Factors and Needs Assessment of Hyflex Learning with Science Activity Base For Strengthen Critical Thinking

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Abstract. This article aimed to analyzed the factors of Hyflex learning with science activity base for strengthen critical thinking. This mixed method research on the qualitative research and quantitative research both to participatory action learning. The first to involved synthesizing documentary, interview with 20 teachers, and to collection data by questionnaire with 150 teachers and 150 students. The study revealed that the factors were to instructional using the students base, content transferal of technology to knowledge linking and communication, learning methods to anytime, accessing the technology for opportunity to continuous learning, experience arrangement and environment to diversity. And the needs assessment of Hyflex learning with science activity base for strengthen critical thinking of a level at high levels, The participants showed high needs regarding of students base (PNI Modified= .35) and technology transferal (PNI Modified= .33)

Keywords: Factors and needs assessment of hyflex learning, science activity base, critical thinking

1. Introduction

Strengthen critical thinking to students a learning using ideas and consideration, analyzed and assessment of the contents and problematic events by knowledge their thoughts and experiences for lead to decisions of learning a implementation to accordance with the principle and reasons. Globalization and a internationalization to the learners be causing the needs to know of analytical able for choose to receive an information, and used to technology for appropriately. Era of scientific progress and communication to information of digital technology to spread and important role in creating for new knowledge and digital citizenship. [1] Which the digital technology can change the paradigmshift and the efficiency of instructional, especially online teaching was one way to improve the quality of knowledge management and learning environments from continuous pursuit of the knowledge, ability to communicate, ability to critical thinking, ability for solving, ability to use life skills, and ability to use technology. [2] Critical thinking was consciousness process for analyzed and information evaluate as examination that has been contemplated with cause and effect. The critical thinking therefore the system builder on the channels to ideas related that a knowledge. In problems of teaching and learning management in critical thinking of the students was to still being monopolized by listening to lectures from teachers only that making the students do not practice the thinking skills,
students can not extend the knowledge, include a upgrading learning with critical thinking processes to encountered problems were obstacles for learning. [3] A caused by the instructor giving priority to the answers rather than processes, from entering content for students to understand and memorize for doing the exercises, as well as lack to evaluation of achievement in the learning process.

Learning activities will focus on exercises to find answers, and lack of media and learning innovation that can to support and comply with the context and according to the needs of the students etc. Which new age teachers need to be taught in accordance with the changing era for provide the learners’ learning to durability and can be used effectively. Critical thinking is the basic skills are important to result for developing to highest the thinking skills of the students. Which will help the learners to know the facts on the basic reasons of what happened, Understand the history of events for decision, solving problems to appropriated and efficiency.

Hyflex learning was method of teaching and learning management that gives learners the freedom to study as teaching style, teaching methods, online learning and classroom teaching. Students can to decide what to study, how and when to study, and study anywhere according to potential, interests and aptitude. Focuses on learning from a variety of learning resources, enable students to developed for abilities to selections, analysis of informations. [4] HyFlex learning is a conceptual framework not software it can be implemented using an institution’s existing course management system or other online course infrastructure. The course is generally listed in the catalogue as a face to face course because the assignment of a room is necessary. Class sessions are offered both online and in the physical classroom so that students can attend either or both those who attend face to face sessions can join the online class discussion if they like, and those who attend online can later review in-class sessions that are posted in audio or audio/video format. Students choose assignments from a menu of learning options, include readings, exercises, research projects to frequent feature of the HyFlex learning is small-group engagement and collaborative work, for team meetings, conducted virtually. [5] Factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking are the ways of learning management to the students for learning activities such as ability, technology skills, living skills and technology citizenship, and learning able developed of the students to efficiency and effectiveness.

The objective in this research aimed to analyzed the factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking.

2. Review of The literature

2.1. Hyflex Learning for Instructional

Hyflex is a course design model that presents to the components of hybrid learning (which combines face-to-face with online learning) in a flexible course structure that gives students the option of attending sessions in the classroom, participating online, or doing both. Students can change their mode of attendance weekly or by topic, according to need or preference. In this “flexible hybrid” design, instructors provide course content for both participation modes and can tailor activities for each format. This is not a self-paced model, even though online sessions can be either synchronous or asynchronous. Students frequently take the same final assessment, regardless for chosen path through the material. Beatty [6] defines Hyflex to be those that "enable a flexible participation policy for students whereby students may choose to attend face-to-face synchronous class sessions or complete course learning activities online without physically attending class" The menu of options offered by Hyflex can ease the scheduling burden for students who commute long distances or who must be away from campus for athletics or other competitive activities. It is useful, too, for students who must coordinate work and family responsibilities with a challenging course schedule. In providing an online option, the model provides the flexibility to keep a class from falling behind if, for example, the instructor has to travel unexpectedly. Hyflex learning were a combining elements of both online and classroom-based learning, Hyflex takes hybrid classes to a new level of flexibility. Students can choose whether they to take classes online, head to classroom for giving the freedom to study, when
and where, they want to based on their own needs, desires, and preferences. Students can change how they choose to attend courses weekly, resolving many of the scheduling issues common to students engaged with extracurricular activities or who have familial and work responsibilities.

2.2. Constructionism Instructional

Constructionism instructional is when learners construct mental models to understand the world around them. Constructionism advocates student-centered, discovery learning where students use information they already know to acquire more knowledge. Learning active design perspective of instructional strategies of education technological were shared the communication and learning environments a control. Student can be compliable on learning activity for self and interactive of externals environmental a meaning activities knowledge experience on learning. [7] There is the knowledge to linked the news knowledge and original knowledge. Students learn through participation in project-based learning where they make connections between different ideas, and areas of knowledge facilitated by the teacher through coaching rather than using lectures or step-by-step guidance. Further, constructionism holds that learning can happen most effectively when people are active in making tangible objects in the real world. In this sense, constructionism is connected with experiential learning and builds on Jean Piaget's epistemological theory of constructivism. [7] Problem-based learning is a constructionist method which allows students to learn about a subject by exposing them to multiple problems and asking them to construct their understanding of the subject through these problems. The students of learning can be very effective in mathematics classes because students try to solve the problems in many different ways, stimulating their minds. The strategies on problem-based learning more effective were to, a) learning activities should be related to a larger task. The larger task is important because it allows students to see that the activities can be applied to many aspects of life and, as a result, students are more likely to find the activities they are doing useful, b) learner needs to be supported to feel that they are beginning to have ownership of the overall problem, c) authentic task should be designed for the learner. This means that the task and the learner's cognitive ability have to match the problems to make learning valuable. Reflection on the content being learned should occur so that learners can think through process, what they have learned, d) allow, encourage the learners to test ideas against different views to a different contexts. Instructional advocates student-centered, discovery learning where students use information is knowing to acquire more knowledge.

2.3. Science Activity-based Learning

Science activity-based learning is managed methods that emphasize for active with the learners to proactive learning, and participation of learners for role which focused on science activities, taking to the activities as location. Badrul, H., Khan [8] Therefore, development of learners should be practiced after that course of learning to control group. The science activity-based learning consists to promote for learner using by active learning, motivation of learner that design thinking using by face-to-face in classroom, active learner should be learning by doing of learner from external classroom, focusing on responsibility is reading writing, thinking, discussion and focus group problem solving. A important aspects of learning to encourage learners to enthusiastic about cognition, encouraging learning from the students themselves to rather than listening to teachers in classroom and memorization to create continuous learning outside, get the results in transferring knowledge. Which is passive learning on focusing on the responsibility of learning from discussion, solving problems related in learning of cognitive, range skills, and affective domain.

2.4. Critical Thinking

Is meaning of the process design thinking for thoughtful process with especially story by knowledge and experience in solving of analyze to assessment and cause conclusion of reason. However, the
tester of divided two type (e.g. test by writing and test by workshop) that measure from behavior direct of observation such as individual of interviews, to recorded individual. Which, the measure can keep portfolio or developed to work for occur thinking. [9] Thinking skills were combined individual for development in the elements to deductive summary, definition meaning, reliability of resource, inductive summary, hypothesis testing and prediction, definition and presumption. Critical thinking were the abilities to think clearly and rationally, understanding the logical connection ideas.

3. Methodology
The research methodology were mixed method research both to participatory action learning. In qualitative research to study employed a review of documentary. And quantitative research to survey by questionnaire with the sampling to analyzed the factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking on research design to the data.

3.1. The Sampling
The results sampling method that will be used in this study of 150 teachers and 150 students of Nakhonratchasima Rajabhat University throughout Thailand. The total number of 300 participants, they all were multistage random sampling.

3.2. Data Collection
Respondents were asked to collection data by dividing the collection process include the qualitative and quantitative study employed as, a) study the documentary for analyzed the factors of Hyflex learning with science activity base for strengthen critical thinking on instructional using the students base, content transfer a technology to knowledge linking and communication, access a learning method to anytime, giving an opportunity to access and continuous learning, include experience arrangement and environment to diversity for the conceptual framework, b) synthesis of factors from studying documents to interviews by structure questionnaire with 20 teachers to analyzed the factors of the qualitative research, c) survey the needs assessment by semi-structure questionnaire of 5-rated scales with teachers and students, total number of 300 participants for study the needs assessment of Hyflex learning with science activity base for strengthen critical thinking, there are consistent with current conditions and the needs of the teachers and students of the quantitative research to the data.

3.3. Data Analysis
The factors of Hyflex learning with science activity base for strengthen critical thinking on the qualitative was analyzed by a thematic analysis an interpretive research (Erickson)[10], which emphasized the way that persons make sense of, and give meaning to, the social interactions that constitute daily life in and around schooling, and the needs assessment quantitative data was analyzed by descriptive statistical analysis to mean, standard deviation, modified priority needs index (PNI Modified).

4. The Results
The results of the factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking were followed:

1. The factors of Hyflex learning with science activity base for strengthen critical thinking to shown on figure 1, and table 1.
Figure 1. Factors of Hyflex learning with science activity base for strengthen critical thinking

Table 1: Factors and solutions of Hyflex learning with science activity base for strengthen critical thinking

| Factors                          | Solutions                                                                 |
|----------------------------------|---------------------------------------------------------------------------|
| **Student- Based Factor**        | • Instructional using the students base for focusing the flexible learning, managing activities to variety, interactive, visible to demonstration and communication.  
• Learning management to the knowledge analysis, consideration for analysis thinking of process system.  
• An Enhancing a collaborative of methods in the problem solving, contents integrated and additional learning center for use of searching knowledge data. |
| **Technology Transferal Factor** | • A Content transferal of the technology to knowledge linking and communication for supporting methods on linking of knowledge activities base.  
• Description of communicate content for thing skills.  
• A planning for learning method to developed which individual and groups of communicational into the students, and practice searching skill, self-direct for learning activities.  
• Using technology of learning to facilitate and real-time, and take to an intermediary for presenting. |
| **Technology Learning Factor**   | • Learning methods to anytime were supported in occur skills of thinking to computational and analyze question, take to the application use of interactive. |
Table 1: (Followed)

| Factors                        | Solutions                                                                 |
|--------------------------------|---------------------------------------------------------------------------|
| • Using an experimental and   | • Supported for learning method of technique and modern tools, used to    |
| practical to group learning   | the networks system of technology learning.                               |
| management by the technology   | • The result process of data searching for thinking skill to knowledge    |
| which the received of increase| innovation.                                                               |
| data.                          | • Creating to new knowledge part of process to continuous and feedback.   |
| Technology Accessing Factor    | • Accessing technology to opportunity for continuous learning by         |
|                                | electronics learning, and open learning of online.                       |
|                                | • Communication of linking in two ways for emotion felling thinking on    |
|                                | understanding, and classification to compared for events in skillful and  |
|                                | accurate.                                                                |
|                                | • Linking a part experimental and new experimental for result innovation  |
|                                | of type variety.                                                         |
| Technology Environments Factor | • An experience arrangement and environment to diversity of technology    |
|                                | environments for learning in 21st century skills, mind mapping on        |
|                                | occurring of demonstration for activity to concrete objective.            |
|                                | • Using digital resources, online for learning accommodate on creating    |
|                                | game role-play in the questions, answers.                                |
|                                | • Usage technological resource for searching in learning practices.       |

2. The needs assessment of Hyflex learning with science activity base for strengthen critical thinking to shown on table 2.

Table 2: Needs assessment of Hyflex learning with science activity base for strengthen critical thinking.

| Needs to Hyflex learning with science activity base | Practice Levels | Desirable Levels | Needs Assessment | Priority |
|----------------------------------------------------|-----------------|------------------|------------------|----------|
|                                                    | X               | X               | PNI Modified     | Group Ranks |
| Students- based                                    | 3.59 .75        | 4.86 .60        | 0.35             | High     | 1       |
| Technology Transferal                              | 3.62 .76        | 4.79 .64        | 0.33             | High     | 2       |
| Technology Learning                                | 3.65 .79        | 4.64 .68        | 0.31             | High     | 4       |
| Technology Accessing                               | 3.63 .81        | 4.59 .70        | 0.32             | High     | 3       |
| Technology Environments                            | 3.64 .82        | 4.54 .74        | 0.30             | High     | 5       |
| Totals                                             | 3.63 .79        | 4.68 .67        |                  |          |

The level to needs of Hyflex learning with science activity base for strengthen critical thinking in the elements of students-based, technology transferal, technology learning, technology accessing, and technology environments at level of most levels (X̄=4.68, S.D.=0.67). In the needs assessment showed high needs regarding of students-based (PNI Modified=.35), technology transferal
5. Discussions
Factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking were to students base, technology transferal, technology learning, technology accessing, and technology environments. Because, the Instructional using the students base for focusing the flexible learning, managing activities to variety, interactive, visible to demonstration and communication, can be learning management to knowledge analysis, and consideration for analysis thinking of process system and enhancing a collaborative of method in problem solving, contents integrated and additional learning center for use searching knowledge data. Accordant with Darling- Hammond, L., & Synder, J. [11] adding for learning center in classroom were to develop of learning process of goal together, and searching and new opportunity of variety for support to learning of skill continues selecting characterization of data present for problem solving to occur which to reviewing elements appropriate. Accessing the technology for opportunity to continuous learning by electronic learning. Miller, J., Risser, M., & Griffith, R. [12] HyFlex has to roots in two words: Hybrid – combines both online and face-to-face teaching and learning activities in a single course, and Flexible – students choose their mode of participation whether face-to-face, online, or both. This study was implemented in a graduate educational learning technology. Findings show that capture the meanings the participating graduate students assigned to their experience with HyFlex design: accommodating students’ needs, increasing access to course content, differentiating instruction, and encouraging student control. Handle, B.[13] the curriculum development is a continuous process of development that pertains to the role of the teacher, and the development of a student- centered approach to education requires teachers to have a deeper understanding of their responsibility. Accordant Fabricatore & Lopez. [14] the ability is one of new capacities that to development to use activities to promote values and attitudes desired to support the comprehensive and critical thinking development of students. Hyflex learning with science activity base for strengthen critical thinking for students can choose whether they to take classes online, head to classroom for giving the freedom to study, can change how they choose to attend courses weekly, resolving many of the scheduling issues common to students. Instructional to various and suitable for readiness of the students by passing the principles that the students has a choice, equality, ability to reuse from learning, ability to technology access. Darling- Hammond, L., & Synder, J. [11] the activity base for learning management methods that emphasize role, participation or proactive learning that brings developing the learners to achievement learning in the objectives on encouraging students to be alert and enthusiastic about cognitive thinking. The ways of thinking such as creativity, have the judgment of problem solving and learning. Hyflex learning is combine synchronous online and face-to-face for instruction with the students to attribute on learning activities designs, organize activities to various, students center, learning environment of quality.

6. Conclusion
Factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking are the ways of learning management to the students of effectiveness. In the factors as, 1) student- based to instructional using the students base for focusing flexible learning, 2) technology transferal to content transferal of the technology to knowledge linking and communication for supporting methods on linking of the knowledge activities base, 3) technology learning for learning methods to anytime were supported in occur skills of thinking to computational and analyze question, take to the application use of interactive, 4) technology accessing to opportunity for continuous learning by electronics learning, and open learning of online, and 5) technology environments into experience arrangement and environment to diversity of technology environments for learning in 21st century skills. The level to needs of Hyflex learning with science activity base for strengthen critical thinking at level of most levels, and In the needs assessment showed high needs regarding of students base (PNIModified=.35), technology transferal (PNIModified=.33), technology accessing (PNIModified=.31), and technology environments (PNIModified=.30). Respectively.
Modified = .32), technology learning (PNIModified= .31), technology environments (PNIModified= .30). Respectively.

7. Implementation
Factors and needs assessment of Hyflex learning with science activity base for strengthen critical thinking of the elements make to science activity-based learning that three steps as cognitive domain, psychomotor domain and affective domain of learners. Moreover, the science activity-based can designed to learn with technology such as sender to message use of e-mail, connected personal between video conference and communicational to utilization in life of online learning.

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