New Active Learning Model with Formative Assessment in Large Classroom

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Abstract - **This qualitative research aims to study, analyze, and synthesize the model of Active Learning with Formative Assessment (ALFA) in Thailand. Data sources are related books, researches, articles and web sites. The researcher used the content analysis method. Active Learning (AL) is based on the Constructivist theory, which focuses on the student-centered approach, with learning activities which the teacher challenges students by using an AL environment, encouraging students to discover by themselves, using problem-based learning through reading, writing, interacting, analyzing, and discussing together. Formative Assessment (FA) is the assessment process used during study. The feedback can reflect the learning process. The ALFA model will improve instruction to fit and develop students to their full potential. The finding has 5 systematic steps: 1) Analysis, 2) Development, 3) Delivery, 4) Revision, and 5) Summative Evaluation. Important processes are the continuous loops of step 2-3-4 to improve AL activities using FA feedback.**

Keywords - **Active Leaning, Formative Assessment**

I. INTRODUCTION

A main problem confronted by Thai teachers with large classroom is the difficulty in assessing during studying. Teachers need to know the students' previous knowledge to adapt teaching and learning strategies to suit students' learning needs. Student-centered learning encourages different students to more learn and develop themselves. Learning activities allow them to practice and develop skills; thinking, managing, and applying their knowledge in real life. Moreover, the learning environment and instructional media can facilitate a full learning process [1]. AL is the best way to change passive students to active students who actively participate in activities [2]; experimenting, problem solving, cognitive developing, analyzing, discussing, or critical thinking. There are many AL activities that can link content with problems and experiences, or motivate students to observe, exchange ideas, and communicate in their group, or foster interactions in class to make students proud of themselves and have a better learning process [3-4]. Strategies which foster experiences into learning processes are efficient ways [5] to enable Vygotsky's Zone of Proximal Development (ZPD) area [6]. FA can help AL by focusing on a student's interactions with both peers and the teacher. It allows the teacher to monitor the student's progress in real time and can improve or change instruction immediately [3, 7-8]. Information technologies for real-time FA can help students to provide feedback by using individual devices through networks in classroom [9].

II. OBJECTIVE

To study, analyze, and synthesize the ALFA model in Thailand.

III. LITERATURE REVIEWS

A. The Theory Behind AL

AL is based on the Constructivist theory; facilitating environments, opportunities, interactions, assignments, and other aspects are used to foster increased deep learning [10]. This theory states that the learning process starts by learning through social interactions with others, such as teachers or peers. Vygotsky (1896-1934) defined the Zone of Proximal Development (ZPD) as an important area of the learning process; the gap between the achievement made by learners acting by themselves and those made with assistance or suggestion from experts. AL activities can foster students to develop their understanding.

B. AL with FA

The main problem in large classrooms is how to assess the prior knowledge of students and revise instruction to fit with specific students [11-12]. One solution is to use information technology to process real-time formative assessment using the classroom network and individual devices [9, 13]. This solution can encourage students' participation and improve the learning process [14-17]. Real-time FA feedback, comprising both understanding and misunderstanding, helps the teacher to improve instruction and solve real problems in a short time [18].

Brewer (2004) used the real-time FA software "Bio Bytes" to ask a multiple-choice question on a Biology course. Students selected their answer choice and their level of confident. This system reflects the students' learning process, and the teacher can improve instruction on-time, based on feedback. This experiment found that a Clicker group had significantly higher achievement than the Control group [8]. This result was similar to that found by Yourstone et al. (2008), using FA software. They stated that a Personal Response System (PRS) could improve the students' learning process. Therefore, along with Clicker, all similar FA software should affect the learning process.

Ponce et al. (2018) wanted to correct Clicker's limitation, which is that it can support only multiple-choice questions. They developed software to highlight text which students did not understand. All feedback was processed, and the sum number of each word sorted by the most highlighted over 3 levels of red, orange, and yellow. The teacher could show a summary screen to the classroom and discuss AL techniques.

IV. METHODOLOGY

This qualitative research used related books, researches, articles, and many educational websites as data sources. The content analysis method was used with the analysis and synthesis tables.

V. RESEARCH FINDING

A. Active Learning

AL means anything related to students doing something and thinking about what they have done [20], instead of passively sitting in the classroom. Therefore, it is everything related to instruction which students do except for passive listening, sitting, and note taking [21]. Students must take more responsibility for their learning by themselves while the teacher encourages them to want to solve problems by themselves instead of passive receiving only [10]. Students must apply their knowledge to do AL activities [22]. AL is a student-centered approach, and the teacher should decrease the content transfer process and increase the students' participation in and interaction with learning activities [23]. Teacher should take the role as a motivator to encourage and challenge students to be self-searching. A comparison of AL models is shown in Table I.

TABLE I
COMPARISON OF AL MODELS

Author	Active Learning Model
New York University (2018)	6 Steps to Creating an AL Environment. 1. Needs Assessment analysis and selection of AL strategy. 2. Identification of topic and all related questions. 3. Identification of learning objectives and outcomes. 4. Planning and designing both inside and outside classroom's activities. 5. Identification of learning sequence to foster learners to achieve objectives. 6. Evaluation of the AL effectiveness. Note: AL can be switched with traditional teaching; it is not necessary to replace all traditional teaching.
Auster, E. R., & Wylie, K. K. (2006).	4 Dimensions of AL with Systematic approach: 1. Context Setting: to create a holistic classroom including the acceptance, facilities for participation and interaction. 2. Class Preparation: to plan and create content and necessary processes for the classroom. The teacher needs to improve this step for every successive session. 3. Class Delivery: to teach and facilitate in real sessions. The teacher delivers his/her previous class preparation to students. Then, the resulting feedback after the session will be used to improve the next session. 4. Continuous Improvement: to link class preparation and class delivery with session feedback. This continuous improvement will help the teacher to change, improve, or explore the best solution to foster AL with feedback reflections.
Bonwell, C.C. & Eison, J.A. (1991).	AL characteristics are: 1. Learners do more than listen. 2. To focus on skill development more than data communication. 3. To set goals for higher order skills. 4. To try to get learners involved in the activities. 5. To focus on learners' attitudes and values.
Felder, R.M. & Brent, R. (2009)	The basic AL activities are: 1. To ask students to organize randomly-selected groups (2-4 students per group). Select one randomly-selected student to be the note taker of each group (such as selecting the last person on the right-hand). 2. To ask a question or present a problem and provide sufficient time (15 secs to 3 mins). 3. To select representatives or volunteers to share their answers and discuss them in class.
McKinney, K. & Heyl, B., (Eds.). (2008).	Models of AL activity are: 1. Think-Pair-Share 2. Collaborative Learning group 3. Student-led review sessions 4. Games 5. Analysis or reactions to videos 6. Student debates 7. Student-generated exam questions 8. Mini-research proposals or project 9. Analysis of case studies 10. Keeping journals or logs 11. Writing and producing a newsletter 12. Concept mapping

B. Formative Learning

FA means assessment done during delivery instruction. It should assess learning with the real conditions of teacher-student interaction. The benefit is that the teacher can monitor students' development and adjust their vision and attitude about the subject, include concept investigation to prevent misconception [27-28].

The FA purpose is to improve learning activities for better learning achievement. Scriven (1967) said that FA will collect data to assess course effectiveness and recommend ways to improve the approach, with curriculum consistent with the school. FA can be used in various subjects, and is used to design revision until students succeed in their final learning objective [29]. Therefore, FA is a process which feeds back data to reflect the learning process. A comparison of FA models is shown in Table II.

TABLE II
COMPARISON OF FA MODELS

Author	Models
Kornhauser Z. & Klaf S. (2016).	Assessment in the Active Classroom has 5 steps: 1. Plan: Redesign your course unit. 2. Implement: A revised version of your course unit. 3. Assess: Gather evidence of student learning. 4. Analyze: Analyze data, identify needs, and reflect on changes to the course unit. 5. Improve: Use data to inform improvement of the course unit.
Angelo, T., & Cross, P. (1993).	Classroom Assessment Techniques: CATs has 6 indexes: 1. Learning Achievement* (Summative Assessment) 2. Gap between Post and Pre-test 3. Performance Test of higher skills 4. Interaction between peers and instructor 5. Satisfaction in learning experience 6. Attitude to learning and subject
Dick, W., Carey, L. & Carey, J.O. (2001).	Use FA for Instruction System Design in 3 steps. 1. One-to-One Evaluation. Assess the draft of instruction with 1-3 representative students. Then, revise using all feedback. 2. Small-Group Evaluation. Assess the prototype of instruction with small group students. 3. Field-Trial. Experiment the instruction in real learning context. Moreover, assess the students' attitude with questionnaire.

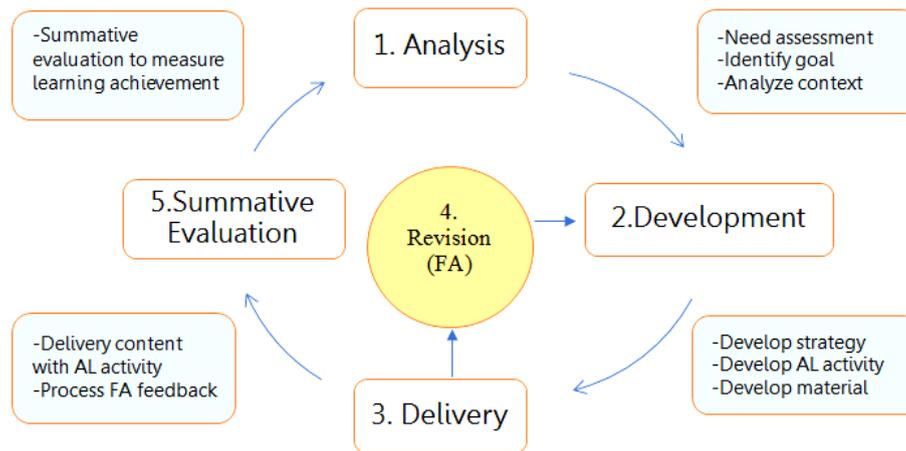Finally, the researcher presents the synthesized ALFA models, as shown in Fig. 1.

Fig. 1 Model of Active Learning and Formative Assessment

VI. DISCUSSION AND CONCLUSION

The researcher synthesized the ALFA model, which has 5 systematic steps:

1) Analysis: This step is a process to analyze and design the goal of ALFA instruction, includes analyzing ALFA needs assessment, identifying goal sand learning objectives, analyzing the context of the students and environment, and designing a draft for a course outline. All instructors or designers must begin with the needs assessment to identify clear learning objectives; they should also analyze the target students and the learning environment, as every course is different, depending on different contexts [21, 32].

2) Development: The teacher should develop instruction following the course outline, including developing strategies, AL activities, and materials [32].

3) Delivery: This is a teaching session to deliver the content to students, including teaching preparation, delivering content with learning strategies and active learning activities, moderating the activities with the FA tools or observation, and collecting all feedback in session to assess the students' learning process [25].

4) Revision: This should depend on the FA feedback after the delivery session; the teacher can improve the next teaching preparation to fit their students' needs. The teacher can revise AL activities or strategies or tools for the next session. The important ALFA processes will occur at the continuous loop of development-delivery-revision steps to improve AL activities through FA feedback. Many educators expect to receive real-time, or very nearly real-time, formative assessment of their students, to improve them using the ZPD concept. Mayer et al. [8] found that FA from a Personal Response System (PRS) helped a clicker group achieve learning outcomes significantly higher than those of the control group. Feedback from FA with PSR fosters students' perceptions during learning. This system will be the best way to guide students, prepare instruction to fit the students' learning level or improve instruction by a systematic approach, and it can foster students to achieve the learning goal and achieve better grades [25, 32].

5) Summative Evaluation: At the end of course, the teacher must test students with summative assessment, in order to conclude the students' achievement [33]. All evidence of the ALFA model will be shown in the final step; the students' learning achievements after this process will be identified. ALFA results in a teacher as an Activator, different from a Facilitator [33]. FA is a useful tool to improve the learning process of students. The ALFA model must be used by teachers themselves to create interactions with students, and foster students to develop their learning outcomes, following the "Teach less, learn more" method of 21st century learning.

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

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