

# Synthesize Essential Elements for Virtual Flipped Classroom Environment with Scaffolding System Using Active Learning to Develop Creative Thinking and ICT Literacy

Nipada Trairut<sup>1</sup>

and Namon Jeerungsuwan<sup>2</sup>

King Mongkut's University of Technology North Bangkok, Thailand

<sup>1</sup>nipada.tr@gmail.com

<sup>2</sup>namon.j@fte.kmutnb.ac.th, namon2015@gmail.com

**Abstract** - The purposes of this research were to analyze and synthesize elements that are essential for virtual flipped classroom environment with scaffolding system to support active learning to develop creative thinking and ICT literacy. The research methodology was documentary research. It was found that there were major elements and sub-elements which were essential for virtual flipped classroom environment with scaffolding system to support active learning to develop creative thinking and ICT literacy; major elements as follows virtual flipped classroom environment to develop creative thinking and ICT literacy of undergraduate student as follows virtual flipped classroom that consists of: 1) normal in-class learning that consists of various workshop activities learning content, participated learning process, students' learning feedback, communication, assessment, students' role and teachers' role and 2) home learning include 2 elements: 2.1) virtual environment that consists of Learning management, users that consists of students and teachers, online-media, students' tool and communication, assessment and self – directed learning and 2.2) scaffoldings that consists of conceptual scaffolding, metacognitive scaffolding, procedural scaffolding and strategic scaffolding.

**Keywords** - Virtual Flipped Classroom Environment, Scaffolding System, Active Learning, Creative Thinking, ICT Literacy

## I. INTRODUCTION

The advancement of science and brain-related research and technology, together with the presentation of the concept about the 21<sup>st</sup> century essential skill, resulted in the change in the educational paradigm. The educational management in every level therefore emphasized the development of thinking process in advance level among the student, especially the creativeness of idea and the development of communication skill. Technology is a tool of knowledge and social skill seeking, the educational management therefore is needed to be integrated in every sciences both inside and outside classroom. This is also including the preparation of the proper learning development for 21<sup>st</sup> century in order to increasing the meaning of learning among the student.

“Flipped Classroom” is one of the innovations and views that emerged in the area of education. It is a method that uses the classroom to be value for the children by practicing them to apply their knowledge in any situations to create the Master Learning style. It is also the management of education to escalate the level and value of professor

occupation in another style through the use of technology that will support the learning process. That is, this Flipped Classroom is the method that allows the student to study at home and do their homework at school by using technology multimedia and tool as a education management tool and inspect the student's development. As a result, the students need to have sufficient knowledge about information technology and communication in order to allow them to learn by themselves and have the potential of life-long learning that shall be a basic skill of learning into the smart learning in 21<sup>st</sup> Century. The role of teachers shall be changed from the communicants to the tutors or coaches who shall inspire and create a joyful environment in class, including the facilitator of each class [1] to allow the students to practice in real situation and lead to the Active learning style. This can be explained that the self-learning through the practice and thinking learning style shall lead to the real learning process which is the learning activity that focus on the students' achievement in the advance or creative thinking in the independence process, especially the analysis, the problem solution and creative thinking for the problem of homework and development the learning's learning achievement [2] which the environment learning, technique and teaching methods of instructors is very important of the learners which can lead to creativity.

The Flipped Classroom with technology-based learning needs to focus on the preparation of the proper learning environment by teachers. For instance, the virtual learning environment to present a better sense of realistic for learning which allow the students to access the lesson wherever more flexibly, depending on their needs. (Dillenbourg, P., Schneider, D.K. & Synteta, P., 2002; Sandy Britain & Oleg Liber, 1999; Thanompon Laohacharadsaeng, 2001) This shall assist in the process of knowledge transfer that students can apply such knowledge variously, including to develop the process of learning as a part of advance thinking system like creative thinking and also a presentation tool that can lead to the

learning of information technology and communication [3].

In addition, since the virtual learning environment is an online-learning, students therefore are needed to learn by themselves mostly. As a sequence, they should be supported in their potential through the use of scaffolding as a tool for preparing the facilities, supporting and suggesting upon the needs of the students gradually during their process of learning or any problem solving. It must also be able to reduce the students' problem in case that they cannot achieve the goal of learning and teaching [4, 5] The mentioned above learning administration and management is in line with the policy of 21<sup>st</sup> century learning that encourages the students to think creatively and response to the global changes. Therefore, the researcher was interested in the analysis and synthesis of the virtual flipped classroom environment with scaffolding system using active learning to develop creative thinking and ICT literacy with a purpose to apply the discovered result as a guideline for further learning administration and management.

## **II. RESEARCH OBJECTIVE**

To analyze and synthesize the factors of virtual flipped classroom environment with scaffolding system using active learning to develop creative thinking and ICT literacy.

## **III. RESEARCH METHODOLOGY**

This research was a document research based on the related ideas and theories to analyze and define the factors of virtual flipped classroom environment with scaffolding system to support active learning to develop creative thinking and ICT literacy. The related concepts and theories were defined in 4 aspects as followed:

1. Virtual Environment; to synthesize the factor of learning management in virtual learning environment.
2. Flipped Classroom; to synthesize the factor of learning management in flipped

classroom.

3. Scaffolding; to synthesize and define the tool and standard pattern of the scaffolding for the learning management in the virtual learning environment in flipped classroom.

4. Active Learning; to synthesize the active learning process and activities for the learning management in the virtual learning environment in flipped classroom.

The process of studying and synthesizing of virtual learning environment of flipped classroom with active learning scaffolding's appropriateness to promote creative thinking and understanding of information technology and communication were as follows:

1. Study, analyze and synthesize the related documents and researches both domestic and foreign, together with the current learning management.

2. Determine the framework of virtual environment of flipped classroom in term of scaffolding, active learning, creativeness and information and communication technology (ICT) literacy.

3. Summarize the factors of virtual environment of flipped classroom in term of scaffolding, active learning, creativeness and information and communication technology (ICT) literacy.

#### IV. RESULT AND DISCUSSION

The result of the synthesis of the virtual flipped classroom environment with scaffolding system to support active learning to develop creative thinking and ICT literacy were as followed:

**TABLE I**  
**THE ILLUSTRATION AND ANALYSIS**  
**OF VIRTUAL LEARNING**  
**ENVIRONMENT FACTORS.**

Virtual Environment Factors	Billkin and Volkan (2006)	Kennedy (2009)	Adirek Yawawong and etc. (2012)
Learning management and tracking of students	/	/	/
Teachers	/		/
Students	/		/
Online Media	/	/	
Communication		/	/
Students' tool		/	/
Assessment	/	/	

Table I illustrated the analysis of the factors of virtual environment in the ways that the factors of virtual environment consists of the Learning management and tracking of students, users which are students and teachers, online-media, communication, students' tool and the assessment. The detailed were as follows;

1<sup>st</sup> Factor: Learning management and tracking of students through the use of learning management system that has the registration record together with class list and students' homepage, course outline where teachers can track the students through the statistic system.

2<sup>nd</sup> Factor: Users consist of teachers and students where the teachers' role is to prepare the content of learning, learning management plan and to observe the students' behavior through learning tracking system. Similarly, the students' roles to perform and learning things by themselves with the use of prepared media and tool.

3<sup>rd</sup> Factor: Online Media; in the virtual learning environment, the teachers must prepare the documents, additional learning sources, pictures and online video clips for the students in the proper order content structure together with the guideline to the content to the students. There must also be a space for sharing data between teachers and student.

4<sup>th</sup> Factor: Communication In the virtual learning environment, there must be a communication tool for exchanging of information between students and teacher and also students and students. Such communication can be done by 2 choices as follows:

- Asynchronous such as email and discussion boards.
- Synchronous such as instant messaging, virtual chat room and video conference.

5<sup>th</sup> Factor: Students’tool-there should be a tool for exchanging and recording the learning of each person in the form of Blog, Wikis or Diary Electronic. This is also include the presentation tool for the students such as Prezi or Powtoon. Moreover, the teachers supposes to prepare the online space for uploading students’ file such as dropbox, box, google drive, including learning calendar, search tools and social bookmarking.

6<sup>th</sup> Factor: Assessment for virtual learning environment, there should be a management for teachers, students, and lesson information to be record in a database in order to used for the assessment. The assessment for the virtual learning environment is an automatic system with an instant output. This could be categorized into 3 categories as follows:

- Formative Assessment
- Summative Assessment
- Self – Assessment

**TABLE II  
THE ILLUSTRATION AND ANALYSIS  
OF FLIPPED CLASSROOM FACTORS**

Flipped Classroom	Vicharn Panich (2013)	Bergmann and Jonathan (2012)	Yuan, Xing and Zhang (2014)
Inside Class - learning’s activities	/	/	/
Outside Class - Content Delivery	/	/	/
- Self-Directed Learning	/	/	/
- Tools and Resources for Students	/	/	/
Multi-Assessment	/	/	/
Students’ role	/	/	/
Teachers’ role	/	/	/

Flipped Education is a learning management in flipped education pattern which is the learning style that changes from lecturing in class into practicing various activities to answer the question and apply in the real situation. This shall be a self-learning activity that the teachers’ role will change from being a communicant into a coach and facilitator of each class whereas the lecturing shall be done through the technology media such as video, online-video podcasting or screen casting and more. The role of students in the flipped classroom is to use self-directed learning methods to access the lesson at home or outside the school through flipped education tools such as Dropbox, Edmodo, Google Apps, Educreation, GlogsterEdu Screencast, Socrative, Teaching Channel, Twitter, YouTube. The assessments to be conducted in a flipped education shall be various in order to assess and measure the students’ achievement of each lesson’s objective.

Table II illustrated the analysis of flipped classroom’s factors and it could be summarized that the flipped classroom’s factors consists of: 1) inside class though learning’s activities, 2) outside class Include content delivery, self-directed learning, Tools

and Resources for Students, 3) multi-assessment, 4) student’s role, and 5) teacher’s role.

**TABLE III**  
**THE ILLUSTRATION AND ANALYSIS**  
**OF SCAFFOLDING**

Various Scaffoldings	Sumalee (2551)	Hannafin (1999 cited in Sumalee, 2003)	McLoughl in (2002)	Sherman (2005)
Conceptual Scaffolding	/	/	/	/
Metacognitive Scaffolding	/	/	/	/
Procedural Scaffolding	/	/	/	/
Strategic Scaffolding	/	/	/	/
Performance Scaffolding				/
Interpersonal Scaffolding				/

Table III illustrated the analysis of various scaffolding pattern and summarized that the patterns of scaffolding consists of conceptual scaffolding, metacognitive scaffolding, procedural scaffolding and strategic scaffolding. The detailed are as followed:

1. Conceptual Scaffolding; shall assist in building the important concept of problem and content.

2. Metacognitive Scaffolding shall assist in the thinking process of learning that can stimulate the students to self-conceptualize for the proper problem resolution.

3. Procedural Scaffolding; shall assist in the suggestion of how to use learning resource and tool which shall explain the system distributions or the working of learning environment prepared for the students.

4. Strategic Scaffolding; shall assist in the suggestion for the analysis and learning, assignment and problem solution in learning environment.

**TABLE IV**  
**THE ILLUSTRATION AND ANALYSIS**  
**OF ACTIVE LEARNING FACTORS**

Active Learning	Suparnee (2014)	Fink (2009)	Grabinger (1996 cited in Saowanee 2011)	Chaiyot (2008)
Various practical activities	/	/	/	
Learning content		/	/	/
Participated learning process	/	/	/	/
Students’ learning feedback	/	/		
Communication	/	/		
Assessment	/	/	/	
Student’s role			/	/
Teacher’s role	/			/

Active learning is a style of learning administration and management for both theory and practice that the variety of practice shall stimulate the students to participate and perform each skill through the practice. This is for building students’ process of higher order thinking skills with the sense of independence and self-conceptual. There will be clear communication between students and teachers, a students’ learning feedback through the instant feedback from their friends or teachers. The assessment and measurement should be an Authentic assessment and Alternative assessment whereas the teachers shall be the facilitators for the learning management and allow the students to study by themselves.

Table IV illustrated the analysis of Active Learning factors and could be summarized that the Active learning factors consists of various practical activities, learning contents, participation learning process, students’ learning feedback, communication, assessment, students and teachers’ role.

## V. CONCLUSIONS

According to the document analysis and synthesis to define the factors of the virtual flipped classroom environment with scaffolding system to support active learning to develop creative thinking and ICT literacy,

it was found that consists of the following factors: virtual flipped classroom that consists of: 1) inside-class that consists of various practical activities, learning content, participated learning process, students' learning feedback, communication, assessment, students' role and teachers' role, 2) outside class include 3 elements; 2.1) self – directed learning, 2.2) virtual environment that consists of learning management and tracking of students, users that consists of students and teachers, content delivery, students' tool and communication, assessment and self-directed learning, and 2.3) scaffoldings that consists of conceptual scaffolding, metacognitive scaffolding, procedural scaffolding and strategic scaffolding.

- [4] Kewsri, S. (2007). “Development of a scaffolding web-based inquiry model for science subject to develop problem solving skills of lower secondary school students”. PhD Thesis: Chulalongkorn University.
- [5] Raymond, E. (2000). “Cognitive Characteristics. Learners with Mild Disabilities”. Needham Heights, MA: Allyn & Bacon, A Pearson Education Company.

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## **REFERENCES**

**(Arranged in the order of citation in the same fashion as the case of Footnotes.)**

- [1] Panich, V. (2013). “Teacher for Learner: create a flipped classroom”. The Siam Commercial Foundation.
- [2] Chanpasert, S. (2014). “Active Learning: Learning in the 21<sup>st</sup> Century”. IPST Magazine, 2014, Vol. 42, No. 188.
- [3] Kingsawat, K., Kwerzen, K., and Tuasuk, K. (2013). “Elements and factors that promote to Integration of Information Literacy Instruction at Primary Education Level in a Virtual Learning Environment”. TLA Research Journal, 2013, Vol. 01.