasks given by teachers" "Student have picture in their mind frequently when doing something"	C1 : Visualization

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
teaching - learning activities to improve/ enhance students in term of ***Ideas' Conceptualization***?	" Students can have various "Student have picture in their mind frequently when doing something" "Students can design their own style of assignment which different from others" "Students can apply what they have be taught with other things" "Students can apply their knowledge with other subjects" "Students can communicate their ideas with their friends." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***- Students had great imagination and could design tasks by their own.*** ***- Students could apply knowledge and present their ideas.***	C1 : Visualization C2 : Idea Generation C3 : Interrelate Ideas C4 : Communicate Ideas
1.2 What was your best experience with your teaching – learning activities to improve/	"Students can plan to the tasks according to the demonstration of the teachers" " Students learn to be aware of	A1 : Observe

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
enhance students in term of ***Analytical Tasks***?	their surroundings" "The students can analyze the process of doing task and if there is problem, they can identify what are the cause" "Students pay attention to the details and listen carefully throughout the process of teaching." " Students are highly motivated to learn" "Students curiously want to know what the answers are, and they try to search for the answer from many sources before making decision." "Students highly understand what have been taught." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***- Students were able to analyze and identify things.*** ***- Students pay attention as well as being curious to find the answer to understand new things.***	A1 : Observe A2 : Attention A2 : Attention A3 : Search Information A4 : Understand

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
1.3 What was your best experience with your teaching - learning activities to improve/ enhance students in term of ***Students' Engagement***?	"Students listen to other people." "Students accepts other people ideas which is better or majority of people accept." "Students accepts whatever tasks their team assigning to them to do." "Students happily help their team to finish the task." "Students think about their group's benefit first." "Students are motivated to participate in class activity or any activities the teacher tell them to do." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***- Students listen to their team and had high acceptance.*** ***- Students support their team and welling to be part of the team.***	E1 : Listen E2 : Accept E3 : Support E4 : Take Part

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
1.4 What was your best experience with your teaching - learning activities to improve/ enhance students in term of ***Result-Orientation Development***?	" Students can complete the task perfectly" " Students do not copy their friends 'works" "Their work can contribute to new ideas or new invention which can be used in reality." "Students finish their work on time." "Most of the tasks that the students do are correct or meet the criteria that the teacher set." "Students know their tasks very well. They can answer what are the weakness or the strength." "Students' works are tidy and reflect new things which can be used in real life." "Students must be proud of their tasks." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***- Students completed the tasks without copying and showed new***	R1 : Complete R2 : On-time R3 : Correct R4 : Details

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	innovation within time limit. ***- Students' works were mostly correct and they gave full details.***	
2.1 How did you do to your teaching - learning activities to improve/ enhance student in term of ***Ideas' Conceptualization***?	" For me, it was drawing" " I think Project base learning" "Lesson short note" " I usually used Mind Map" " Also, Matching Game" "Presentation was the best presenting the ideas" **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-drawing or mind-mapping*** ***-playing matching game*** ***-doing project and presenting it***	C1: Visualized Ideas C2 : Generate Ideas C3 : Interrelate Ideas C4 : Communicate Ideas
2.2 How did you do to your teaching - learning activities to improve/ enhance student in term of ***Analytical Tasks***?	" I think I made them indicating the roles of each items" "And, differentiate things, object, or types" "Comparing things, objects, quality, or types works as well" " I tried project base learning and it worked"	A1 : Observe A2 : Attention

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	"Matching Game made students analyze the different things" "For me, I think report writing work the most" and "Finding Facts" " Presentation made students understand things that they did" "Making conclusion" " I think Drawing of what they learn" **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-differentiating, matching, and comparing things*** ***-playing matching game*** ***-making presentation or mind-mapping***	A3 : Search Information A4 : Understand
2.3 How did you do to your teaching - learning activities to improve/ enhance student in term of ***Students' Engagement***?	"I think group activity enhanced students to have participation" "So, Game Based Learning was also work and students loved it"	E1 : Listen E2 : Accept

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	"What I like was the students help others and dividing work for each member by their special skills" "For me, I love to have students work in group and do some project" **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-group activities with more games*** ***-doing project in group***	E3 : Support and E4 : Take Part
2.4 How did you do to your teaching - learning activities to improve/ enhance student in term of ***Result - Orientation Development***?	" I did a lot of group activity, so students have courage to finish and they care if it would make their team success" "In my case, project also worked but we have be sure about the time to due to project" "Giving students some topic and make them present it was very successful in my class since they want to show their friend about their stories or works" **Key theme based on inter coding**	R1 : Complete R2 : On-time R3 : Correct R4 : Details

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	technique by three experts and categorize/summarized as following: ***-group activities with more games*** ***-Presentation and doing project in group***	
Part II: Dream 3.1 In the future, what will be your better experience with your teaching - learning activities to improve/ enhance students in term of ***Idea's Conceptualization?***	"I can make student be able to imagine beyond their knowledge." "Students have positive attitude towards learning new thing." "Student are motivated to learn." "Students can have new ideas to solve problems." "Students have different ideas from other people and they are proud to show it off. "Students are able to apply what they have learn in their real life." "Students can invent new things that can be used in real life." "Students can reflect what they think and tell it to other people." **Key theme based on inter coding technique by three experts and**	C1 : Visualized Ideas C2 : Generate Ideas C3 : Interrelate Ideas C4 : Communicate Ideas

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	categorize/summarized as following: ***-Student must be motivated to learn new things and imagine beyond their knowledge.*** ***-Students are able to apply new ideas, relate to their life, and reflect of what they think.***	
3.2 In the future, what will be your better experience with your teaching - learning activities to improve/ enhance students in term of ***Analytical Tasks?***	"Students know what is going on around them, what are the problems , and realize how these problem can be solved" "Students pay attention to the details and listen carefully throughout the process of teaching or given tasks." "Students curiously want to know what the answers are, and they try to search for the answer from many sources before making decision." "Students highly understand what have been taught." "Students know what are important to them from the past to the present and what will result in the future."	A1 : Observe A2 : Attention A3 : Search Information A3 : Understand

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	Key theme based on inter coding technique by three experts and categorize/summarized as following: ***-Student realize the situation that happen and they pay attention to the current situation and tasks carefully.*** ***-Students highly understand the teaching as well as being curious to learn new things.***	
3.3 In the future, what will be your better experience with your teaching - learning activities to improve/ enhance students in term of ***Students' Engagement?***	"Students listen to other people." "Students accepts other people ideas which is better or majority of people accept." "Students accepts whatever tasks their team assigning to them to do." "Student adapt themselves to new things quickly and confidently." "Students happily help their team to finish the task." "Students think about their group's benefit first." "Students are motivated to	E1 : Listen E2 : Accept E3 : Support E4 : Take Part

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	participate in class activity or any activities the teacher tell them to do." "I want students participate more in the class activity and give ideas more." "Student share their opinions more to the class." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-Student listen and accept others with respect.*** ***-Students are willing to support their team and they are highly motivated to learn.***	
3.4 In the future, what will be your better experience with your teaching - learning activities to improve/ enhance students in term of ***Result - Orientation Development?***	"Students can complete the task perfectly." "Students do not copy their friends 'works." "Their work can contribute to new ideas or new invention which can be used in reality." "Students finish their work on	R1 : Complete R2 : On-time R3 : Correct

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	time." "Most of the tasks that the students do are correct or meet the criteria that the teacher set." "Students know their tasks very well. They can answer what are the weakness or the strength" "Students' works are tidy and reflect new things which can be used in real life." "Students must be proud of their tasks." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-Student can complete the tasks without copying from other students and reflect their originality within time limit.*** ***-Students should provide the works that could be apply in reality with necessary details.***	R4 : Details

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
Part III: Design 4.1In the future, how will you design the better teaching - learning activities to improve/ enhance students in term of ***Ideas' Conceptualization?***	" I think I will do more drawing activity because the students can improve their imagination" " For me, Project base learning is also the best way to get students think about various ideas" "I like to have students draw Mind Map after class to relate ideas" "To communicate, it is a good idea to have students present their ideas in front of the class" **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-drawing or mind-mapping*** ***-doing project and presenting it***	C1 : Visualized Ideas C2 : Generate Ideas C3 : Interrelate Ideas C4 : Communicate Ideas
4.2 In the future, how will you design the better teaching - learning activities to improve/ enhance students in term of ***Analytical Tasks?***	" I still think that students have to know the role or things in computer term" " They should tell the differences of to the things, object, or types" " Students can know the right ways to compare things, objects, quality, or types	A1 : Observe

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	"So, project base learning is good to develop the analytical skills." " I like matching Game to gain students' attention because students in this age love games activities" " I try to play games like Finding Facts with grade 6 and it works pretty good so this method is excellent choice" "To evaluate students' comprehension I think making conclusion, drawing of what they learn, or even doing presentation are good tools to apply in the classroom." **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-Matching games*** ***-Presentation and doing project in group***	A2 : Attention A3 : Search Information A4 : Understand

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
4.3 In the future, how will you design the better teaching - learning activities to improve/ enhance students in term of ***Students' Engagement?***	"I think, there should more group activity which different theme like games or project such as painting to tell a story. This way students can share their ideas" " They should also have the role indication within group to develop their acceptance" **Key theme based on inter coding technique by three experts and categorize/summarized as following:** ***-doing project in group***	E1 : Listen E2 : Accept E3 : Support E4 : Take Part
4.4 In the future, how will you design the better teaching - learning activities to improve/ enhance students in term of ***Result-Orientation Development?***	" I think the activities that make students works in group like Project Based Learning or game based learning is very effective" " The teachers also need to give more courage to students to finish task within the given time" " If the students works can be publicized more I think it would enhance students' motivation and pride" **Key theme based on inter coding**	R1 : Complete R2 : On-time R3 : Correct R4 : Details

Table 4.3: The Participants' Answers in AI 3Ds Interview (Continue)

Questions	Answers	Creativity Criteria Coding
	technique by three experts and categorize/summarized as following: ***-doing project in group and set time limit to finish the tasks*** ***-Giving more encouragement and publicize more of students' works***	

4.3 Proposed Instructional Development Intervention

4.3.1 The Experts Coding Key Theme of Teaching and Learning Activities

4.3.1.1 Ideas' Conceptualization

Table 4.4: Expert's agreement on teaching activities to develop ideas' conceptualization

C1 : Visualized Ideas	• Designing
C2 : Generate Ideas	• Planning
C3 : Interrelate Ideas	• Matching
C4 : Communicate Ideas	• Presenting

According to experts' agreement, the best way to the development of students' creativity in term of visualized idea is to make students design things while the method to enhance ideas' generation is to have students plan their work. To interrelate ideas,

matching is the most appropriate way to apply for students in this ages. Lastly, presentation is the best way to help students to practice their communication skill in term of expressing own ideas.

4.3.1.2 Analytical Tasks

Table 4.5: Expert's agreement on teaching activities to develop analytical tasks

A1 : Observe	• Indicating
A2 : Attention	• Matching
A3 : Search Information	• Finding
A4 : Understand	• Presenting (By making conclusion or drawing mind-map)

The above table is the experts agreement on develop analytical skills. According to the experts, the best method to develop students' observation skill is to have student indicate objects, things, or items that they learn from the class. While to have student improve attention, the matching game is the most effective way. The experts agree that to ask students to search or find answer by themselves help students to improve their skills for finding facts. To evaluate students' comprehension, it is necessary to present or draw mind-map.

4.3.1.3 Students' Engagement

Table 4.6: Expert's agreement on teaching activities to develop students' engagement

E1 : Listen	• Exchange Idea
E2 : Accept	• Divide work
E3 : Support	• Support team
E4 : Take Part	• Be participate

To contribute students' engagement, the experts suggest have students work in group and encourage them to exchange ideas. Moreover, the teacher must ask students to divide work for each member to improve their acceptance and development of responsibility. The students should support their team and be involved in teamwork.

4.3.1.4 Result-Orientation Development

The experts advise the teacher to measure students' result - orientation development by evaluating students' work by the completed works, time limit, correctness, and details.

4.3.2 Teaching Method Developing from AI 3D's Interviews

Table 4.7:Teaching Process to Develop Students' Creativity

Step 1: Developing of Conceptualization Skills (1 hour)	
C1 : Visualized Ideas	• Design story by using Paint
C2 : Generate Ideas	• Plan the design of the picture by using Microsoft Paint
C3 : Interrelate Ideas	• Develop brochure to tell their favorite story or fairy tales (Matching)
C4 : Communicate Ideas	• Present the story or fairly tales
Step 2: Developing of Analytical Tasks (1hour)	
A1 : Observe	• Indicate the tools in Paint and their application
A2 : Attention	• Match the tools and its uses on the exercise
A3 : Search Informa-tion	• Find Facts: Exchange answers and search for correctness
A4 : Understand	• Drawing of what they learn
Step 3: Develop Students' Engagement and Pursuit of Result Orientation Development (2hours)	
E1 : Listen	• Group activity: Developing drawing of My Future

Table 4.7:Teaching Process to Develop Students' Creativity

E1 : Listen	• School By Microsoft Paint
E2 : Accept	• Divide work for each member by their special skills
E3 : Support	• Let the students do their task to support their group
E4 : Take Part	• Observe their group activity and students participation
<u>Step 4 : Evaluate Students' Work by the completed works, time limit, correctness, and details</u>	

The above information is the teaching process of the creativity development lesson plan from AI interview. The lesson plan is focus on giving knowledge to students, encourage students to apply the knowledge and have students work in group to promote engagement skills. The lesson plan and the step of teaching is reviewed 3 by three experts who agree in each teaching step. The process of teaching-learning activities is shown in figure 4.1

Figure 4.1: Teaching Process for Developing Students' Creativity Developed From AI 3Ds Interview

4.3.3 Impacts of Instructional Development Intervention on Students' Creativity

During the teaching - learning activities which the researcher implemented the developed IDI with students. The teaching process is taught for 4 hour. The topic of teaching was the using of Paint. The researcher asked 3 observers to observe the teaching and learning process to evaluate students' interaction while teaching. The observers had to evaluate students by completing the creativity observation forms and feedback on areas that they think should be improved. The evaluation results are presented as the following.

Table 4.8: Creativity Observation Results during teaching and learning activities developed from AI interview

Skills to be observed	**Conceptualization**	**Analytical task**	**Students' Engagement**	**Result-Orientation**
Percentage of interaction related to creativity dimensions in 4 areas	91.67	66.67	100	91.67
Interpretation of the percentage	The students' conceptualization skills could be developed in *high level* by implementing of teaching process developed from AI interview	The students' analytical task skills could be developed *in moderate* level by implementing of teaching process developed from AI interview	The students' engagement skills could be developed in *high level* by implementing of teaching process developed from AI interview	The students' result-orientation skills could be developed *in high level* by implementing of teaching process developed from AI interview

According to the 3 observers, the lesson plan can contribute students to have better skills in 4 areas. The lesson plan can contribute students to have 100 percent of engagement. The conceptualization and result-oriented are the second which accounted for 91.67 percent of students who develop their skills by the application of this lesson plan. Lastly, the lesson plan enhance students' analytical skills for 66.67 percent according to the observers.

Therefore, the teaching and learning activities developed by AI interview could be developed students' creativity in high level in three areas: conceptual thinking, students' engagement, and result-orientation development. It also provides students with analytical skills at a moderate level.

The observers also provide other suggestions and other comments for advantages and disadvantages of implementing of the teaching-learning activities as following;

Advantages of IDI teaching – learning activities

- Encourage students' to participate in class more
- Students are motivated to learn outside the box.
- You can apply for other subjects or other subjects.
- Students know what they are doing and what they are going to do.
- It is a good tools for helping students to plan things

Disadvantages of IDI teaching-learning activities

- The time of teaching is limited and should be longer in order to make students are more time to prepare tasks.

- Lazy students are rarely involved and teachers need clear instructions and guidelines.
- This teaching activity is good for classes with small numbers of students, as the teacher must individually guide the students.

Suggestions

- The teacher may need to divide the students into group of weak, moderate, and excellent learners and mix them when doing group work.
- The teacher may need to identify their own roles because some students cannot make their own decisions.
- The teacher must ensure that the classroom environment is motivated.
- Some students just want to play computer game, so the rules of the classroom should be controlled effectively.

Phase III: Post Instructional Development Intervention.

In this phase, the researcher investigated the different of students' creativity between before and after IDI. The researcher gave students the creativity assessment again to compare the results of pre and post IDI in order to answer the third research question which stated that;

Q3: What are the differences between before and after IDI?

4.4 Post Creativity Assessment after Implementation of IDI

After finishing implementing of IDI, the research assessed the students' creativity again to compare the results and gain some insight on the students' development of creativity. The results of post assessment are as following table;

Table 4.9: Post-IDI of Creativity Assessment Result

Class	Conceptualization		Analytical Tasks		Engagement		Result-Oriented		Average score and percentage by Class	
	Total (73)	**%**	**Total (4)**	**%**	**Total (4)**	**%**	**Total (84)**	**%**	**Total (165)**	**%**
4/1	20.71	28.37	3.50	87.50	3.39	84.75	30.21	35.96	**57.81**	**35.04**
4/2	19.59	26.84	3.63	90.75	2.94	703.50	27.18	32.36	**53.34**	**32.33**
4/3	22.01	30.15	3.06	76.50	2.36	59.00	29.73	35.36	**57.14**	**34.64**
The average score and percentage by creativity dimension	**20.77**	**28.45**	**3.40**	**84.92**	**2.90**	**72.42**	**29.04**	**34.57**	**48.96**	**34.00**

The research findings indicated that overall the students' creativity in post IDI were higher than those in pre-IDI. The average percentage of the four skills was 34 percent. The class with highest percentage was 4/1 (35.04) while 4/3 had a slight lower result. The class with lowest percentage was 4/2 accounted for 32.33 percent.

For Ideas' Conceptualization, there was the average of 28.45 percent overall. Class 4/3 had the highest result of 22.07 score. Class 4/1 was the second with 20.71 on average and the lowest class was 4/2 (19.59) Tasks analytical had a slight increase in number with 84.92 percent. The class with highest score was 4/2 (3.63). The class 4/1 was the second highest and 4/3 came the third (3.06). In Students' Engagement, class 4/1 showed highest result of 3.39 while 4/2 came in the second place (2.94) and 4/3 was the lowest (2.36). The average score was 2.90 with 72.42 percent. The Result-Orientation Development was 29.04 on average. The percentage of this section for three classes was

34.57 percent of correct answers. Class 4/1 had highest score 30.21, 4/3 (29.73) and 4/2 (27.14) accordingly.

4.5 Hypothesis Testing

Table 4.10: Idea' Conceptualization T-Test

Score	N	X	S.D	df	t	Sig.
Pre - Test	3	24.38	1.34	2	-21.07	.040
Post - Test	3	28.45	1.65			

*Statistically significant at the 0.05 level

According to the t-test of Idea's Conceptualization indicated that the students showed better performance after implementation of IDI. The mean of pre-IDI was 24.48 standard deviation of 1.34 and it increased to 28.45 with the standard deviation of 1.65 in post-IDI. The t-test showed the number of -2107 at 0.05 significant level.

Table 4.11: Analytical Tasks T-Test

Score	N	X	S.D	df	t	Sig.
Pre - Test	3	84.07	7.16	2	-1	.136
Post - Test	3	84.92	7.47			

*Statistically significant at the 0.05 level

In Analytical Tasks, the pre IDI and Post IDI result had a slight different result. The pre IDI mean was 84.07 with 7.16 standard deviation. The post IDI result had a slight increase with the number of mean 84.92 and standard deviation of 7.47. The t score was -1 at 0.05 significance level.

Table 4.12: Students' Engagement T-Test

Score	N	X	S.D	df	t	Sig.
Pre - Test	3	69.58	10.27	2	-1.85	.010
Post - Test	3	72.42	12.91			

*Statistically significant at the 0.05 level

The T-test of Students' Engagement showed the differences in the number of means between pre and post IDI. The pre IDI showed the mean of 69.58 (S.D=10.27) while in post IDI was 72.42 (S.D=12.91). The t value was -1.85 at 0.05 significant level.

Table 4.13: Result-Orientation Development T-Test

Score	N	X	S.D	df	t	Sig.
Pre - Test	3	29.78	1.90	2	-99.57	.025
Post - Test	3	34.57	1.94			

*Statistically significant at the 0.05 level

The last skills to be indicated is Result-Orientation Development. The result showed that the average score for 3 classes has increased from 29.78 (S.D=1.90) to 34.57 (S.D=1.94). The t score was -99.57 at 0.05 significance level.

After comparing the percentage of pre and post IDI assessment, the results are showed as following table.

Table 4.14: The comparison of percentage between pre and post IDI of 4 skills of creativity

Class	**Idea's Conceptualization**		**Analytical Tasks**		**Students' Engagement**		**Result-Orientation Development**	
	% Pre-IDI	**% Post-IDI**	**% Pre-IDI**	**% Post-IDI**	**% Pre-IDI**	**% Post-IDI**	**% Pre-IDI**	**% Post-IDI**
4/1	24.41	28.37	84.75	87.50	79.50	84.75	31.08	35.96

Table 4.14: The comparison of percentage between pre and post IDI of 4 skills of creativity

Class	Idea's Conceptualization		Analytical Tasks		Students' Engagement		Result-Orientation Development	
	% Pre-IDI	% Post-IDI	% Pre-IDI	% Post-IDI	% Pre-IDI	% Post-IDI	% Pre-IDI	% Post-IDI
4/2	23.03	26.84	90.75	90.75	70.25	73.50	27.60	32.36
4/3	25.70	30.15	76.50	76.50	59.00	59.00	30.67	35.39
Mean	24.38	28.45	84.07	84.92	69.58	72.42	29.78	34.37
Comparison		**+4.07**		**+0.85**		**+2.84**		**+7.59**

From the table showing above, the researcher found that the average percentage of pre and post IDI's assessments has increased. The result-orientation development was the skills that had the highest increase by 7.59 percent. The second was Idea's conceptualization with the increase of 4.07 percent. Students' engagement was 2.84 increase and the analytical task increase the lease with only 0.85 percent.

Form the comparison of t-test and percentage of pre and post IDI indicated that the hypotheses which state that "There is improvement in student's creativity before after and IDI's in computer subject primary 4" is accepted due to the fact of the results presented.

CHAPTER 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary of the findings

Phase I

In this phase the researcher has analyzed the findings of pre instructional development intervention by review literatures and providing creative assessment to students. The results showed that 29.42% of students were creative, which was considered low level. Class 4/1 had the highest score, accounting for 30.61 % of all 4 skills. The second is 4/3 (30.27) and 4/2 (28.14) consequently. The students' highest result was in analytical tasks skills while ideas conceptualization was the lowest.

Phase II

In this phase, the researcher organized appreciative inquiry (AI) interviews by using 3Ds' questions that were discovery, dream, and design. The results of the AI interview could be used to design the lesson plan for teaching-learning process to promote students' creativity as following;

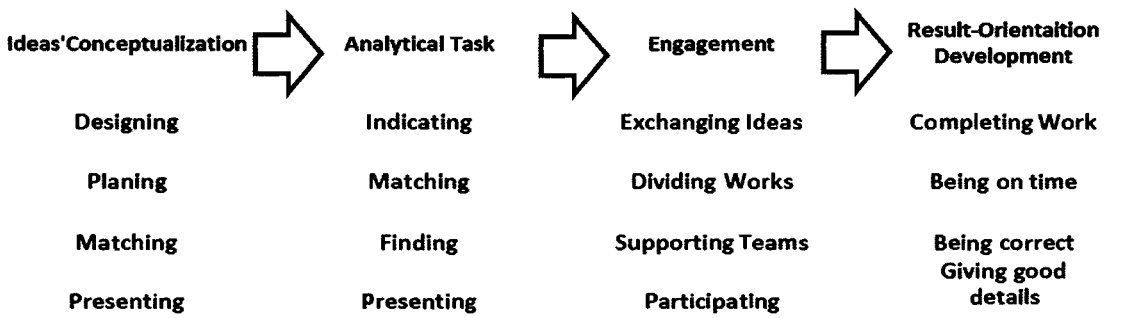

Figure 5.1: Teaching Process for Developing Students' Creativity

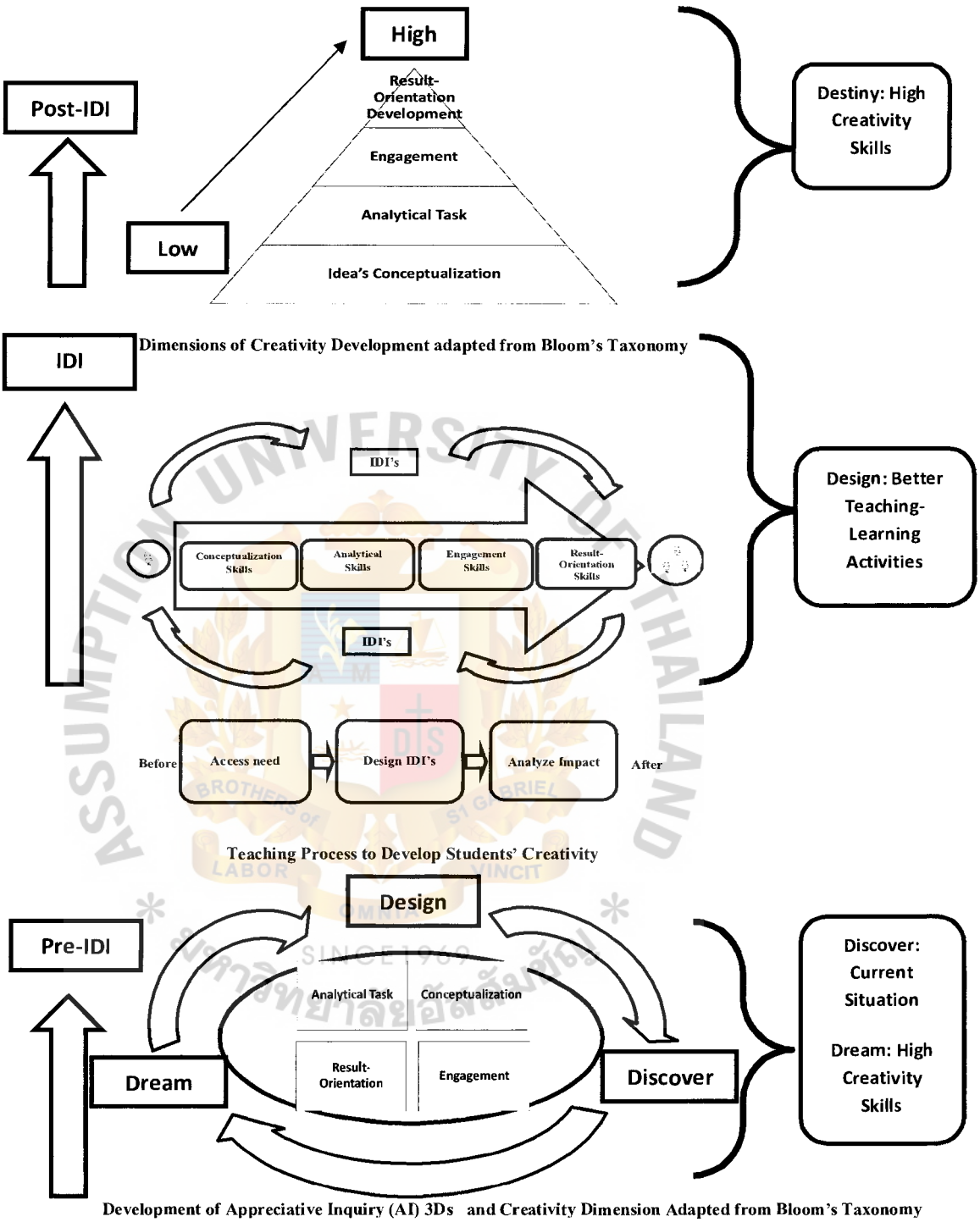

Figure 5.2 Process of Instructional Intervention Development and Key Themes

The teaching process designed from AI interview was applied with the students, during the teaching process the observers observe the students responding and find out

that the students shows the potential of the four skills. The lesson plan could contribute students to have 100 percent of engagement. The conceptualization and result-oriented were the second which accounted for 91.67 percent of students who develop their skills by the application of this lesson plan. Lastly, the lesson plan enhance students' analytical skills for 66.67 percent according to the observers. Therefore, the research can summarize the whole process of IDI as figure 5.2

Phase III

In this phase, there was an analysis of creativity assessment again to measure weather students' creativity was improve by the instructional development intervention developed from AI interview. The results indicated that students' creativity assessment in the post assessment was higher than those in pre-IDI. In the post-IDI, the results of average percentage was 34 which greater those in pre-IDI which was 29.42. The class with highest result was 4/1 (35.04). The second highest is 34.64 (4/3). The lowest is 4/2 (34.64).

5.2 Conclusion

The findings of the research indicated that the developed tools as IDIs that were applied to teach students were able to enhance their creativity in four areas; ideas' conceptualization, analytical tasks, students' engagement, and result-orientation. The pre-IDI and post IDI showed positive differences among the 4 skills. This can be concluded that the IDI had positive impacts on students' creativity. The result of pre-IDI and post-IDI were different in which post-IDI resulted in increase of number of creativity in all three classes. The number of measurement in every areas of four skills were higher than in

pre-IDI. The skills that developed the highest were students' engagement while the analytical tasks had lowest improvement.

5.3 Recommendations

5.3.1 Recommendations for practical use of the research findings

Teaching and learning activities- the recommendation for the application of the findings of this research are that the teachers can use the process of proposed teaching activities in their class with the topic that enhance their creativity.

Classroom environment- this teaching process is ideal for creating highly active environments that focus on student collaboration.

5.3.2 Recommendations for future research

1. The researchers who are interested in doing research on this topic may need to extend the data collection period to three or six months to see consistent progress of the results.

2. The teaching activities applied in this research with students in their youngest age are the most useful of this.

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APPENDICES

APPENDIX A

Letter of IOC Request

Assumption College Ubonratchathani
โรงเรียนอัสสัมชัญอุบลราชธานี
๕๐๐ ถ.ชยางกูร อุบลราชธานี ๓๔๐๐๐ โทร.๐-๔๔๒๔-๔๔๔๔ โทรสาร ๐-๔๕๓๑-๓๔๔๐

ที่ อสข 586/2559

11 ตุลาคม 2559

เรื่อง ขอความอนุเคราะห์ เป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือที่ใช้ในงานวิจัย

เรียน ผู้ช่วยศาสตราจารย์ ดร. เบญจลักษณ์ เมืองมีศรี
ผู้ช่วยศาสตราจารย์คณะเทคโนโลยีอุตสาหกรรม มหาวิทยาลัยราชภัฏวไลยอลงกรณ์ ในพระบรมราชูปถัมภ์ จังหวัดปทุมธานี

ด้วย นางวิภาวรรณ ทองสรรค์ นักศึกษาระดับบริญญาโท สาขาการจัดการองค์กร (Master degree in Management of Organizational Development) มหาวิทยาลัยอัสสัมชัญ ได้รับอนุมัติให้จัดทำงานวิจัยเรื่อง Improving student creativity through IDI's:A Case of computer subject primary4 งานวิจัยนี้ วัตถุประสงค์เพื่อศึกษาสภาพปัจจุบันด้านทักษะที่ส่งผลต่อความสร้างสรรค์ของนักเรียนชั้นประถมศึกษาปีที่ 4 ในรายวิชาคอมพิวเตอร์ นอกจากนี้งานวิจัยนี้ยังมุ่งเน้นเพื่อออกแบบ IDI ที่เหมาะสมในการพัฒนานักเรียน และยังมีวัตถุประสงค์เพื่อเปรียบเทียบผลทั้งก่อนและหลังการใช้ IDI โดยมีเครื่องมือที่ใช้ในงานวิจัยประกอบไปด้วย

1. คำชี้แจง AI สำหรับการสัมภาษณ์กลุ่ม
2. แบบทดสอบ pre test และ post-test
3. แบบสังเกตพฤติกรรมทักษะ
4. ทักษะของความสร้างสรรค์

เนื่องจากในการจัดทำการวิจัยในหัวข้อดังกล่าว จำเป็นต้องมีผู้เชี่ยวชาญเฉพาะในการตรวจสอบเครื่องมือที่ทำการวิจัย ซึ่งโรงเรียนอัสสัมชัญอุบลราชธานีผู้ให้ทุนการศึกษาได้พิจารณาหัวข้อการจัดทำงานวิจัยของนักศึกษาแล้วเห็นว่าท่านเป็นผู้เชี่ยวชาญในเรื่องดังกล่าว ดังนั้นโรงเรียนอัสสัมชัญอุบลราชธานี จึงขอความอนุเคราะห์ท่านเป็นผู้เชี่ยวชาญในการตรวจสอบเครื่องมือการทำวิจัยของนางวิภาวรรณ ทองสรรค์ ดังรายละเอียดที่ส่งมาพร้อม

ขอแสดงความนับถือ

(ภราดา ดร.ประวัติ สุทธินนท์)
ผู้อำนวยการโรงเรียนอัสสัมชัญอุบลราชธานี

ฝ่ายธุรการการเงิน โทรศัพท์ 0-4528-4444 ต่อ 411 โทรสาร 0-4531-3440

Assumption College Ubonratchathani
โรงเรียนอัสสัมชัญอุบลราชธานี

ที่ อสช 584/2559

11 ตุลาคม 2559

เรื่อง ขอความอนุเคราะห์เป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือที่ใช้ในงานวิจัย

เรียน ดร.ชุติวัน นามมั่น
อาจารย์ภาควิชาคณิตศาสตร์ สถิติและคอมพิวเตอร์ คณะวิทยาศาสตร์ มหาวิทยาลัยอุบลราชธานี
ปริญญาครุศาสตรดุษฎีบัณฑิต (เทคโนโลยีสารสนเทศ) มหาวิทยาลัยพระจอมเกล้าพระนครเหนือ

ด้วย นางปิยาภรณ์ ทองสรรค์ นักศึกษาระดับบริญญาโท สาขาการจัดการองค์กร (Master degree in Management of Organizational Development) มหาวิทยาลัยอัสสัมชัญ ได้รับอนุมัติให้จัดทำงานวิจัยเรื่อง Improving student creativity through IDI's:A Case of computer subject primary4 งานวิจัยนี้ วัตถุประสงค์เพื่อศึกษาสภาพปัจจุบันด้านทักษะที่ส่งผลต่อความสร้างสรรค์ของนักเรียนชั้นประถมศึกษาปีที่ 4 ในรายวิชาคอมพิวเตอร์ นอกจากนี้งานวิจัยนี้ยังมุ่งเน้นเพื่อออกแบบ IDI ที่เหมาะสมในการพัฒนานักเรียน และยังมีวัตถุประสงค์เพื่อเปรียบเทียบผลทั้งก่อนและหลังการใช้ IDI โดยมีเครื่องมือที่ใช้ในงานวิจัยประกอบไปด้วย

1. คำถาม AI สำหรับการสัมภาษณ์กลุ่ม
2. แบบทดสอบ pre-test และ post-test
3. แบบสังเกตพฤติกรรมทักษะ
4. ทักษะของความสร้างสรรค์

เนื่องจากในการจัดทำงานวิจัยในหัวข้อดังกล่าว จำเป็นต้องมีผู้เชี่ยวชาญเฉพาะในการตรวจสอบเครื่องมือที่ทำการวิจัย ซึ่งโรงเรียนอัสสัมชัญอุบลราชธานีผู้ให้ทุนการศึกษาได้พิจารณาหัวข้อการจัดทำงานวิจัยของนักศึกษาแล้วเห็นว่าท่านเป็นผู้เชี่ยวชาญในเรื่องดังกล่าว ดังนั้นโรงเรียนอัสสัมชัญอุบลราชธานี จึงขอความอนุเคราะห์ท่านเป็นผู้เชี่ยวชาญในการตรวจสอบเครื่องมือการทำวิจัยของนางปิยาภรณ์ ทองสรรค์ ดังรายละเอียดที่ส่งมาพร้อม

จึงเรียนความมานี้

ขอแสดงความนับถือ

(ดร.ดารา ดร.ประวิติ สุทธินนท์)
ผู้อำนวยการโรงเรียนอัสสัมชัญอุบลราชธานี

ฝ่ายธุรการการเงิน โทรศัพท์ 0 4528 4444 ต่อ 411 โทรสาร 0 4531 344

Assumption College Ubonratchathani
โรงเรียนอัสสัมชัญอุบลราชธานี

ที่ อสช 585/2559

11 ตุลาคม 2559

เรื่อง ขอความอนุเคราะห์เป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือที่ใช้ในงานวิจัย

เรียน นางจิราพร ปรีชาพรประเสริฐ
ผู้อำนวยการโรงเรียนเทศบาลวารินวิชาชาติ

ด้วย นางวิภาวรรณ ทองสรรค์ นักศึกษาระดับปริญญาโท สาขาการจัดการองค์กร (Master degree in Management of Organizational Development) มหาวิทยาลัยอัสสัมชัญ ได้รับอนุมัติให้จัดทำงานวิจัยเรื่อง Improving student creativity through IDI's:A Case of computer subject primary4 งานวิจัยนี้ วัตถุประสงค์เพื่อศึกษาสภาพปัจจุบันด้านทักษะที่ส่งผลต่อความสร้างสรรค์ของนักเรียนชั้นประถมศึกษาปีที่ 4 ในรายวิชาคอมพิวเตอร์ นอกจากนี้งานวิจัยนี้ยังมุ่งเน้นเพื่อออกแบบ IDI ที่เหมาะสมในการพัฒนานักเรียน และยังมีวัตถุประสงค์เพื่อเปรียบเทียบผลทั้งก่อนและหลังการใช้ IDI โดยมีเครื่องมือที่ใช้ในงานวิจัยประกอบไปด้วย

1. คำถาม IDI สำหรับการสัมภาษณ์กลุ่ม
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เนื่องจากในการจัดทำงานวิจัยในหัวข้อดังกล่าว จำเป็นต้องมีผู้เชี่ยวชาญเฉพาะในการตรวจสอบเครื่องมือที่ทำการวิจัย ซึ่งโรงเรียนอัสสัมชัญอุบลราชธานีผู้ให้ทุนการศึกษาได้พิจารณาหัวข้อการจัดทำงานวิจัยของนักศึกษาแล้วเห็นว่า ดร.ณเรียศักดิ์ ทองสอด จึงเป็นบุคลากรในหน่วยงานของท่าน เป็นผู้เชี่ยวชาญในเรื่องดังกล่าว ดังนั้นโรงเรียนอัสสัมชัญอุบลราชธานี จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการขออนุญาตให้ ดร.ณเรียศักดิ์ ทองสอด เป็นผู้เชี่ยวชาญในการตรวจสอบเครื่องมือการทำวิจัยของนางวิภาวรรณ ทองสรรค์ ดังรายละเอียดที่ส่งมาพร้อม

จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ด้วย จักขอบคุณยิ่ง

ขอแสดงความนับถือ

(ราชาคม ศรีประวัติ สุทธินนท์)
ผู้อำนวยการโรงเรียนอัสสัมชัญอุบลราชธานี

ฝ่ายธุรการการเงิน โทรศัพท์ 0-4528-4444 ต่อ 411 โทรสาร 0-4531-3449

APPENDIX B

IOC Results

Index of Item-Objective Congruence: IOC

AI Interview Script

Item	Expert 1	Expert 2	Expert 3	Total	IOC
1	1	1	1	3	1
2	1	1	1	3	1
3	1	1	1	3	1
4	1	1	1	3	1

Observation Form

Item	Expert 1	Expert 2	Expert 3	Total	IOC
1	1	1	1	3	1
2	1	1	1	3	1
3	1	1	1	3	1
4	1	1	1	3	1
5	1	1	1	3	1
6	1	0	1	2	0.67
7	1	1	1	3	1
8	1	1	1	3	1
9	1	1	1	3	1
10	1	1	1	3	1
11	1	1	1	3	1
12	1	1	1	3	1
13	1	1	1	3	1
14	1	1	1	3	1
15	1	0	1	2	0.67
16	1	0	1	2	0.67

Pre-test/Post-test

Item	Expert 1	Expert 2	Expert 3	Total	IOC
1	1	0	1	2	0.66
2	1	0	1	2	0.66
3	1	0	0	1	0.33
4	1	0	1	2	0.66
5	1	1	1	3	1
6	1	1	1	3	1
7	0	1	1	2	0.66
8	0	1	1	2	0.66
9	1	1	1	3	1
10	0	1	1	2	0.66
11	0	1	1	2	0.66
12	1	1	1	3	1
13	1	1	1	3	1
14	1	1	1	3	1
15	1	1	1	3	1
16	1	1	1	3	1

Lists of Experts:

1. Dr. Takietkamol Tongngok

   Field of expertise: Measurement and Evaluation of Education (Chulalongkorn University)

   Working at: Educational Specialist at Warinchumrab Administration Office

2. Prof. Chatchawin Nammun (Ph.D.)

   Field of expertise: Mathematics, Statistics and Computer Science

   Working at: Ubon Ratchathani University

3. Asst. Prof. Benchalak Muangmeesri (Ph.D)

   Field of expertise: Technology Management

   Working at: Rajabhat Walaialongkorn University

Index of Item-Objective Congruence: IOC

The criteria are as follows:

+1 means the question is congruent with the objectives

0 means the question is uncertain to be congruent with the objectives

-1 means the question is not congruent with the objectives

Pre-test/Post-test

Items	Level of Assessment		
	1	0	-1
1. Draw a face that express the feelings (C1= Visualize ideas)			
2. Draw the sad face as many as possible. (C2= generate ideas)			
3. What do these faces mean? (C3= interrelate ideas)			
4. Draw the feeling you have now. (C4= communicate ideas)			
5. How many balloons are there in the picture? (A1= observe)	✓		
6. [illegible] in the picture? (A2= pay attention)	✓		
7. What is the name the vehicle the girls is riding? (A3 = search information)	✓		
8. Why is the girl smiling? (A4= understand)	✓		
9. [illegible] you do when you friends in the group are giving his [illegible]	✓		
10. [illegible] have good ideas which you think [illegible] should you do? (E2= accept)	✓		
11. [illegible] What	✓		
	✓		

Index of Item-Objective Congruence: IOC

The criteria are as follows:

+1 means the question is congruent with the objectives

0 means the question is uncertain to be congruent with the objectives

-1 means the question is not congruent with the objectives

Observation Form

Items	Level of Assessment		
	1	0	-1
The student can visualize ideas	✓		
The student can generate ideas	✓		
The student can interrelate ideas	✓		
The student can communicate ideas	✓		
[illegible] student's tools	✓		
[illegible] to the class. Analytical skill		✓	
[illegible] information. (by asking friend, teacher when	✓		
[illegible] what they are doing.	✓		
[illegible]	✓		
[illegible] idea.	✓		
[illegible]	✓		
[illegible]	✓		
	✓		
	✓		
		✓	
		✓	Dump

Items	Level of Assessment		
	1	0	-1
[redacted]			
R1 = complete task Give 1 if the student can complete the test. Give 0 if the student cannot complete the test	✓		
R2 = manage time Give 1 if the student can complete the test on time. Give 0 if the student cannot complete the test on time.	✓		
(R3:manage accuracy) Put the total number of correct answers the student can do.	✓		
(R4= manage details) Give 1 if the student does the test neatly and clearly. Give 0 if the student doesn't do the test neatly and clearly.	✓		

Index of Item-Objective Congruence: IOC

The criteria are as follows:

+1 means the question is congruent with the objectives

0 means the question is uncertain to be congruent with the objectives

-1 means the question is not congruent with the objectives

AI Interview Script

Interview Questions for Computer Teachers	Level of Assessment		
	1	0	-1
Section 1: *Discover*			
1. What was your best experience with your teaching-learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development	✓		
2. How did you do to your teaching- learning activities to improve/ enhance student in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development	✓		
Section 2: *Dream*			
3. In the future, what will be your better experience with your teaching- learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development	✓		
Section 3: *Design*			
4. In the future, how will you design the better teaching-learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development	✓		

Index of Item-Objective Congruence: IOC

AI Interview Script

Items	Level of Assessment		
	1	0	-1
Section 1: *Discover* What was your best experience with your teaching- learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development			
How did you do to your teaching- learning activities to improve/ enhance student in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development			
Section 2: *Dream* In the future, what will be your better experience with your teaching- learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development			
Section 3: *Design* In the future, how will you design the better teaching- learning activities to improve/ enhance students in term of: Ideas' Conceptualization, Analytical Tasks, Students' Engagement, Task-Orientation Development			

Index of Item-Objective Congruence: IOC

Observation Form

NO.	Item	Level of Assessment		
		1	0	-1
Conceptualization Skills				
1	The student can visualize ideas			
2	The student can generate ideas			
3	The student can interrelate ideas			
4	The student can communicate ideas			
Analytical Skills				
1	The student can observe paint's tools			
2	The student can pay attention to the class.			
3	The student can search information. (by asking friend, teacher when he/she have problems)			
4	The student understands what they are doing.			
Engagement Skills				
1	The student listens to group members.			
2	The student accepts other members' idea.			
3	The student supports the works of team.			
4	The student takes part of group activities.			
Results-Orientation Skills				
1	The student can complete the task.			
2	The student can finish the task on time.			
3	The student work on task correctly.			
4	The student can give details the task.			

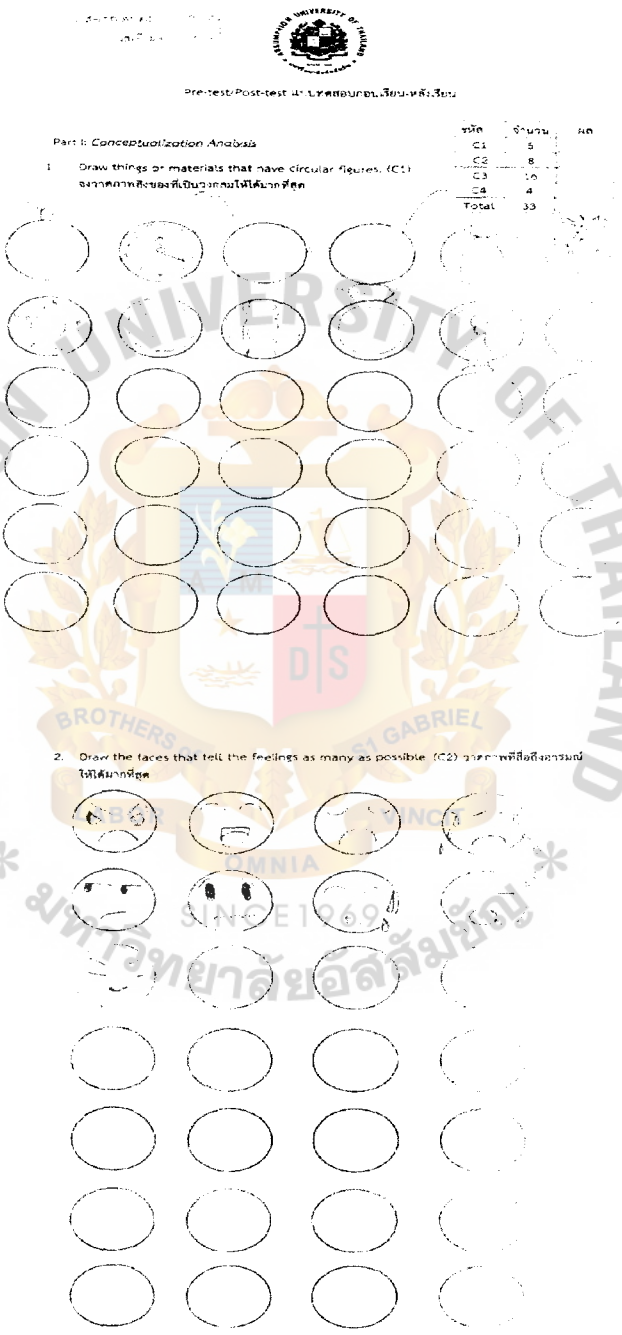
Index of Item-Objective Congruence: IOC

Pre-test/Post-test

Items	Level of Assessment		
	1	0	-1
Section 1: *Conceptualization Skills*			
Draw a face that express the feelings (C1= Visualize ideas)			
Draw the sad face as many as possible. (C2= generate ideas)			
What do these faces mean? (C3= interrelate ideas)			
Draw the feeling you have now. (C4= communicate ideas)			
Section 2: *Archival Skills*			
How many balloons are there in the picture? (A1= observe)			
Are there cars in the picture? (A2= pay attention)			
What is the name the vehicle the girls is riding? (A3 = search information)			
Why is the girl smiling? (A4= understand)			
Section 3: *Engagement Skills*			
What should you do when you friends in the group are giving his ideas? (E1= listen)			
When you friend in your group have good ideas which you think is better than your idea, what should you do? (E2= accept)			
When your friends in the group decide to do a group work, what should you do? (E3= support)			
What should you do when you have to do a group work? (E4 = take part)			
Section 4: *Results- orientation Skills*			
R1= complete task Give 1 if the student can complete the test. Give 0 if the student cannot complete the test			
R2 = manage time Give 1 if the student can complete the test on time. Give 0 if the student cannot complete the test on time.			
R3:manage accuracy) Put the total number of correct answers the student can do.			
R4= manage details) Give 1 if the student does the test neatly and clearly. Give 0 if the student doesn't do the test neatly and clearly.			

APPENDIX C

Example: Pre-test/Post-test



Pre-test/Post-test ก่อน-หลังเรียน

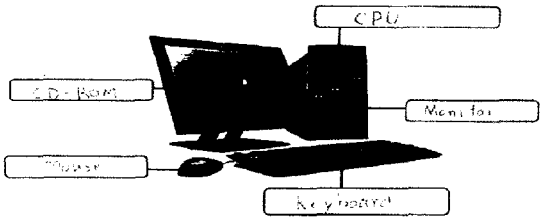
รหัส	จำนวน	คะ
C1	5	
C2	8	
C3	16	
C4	4	
Total	33	

Part I: *Conceptualization Analysis*

1. Draw things or materials that have circular figures. (C1)
วาดภาพสิ่งของที่เป็นวงกลมให้ได้มากที่สุด

2. Draw the faces that tell the feelings as many as possible. (C2) วาดภาพที่สื่อถึงอารมณ์ให้ได้มากที่สุด

3 Match the part of computers with their names? (C3) จงจับคู่ชิ้นส่วนของคอมพิวเตอร์กับชื่อของมัน



CD-ROM	CPU	Monitor	Mouse	Keyboard

4 Write the output of the following input and process. (C4) จงบอกผลลัพธ์จากกระบวนการต่อไปนี้

Input	Processing	Output
		
Film	Camera	Picture

Cake better	Oven	
Bread	toasting	
Ice cream/Milk	Blender	
Chopped Meat	Cooking	

Part II. Analytical Skills Analysis

Use this picture for question 5-6 ใช้ภาพนี้ตอบคำถามข้อ

รหัส	จำนวน	คำ
A1	3	
A2	1	
A3	1	
A4	1	
Total	6	

5. How many balloons are there in the picture? (A1) มีลูกโป่งกี่ลูก

6 Are there car in the picture? (A2) มีรถอยู่ในรูปภาพหรือไม่

Use this picture for question 7-8 [illegible]

7. What is the name the vehicle the girls is riding? (A3) [illegible]

a. [illegible] b. [illegible] c. Motor Cycle d. [illegible]

8. Why is the girl smiling? (A4) เพราะเหตุเด็กผู้หญิงจึงยิ้ม

a. She is sad because she must hold the ball [illegible]
[illegible]

b. She is excited because she can catch the ball [illegible]
[illegible]

c. She is happy because she can play with the ball [illegible]
[illegible]

d. She is sad because she [illegible] friends to play with [illegible]
[illegible]

Part III: *Engagement Skills Analysis*

9. What should you do when you friends in the group are giving his ideas? (E1)

เราควรทำอย่างไรเมื่อเพื่อนเสนอความคิดเห็น

a. Playing [illegible]

b. [illegible]

c. Ignore him [illegible]

d. Listen [illegible]

รหัส	จำนวน	ผล
E1	1	
E2	1	
E3	1	
E4	1	
Total	4	

10. When you friend in your group have good ideas which you think is better than your idea, what should you do? (E2)

เมื่อเพื่อนในกลุ่มเสนอข้อคิดเห็นที่เราคิดว่าดีกว่าความคิดเรา เราควรทำอย่างไร

a. Tell other friends that [illegible] idea is better [illegible]

b. [illegible]

c. Accept his idea [illegible]

d. Ignore his idea [illegible]

11. When your friends in the group decide to do a group work, what should you do? (E3) เมื่อเพื่อนในกลุ่มต้องทำงานกลุ่มเราควรทำอย่างไร

a. Play with other friends in other group [illegible]

b. Participate in the group work [illegible]

c. Do your [illegible]

d. Sleep [illegible] and let your friend do the work [illegible]

12. What should you do when you have to do a group work? (E4)

เราควรทำอย่างไรเมื่อเพื่อกำลังทำงานกลุ่ม

a. Help your friends [illegible]

b. Do your own work [illegible]

c. Ignore your group member who you don't [illegible]

d. Play with your friends [illegible]

APPENDIX D

The AI 3Ds Interview answer

Section1: *Discovery*

- **What was your best experience with your teaching- learning activities to improve/ enhance students in term of:**

a) Ideas' Conceptualization

C1: Visualized Ideas	• Students can have various imagination on the tasks given by teachers • Student have picture in their mind frequently when doing something.
C2: Generate Ideas	• Students can design their own style of assignment which different from others.
C3: Interrelate Ideas	• Students can apply what they have be taught with other things. • Students can apply their knowledge with other subjects
C4: Communicate Ideas	• Students can communicate their ideas with their friends.

b) Analytical Tasks

A1: Observe	• Students can plan to the tasks according to the demonstration of the teachers. • Students learn to be aware of their surroundings. • The students can analyze the process of doing task and if there is problem, they can identify what are the cause
A2: Attention	• Students pay attention to the details and listen carefully throughout the process of teaching. • Students are highly motivated to learn
A3: Search Information	• Students curiously want to know what the answers are, and they try to search for the answer from many sources before making decision.
A4:Understand	• Students highly understand what have been taught.

c) Students' Engagement

E1:Listen	• Students listen to other people.
E2:Accept	• Students accepts other people ideas which is better or majority of people accept. • Students accepts whatever tasks their team assigning to them to do.
E3:Support	• Students happily help their team to finish the task. • Students think about their group's benefit first.
E4:Take Part	• Students are motivated to participate in class activity or any activities the teacher tell them to do.

d) Result –Orientation Development

R1:Complete	• Students can complete the task perfectly. • Students do not copy their friends 'works. • Their work can contribute to new ideas or new invention which can be used in reality.
R2:On-time	• Students finish their work on time.
R3:Correct	• Most of the tasks that the students do are correct or meet the criteria that the teacher set. • Students know their tasks very well. They can answer what are the weakness or the strength.
R4:Details	• Students' works are tidy and reflect new things which can be used in real life. • Students must be proud of their tasks.

- **How did you do to your teaching- learning activities to improve/ enhance student in term of:**

a. Ideas' Conceptualization

C1:Visualized Ideas	• Drawing
C2:Generate Ideas	• Project base learning • Lesson short note
C3:Interrelate Ideas	• Mind Map • Matching Game
C4:Communicate Ideas	• Presentation

b. Analytical Tasks

A1:Observe	• Indicating the roles of each items • Differentiate things, object, or types • Compare things, objects, quality, or types
A2:Attention	• Project base learning • Matching Game
A3:Search Information	• Report writing • Finding Facts
A4:Understand	• Presentation • Making conclusion • Drawing of what they learn

c. Students' Engagement

E1:Listen	• Group activity • Game Based Learning
E2:Accept	• Divide work for each member by their special skills
E3:Support	• Game Based Learning • Group activity
E4:Take Part	• Game Based Learning • Group Activity • Project Based Learning

d. Result-Orientation Development

R1:Complete	• Group activity • Game Based Learning • Project Based Learning • Individual Test • Presentation • Reports
R2:On-time	
R3:Correct	
R4:Details	

Section 2: *Dream*

- **In the future, what will be your better experience with your teaching-learning activities to improve/ enhance students in term of:**

a) Ideas' Conceptualization

C1 : Visualized Ideas	• The teacher make student be able to imagine beyond their knowledge. • Students have positive attitude towards learning new thing. • Student are motivated to learn. • Students can have new ideas to solve problems. • Students have different ideas from other people and they are proud to show it off.
C2 : Generate Ideas	• Students are able to apply what they have learn in their real life.
C3 : Interrelate Ideas	• Students can invent new things that can be used in real life.
C4 : Communicate Ideas	• Students can reflect what they think and tell it to other people.

b) Analytical Tasks

A1 : Observe	• Students know what is going on around them, what are the problems , and realize how these problem can be solved
A2 : Attention	• Students pay attention to the details and listen carefully throughout the process of teaching or given tasks.
A3 : Search Information	• Students curiously want to know what the answers are, and they try to search for the answer from many sources before making decision.
A4 : Understand	• Students highly understand what have been taught. • Students know what are important to them from the past to the present and what will result in the future.

c) Students' Engagement

E1 : Listen	• Students listen to other people.
E2 : Accept	• Students accepts other people ideas which is better or majority of people accept. • Students accepts whatever tasks their team assigning to them to do. • Student adapt themselves to new things quickly and confidently.
E3 : Support	• Students happily help their team to finish the task. • Students think about their group's benefit first.
E4 : Take Part	• Students are motivated to participate in class activity or any activities the teacher tell them to do. • Teacher want students participate more in the class activity and give ideas more. • Student share their opinions more to the class.

d) Result –Orientation Development

R1 : Complete	• Students can complete the task perfectly. • Students do not copy their friends 'works. • Their work can contribute to new ideas or new invention which can be used in reality.
R2 : On-time	• Students finish their work on time.
R3 : Correct	• Most of the tasks that the students do are correct or meet the criteria that the teacher set. • Students know their tasks very well. They can answer what are the weakness or the strength.
R4 : Details	• Students' works are tidy and reflect new things which can be used in real life. • Students must be proud of their tasks.

Section 3: *Design*

- **In the future, how will you design the better teaching- learning activities to improve/ enhance students in term of:**

a. Ideas' Conceptualization

C1 : Visualized Ideas	• More drawing activity
C2 : Generate Ideas	• Project base learning • Lesson short note
C3 : Interrelate Ideas	• Mind Map • Matching Game
C4 : Communicate Ideas	• Presentation

b. Analytical Tasks

A1 : Observe	• Indicating the roles of each items • Differentiate things, object, or types • Compare things, objects, quality, or types
A2 : Attention	• Project base learning • Matching Game
A3 : Search Information	• Report writing • Finding Facts
A4 : Understand	• Presentation • Making conclusion • Drawing of what they learn

c. Students' Engagement

E1 : Listen	• More Group activity • More Game Based Learning
E2 : Accept	• Divide work for each member by their special skills • Exchange Ideas activity
E3 : Support	• Game Based Learning • Group activity
E4 : Take Part	• Game Based Learning • Group Activity • Project Based Leaning

d. Result-Orientation Development

R1 : Complete R2 : On-time R3 : Correct R4 : Details	• Group activity • Game Based Learning • Individual Test • Presentation • Reports • Give more courage to students to finish task within the given time • Publicize more of students' works

The AI 3Ds Interview

Section1: *Discovery*

1. What was your best experience with your teaching- learning activities to improve/ enhance students in term of:
ประสบการณ์ที่ดีที่สุดในการจัดการเรียนการสอนเพื่อพัฒนาทักษะ ทั้งสี่ด้าน อย่างไร

   a) Ideas' Conceptualization (ทักษะด้านการจินตนาการ ด้านการสร้างแนวความคิด)

   b) Analytical Tasks (ทักษะด้านวิเคราะห์)

   c) Students' Engagement (ทักษะด้านการมีส่วนร่วม)

   d) Result-Orientation Development (ทักษะด้านการพัฒนาผลลัพธ์)

2. How did you do to your teaching- learning activities to improve/ enhance student in term of:
คุณมีกิจกรรมการเรียนการสอนอย่างไรที่นำมาใช้พัฒนาทักษะทั้งสี่ด้านดังนี้

   a) Ideas' Conceptualization (ทักษะด้านการจินตนาการ ด้านการสร้างแนวความคิด)

a) Analytical Tasks (ทักษะด้านวิเคราะห์)

b) Students' Engagement (ทักษะการมีส่วนร่วม)

c) Result-Orientation Development (ทักษะด้านการพัฒนาผลลัพธ์)

Section 2: *Dream*

3. In the future, what will be your better experience with your teaching- learning activities to improve/ enhance students in term of:
ในอนาคตคุณประสบการณ์เรียนการสอนแบบใดที่คุณคิดว่าจะเป็นประสบการณ์การเรียนการสอนที่ดีกว่าในการพัฒนาทักษะทั้งสี่ด้าน

a) Ideas' Conceptualization (ทักษะด้านการจินตนาการ ด้านการสร้างแนวความคิด)

a) Analytical Tasks (ทักษะด้านวิเคราะห์)

b) Students' Engagement (ทักษะการมีส่วนร่วม)

b) Result-Orientation Development (ทักษะด้านการพัฒนาผลลัพธ์)

Section 3: *Design*

4. In the future, how will you design the better teaching- learning activities to improve/ enhance students in term of:

ในอนาคตคุณจะออกแบบกิจกรรมการเรียนการสอนที่ดีๆอย่างไรเพื่อพัฒนาทักษะทั้งสี่นี้

a) Ideas' Conceptualization (ทักษะด้านการจินตนาการ ด้านการสร้างแนวความคิด)

b) Result-Orientation Development(ทักษะด้านการพัฒนาผลลัพธ์)

c) Analytical Tasks (ทักษะด้านวิเคราะห์)

d) Students' Engagement (ทักษะการมีส่วนร่วม)

APPENDIX E

Lesson Plan

Experts' Agreement on Activities to Develop Students' Creativity

1. Ideas' Conceptualization

C1:Visualized Ideas	• Designing
C2:Generate Ideas	• Planning
C3:Interrelate Ideas	• Matching
C4:Communicate Ideas	• Presenting

2. Analytical Tasks

A1:Observe	• Indicating
A2:Attention	• Matching
A2:Search Information	• Finding
A3:Understand	• Presenting (By making conclusion or drawing mind-map)

3. Students' Engagement

E1:Listen	• Exchange Idea
E2:Accept	• Divide work
E3:Support	• Support team
E4:Take Part	• Be participate

4. Result-Orientation Development

Evaluate Students' Work by the completed works, time limit, correctness, and details.

Teaching Method Developing from AI 3D's Interviews

Step 1: Developing of Conceptualization Skills (1 hour)

C1:Visualized Ideas	• Design the picture by using Paint
C2:Generate Ideas	• Plan of what to draw by using size and shape
C3:Interrelate Ideas	• Develop the picture to make a story
C4:Communicate Ideas	• Present the story to class

Step 2: Developing of Analytical Tasks (1hour)

A1:Observe	• Indicate the drawing tools in Paint and their application
A2:Attention	• Match the tools and its uses on the exercise
A2:Search Information	• Find Facts: Exchange answers and search for correctness
A3:Understand	• Drawing of what they learn

Step 3: Develop Students' Engagement and Pursuit of Result Orientation Development (2hours)

E1:Listen	• Group activity: Developing Picture of My Future School By Paint
E2:Accept	• Divide work for each member by their special skills
E3:Support	• Let the students do their task to support their group
E4:Take Part	• Observe their group activity and students participation

Step 4: Evaluate Students' Work by the completed works, time limit, correctness, and details.

Saint Gabriel's Foundation

Lesson Plan in Computer

Lesson No. 4 Primary 4/ Semester 1

Date of Delivery: _____ Teacher:

Miss.WipawanThongsan

I. Objectives

At the end of this activity, the students should be able to:

1. Start Paint program
2. Use Line, Oval, Rectangle and Eraser tools
3. Select colors and fill the pictures drawn
4. Have conceptualization and analytical skills
5. Work with team
6. Complete the tasks on time

II. Subject – Computers

Topic: Fun with Paint

Reference: My World of Computers

Resources: Computer, Projector, PowerPoint Presentation on "Fun with Paint"

III. Learning Process

Teacher's Activity	Students' Activity
A. Developing of Conceptualization Skills	
Visualized Idea • Explain how to open Paint • Parts of Paint Window • Various tools and their use **Contents:** **1. Explain what is** Microsoft Paint **and how to open it**. • Paint is a program using which you can draw and paint pictures. • To open Paint, click on **Start** button→ **All Programs** → **Accessories** → **Paint**. **2. What are the parts of Paint Window?** • Drawing area – It is the white area in the Paint window. This is the place where we can draw. • Ribbon – It is the strip of buttons and icons located above the Drawing area. • Tabs - The Ribbon contains 2 tabs. Each tab has several groups. • Group - Commands with common purpose are grouped together under a single name. Each tab contains several groups. **3. What are the tools used in Paint?** • Pencil tool – It is used for drawing thin lines and curves. • Eraser tool - It is used to erase or rub out any part of the drawing. • Brush tool – It is used to paint thick lines and curves. • Airbrush tool - It sprays the chosen	**Visualized Ideas** • Design the picture by using Paint **Generate Idea** • Plan of what to draw by using size and shape **Interrelate Ideas** • Develop the picture to make a story **Communicate Ideas** • Present the story to class
A. Developing of Conceptualization Skills	
• Line tool – It is used to draw straight lines. • Rectangle tool - It is used to draw rectangles and squares. • Oval tool – It is used to draw circles and ellipses. • Fill With Color tool – It fills a closed	

area with the chosen color. • Polygon tool – It is used for drawing figures with three or more sides. **Generate Idea** • The teacher tells students to plan of what to draw by using size and shape **Interrelate Ideas** • The teacher tells students to develop the picture to make a story **Communicate Ideas** • The teacher tell students to present the story to class	
B: Developing of Analytical Tasks (1hour)	
Observe • The teacher tells students to indicate the drawing tools in Paint and their application **Attention** • The teacher tells the students to match the tools and its uses on the exercise	**Observe** • Indicate the drawing tools in Paint and their application **Attention** • Match the tools and its uses on the exercise
B: Developing of Analytical Tasks (1hour)	
Search Information • The teacher tells students to find facts by exchanging answers and search for correctness **Understand** • The teacher tells students to draw of what they learn	**Search Information** • Find Facts: Exchange answers and search for correctness **Understand** • Drawing of what they learn
C: : Develop Students' Engagement and Pursuit of Result Orientation Development (2hours)	
Listen • The teacher asks students to do group activity: Developing Picture of My Future School By Paint **Accept** • The teacher divides work for each member by their special skills	**Listen** • Group activity: Developing Picture of My Future School By Paint **Accept** • Divide work for each member by their special skills

Support • The teacher lets the students do their task to support their group **Take Part** • The teacher observes their group activity and students participation	**Support** • Let the students do their task to support their group **Take Part** • Observe their group activity and students participation
D: Task –Orientation Evaluation	
The teacher evaluates students' work by the checking completed works, time limit, correctness, and details.	

IV. Assessment Strategy

1. Creativity Observation Form
2. Pre and Post test
3. Creativity Assessment

V. Follow-up Strategy

Complete the activities of "Just for Fun"

Noted by: Approved by:

(Miss.Wipawan Thongsan) (Miss.Siriphat Kaenjun)

Teacher Head, Career and technology

Creativity Observation Form

Instruction: Please √ in the box which match with *students' behaviors* in the class activities.

NO.	Criteria	Yes	No	Note
	Conceptualization Skills			
1	The student can visualize ideas			
2	The student can generate ideas			
3	The student can interrelate ideas			
4	The student can communicate ideas			
	Analytical Skills			
1	The student can observe paint's tools			
2	The student can pay attention to the class.			
3	The student can search information. (by asking friend, teacher when he/she have problems)			
4	The student understands what they are doing.			
	Engagement Skills			
1	The student listens to group members.			
2	The student accepts other members' idea.			
3	The student supports the works of team.			
4	The student takes part of group activities.			
	Result-Orientation Skills			
1	The student can complete the task.			
2	The student can finish the task on time.			
3	The student work on task correctly.			
4	The student can give details the task.			
	Total			

Lesson Plan Evaluation Form

Subject.....Class.....

Lesson Plan no.....Topic..... Time.....Hour

Item	Criteria	Score				
		5	4	3	2	1
1	The lesson plan is complete and appropriate with details.					
2	The lesson plan is related to the topic.					
3	The lesson plan is well arranged.					
4	The contents of the lesson plan is correct.					
5	The lesson covers all the important details.					
6	The objectives are clearly indicated.					
7	The lesson plan requires appropriate time.					
8	The learning objectives and the contents are matched.					
9	The learning activities are related to the objective and the students' ages.					
10	The learning activities are varied and applicable.					
11	The learning activities promote students' creativities.					
12	The learning activities focus on practical learning.					
13	The learning activities enhance ethical values					
14	The teaching materials are varied.					
15	The teaching materials match with the contents.					
16	Students are able to use the teaching materials by themselves.					
17	The evaluations match with the objectives.					

Criteria

5 excellence 4 very good 3 good
2 moderate 1 need to be improved

Suggestions

Contents.....

.....

Learning Activities.....

.....

Evaluation.....

.....

.....

Others (Please specify).....

.....

.....

(Signed).....Evaluator

(.....)

……/……/……..

Improve of lesson plan

.....

.....

.....

.....

(Signed).....Teacher

(.....)

……/……/……..

APPENDIX F

SPSS Data

ตารางสรุป Pre-test

Class	Conceptualization	Analyze	Engagement	Task-Oriented	Total	The average percentage
4/1	17.82	3.39	3.18	26.11	50.50	30.61
4/2	16.81	3.63	2.81	23.18	46.43	28.14
4/3	18.76	3.06	2.36	25.76	49.94	30.27
Average	17.80	3.36	2.78	25.02	48.96	29.67
Full score	73.00	4.00	4.00	84.00	165.00	
The average percentage	24.38	84.00	69.58	29.78	51.94	

ตารางสรุป Post-test

Class	Conceptualization	Analyze	Engagement	Task-Oriented	Total	The average percentage
4/1	20.71	3.5	3.39	30.21	57.81	35.04
4/2	19.59	3.63	2.94	27.18	53.34	32.33
4/3	22.01	3.06	2.36	29.73	57.16	34.64
Average	20.77	3.40	2.90	29.04	56.10	34.00
Full score	73.00	4.00	4.00	84.00	165.00	
The average percentage	28.45	84.92	72.42	34.57		

ผลการทดสอบทางสถิติ (Statistics Analysis)

T-Test

T-TEST PAIRS=Pretest WITH Posttest (PAIRED)

/CRITERIA=CI(.9500)

/MISSING=ANALYSIS.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	29.6733	3	1.33874	.77292
	Posttest	34.0033	3	1.46289	.84460

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	3	1.000	.006

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pretest - Posttest	-4.33000	.12490	.07211	-4.64027	-4.01973	-60.046	2	.000

มีความแตกต่างกันทางสถิติ ที่ระดับความเชื่อมั่น 95%

ตารางคิดร้อยละของ pretest

Class	Conceptualization	% Con	Analyze	% analyze	Engagement	% Eng.	Task-Oriented	% Task
4/1	**17.82**	**24.41**	**3.39**	**84.75**	**3.18**	**79.50**	**26.11**	**31.08**
4/2	**16.81**	**23.03**	**3.63**	**90.75**	**2.81**	**70.25**	**23.18**	**27.60**
4/3	**18.76**	**25.70**	**3.06**	**76.50**	**2.36**	**59.00**	**25.76**	**30.67**
Full score	**73.00**		**4.00**		**4.00**		**84.00**	

เปรียบเทียบข้อมูลทางสถิติของชุดข้อสอบทั้ง 4 แบบ ของ Pretest

```
ONEWAY percenofscore BY group
 /POLYNOMIAL=1
 /STATISTICS DESCRIPTIVES
 /MISSING ANALYSIS
 /POSTHOC=LSD ALPHA(0.05).
```

Oneway

Descriptives

percenofscore

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	3	24.3800	1.33525	.77091	21.0630	27.6970	23.03	25.70
2.00	3	84.0000	7.15454	4.13068	66.2271	101.7729	76.50	90.75
3.00	3	69.5833	10.26625	5.92722	44.0806	95.0861	59.00	79.50
4.00	3	29.7833	1.90190	1.09806	25.0587	34.5079	27.60	31.08
Total	12	51.9367	27.12391	7.83000	34.7030	69.1704	23.03	90.75

ANOVA

percenofscore

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		7768.807	3	2589.602	63.947	.000
	Linear Term	Contrast	.482	1	.482	.012	.916
		Deviation	7768.324	2	3884.162	95.915	.000
Within Groups			323.967	8	40.496		
Total			8092.774	11			

Post Hoc Tests

Multiple Comparisons

percenofscore

LSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-59.62000*	5.19589	.000	-71.6017	-47.6383
	3.00	-45.20333*	5.19589	.000	-57.1851	-33.2216
	4.00	-5.40333	5.19589	.329	-17.3851	6.5784
2.00	1.00	59.62000*	5.19589	.000	47.6383	71.6017
	3.00	14.41667*	5.19589	.024	2.4349	26.3984
	4.00	54.21667*	5.19589	.000	42.2349	66.1984
3.00	1.00	45.20333*	5.19589	.000	33.2216	57.1851
	2.00	-14.41667*	5.19589	.024	-26.3984	-2.4349
	4.00	39.80000*	5.19589	.000	27.8183	51.7817
4.00	1.00	5.40333	5.19589	.329	-6.5784	17.3851
	2.00	-54.21667*	5.19589	.000	-66.1984	-42.2349
	3.00	-39.80000*	5.19589	.000	-51.7817	-27.8183

Multiple Comparisons

percenofscore

LSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-59.62000*	5.19589	.000	-71.6017	-47.6383
	3.00	-45.20333*	5.19589	.000	-57.1851	-33.2216
	4.00	-5.40333	5.19589	.329	-17.3851	6.5784
2.00	1.00	59.62000*	5.19589	.000	47.6383	71.6017
	3.00	14.41667*	5.19589	.024	2.4349	26.3984
	4.00	54.21667*	5.19589	.000	42.2349	66.1984
3.00	1.00	45.20333*	5.19589	.000	33.2216	57.1851
	2.00	-14.41667*	5.19589	.024	-26.3984	-2.4349
	4.00	39.80000*	5.19589	.000	27.8183	51.7817
4.00	1.00	5.40333	5.19589	.329	-6.5784	17.3851
	2.00	-54.21667*	5.19589	.000	-66.1984	-42.2349
	3.00	-39.80000*	5.19589	.000	-51.7817	-27.8183

*. The mean difference is significant at the 0.05 level.

1 = Conceptualization

2 = Analyze

3 = Engagement

4 = Task-Oriented

1 = 4 ส่วนที่เหลือต่างกันทางสถิติ คือ 1=4 < 3 < 2

ตารางคิดร้อยละของ Posttest

posttest								
Class	**Conceptualization**	**% Con**	**Analyze**	**% analyze**	**Engagement**	**% Eng.**	**Task-Oriented**	**% Task**
4/1	**20.71**	**28.37**	**3.50**	**87.50**	**3.39**	**84.75**	**30.21**	**35.96**
4/2	**19.59**	**26.84**	**3.63**	**90.75**	**2.94**	**73.50**	**27.18**	**32.36**
4/3	**22.01**	**30.15**	**3.06**	**76.50**	**2.36**	**59.00**	**29.73**	**35.39**
Full score	**73.00**		**4.00**		**4.00**		**84.00**	

One way anova

```
ONEWAY percenofscore BY group
  /POLYNOMIAL=1
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS
```

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	3	28.4533	1.65657	.95642	24.3382	32.5685	26.84	30.15
2.00	3	84.9167	7.46799	4.31164	66.3652	103.4682	76.50	90.75
3.00	3	72.4167	12.90914	7.45309	40.3486	104.4847	59.00	84.75
4.00	3	34.5700	1.93502	1.11718	29.7631	39.3769	32.36	35.96
Total	12	55.0892	25.97042	7.49701	38.5884	71.5900	26.84	90.75

ANOVA

percenofscore

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		6961.277	3	2320.426	40.548	.000
	Linear Term	Contrast	5.133	1	5.133	.090	.772
		Deviation	6956.144	2	3478.072	60.778	.000
Within Groups			457.810	8	57.226		
Total			7419.088	11			

/POSTHOC=LSD ALPHA(0.05).

Oneway

Post Hoc Tests

Multiple Comparisons

percenofscore

LSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-56.46333*	6.17664	.000	-70.7067	-42.2200
	3.00	-43.96333*	6.17664	.000	-58.2067	-29.7200
	4.00	-6.11667	6.17664	.351	-20.3600	8.1267
2.00	1.00	56.46333*	6.17664	.000	42.2200	70.7067
	3.00	12.50000	6.17664	.078	-1.7434	26.7434
	4.00	50.34667*	6.17664	.000	36.1033	64.5900
3.00	1.00	43.96333*	6.17664	.000	29.7200	58.2067
	2.00	-12.50000	6.17664	.078	-26.7434	1.7434
	4.00	37.84667*	6.17664	.000	23.6033	52.0900
4.00	1.00	6.11667	6.17664	.351	-8.1267	20.3600
	2.00	-50.34667*	6.17664	.000	-64.5900	-36.1033
	3.00	-37.84667*	6.17664	.000	-52.0900	-23.6033

*. The mean difference is significant at the 0.05 level.

สรุป $1 = 4 < 3 = 2$

ตารางเปรียบเทียบ pre กับ post ของชุดข้อสอบ Conceptualization

Pretest	Protest	Pretest	Protest	Pretest	Protest	Pretest	Protest
% Con	% Con	% analyze	% analyze	% Eng.	% Eng.	% Task	% Task
24.41	28.37	84.75	87.50	79.50	84.75	31.08	35.96
23.03	26.84	90.75	90.75	70.25	73.50	27.60	32.36
25.70	30.15	76.50	76.50	59.00	59.00	30.67	35.39

เปรียบเทียบ pre กับ post ของชุดข้อสอบ Conceptualization

```
T-TEST PAIRS=Pretest WITH Posttest (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	24.3800	3	1.33525	.77091
	posttest	28.4533	3	1.65657	.95642

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	3	.998	.040

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-4.07333	.33471	.19325	-4.90481	-3.24186	-21.078	2	.002

ต่างกันทางสถิติที่ 95%

เปรียบเทียบ pre กับ post ของชุดข้อสอบ Analyze

```
T-TEST PAIRS=Pretest WITH Posttest (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	84.0000	3	7.15454	4.13068
	posttest	84.9167	3	7.46799	4.31164

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	3	.977	.136

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-.91667	1.58771	.91667	-4.86077	3.02743	-1.000	2	.423

ก่อนกับหลังไม่ต่างกันทางสถิติ ที่ระดับความเชื่อมั่น 95 %

เปรียบเทียบ pre กับ post ของชุดข้อสอบ Engagement

T-Test

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	69.5833	3	10.26625	5.92722
	posttest	72.4167	3	12.90914	7.45309

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	3	1.000	.010

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-2.83333	2.64969	1.52980	-9.41552	3.74885	-1.852	2	.205

ก่อนกับหลังไม่ต่างกันทางสถิติที่ระดับความเชื่อมั่น 95 %

เปรียบเทียบ pre กับ post ของชุดข้อสอบ Task-Oriented

```
T-TEST PAIRS=Pretest WITH Posttest (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet0]
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	29.7833	3	1.90190	1.09806
	posttest	34.5700	3	1.93502	1.11718

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	3	.999	.025

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-4.78667	.08327	.04807	-4.99351	-4.57982	-99.569	2	.000

ก่อนกับหลังต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับความเชื่อมั่น 95 %

APPENDIX G

Classroom Activities