

# Examining the Sub-Components Activities of the ADDID Model to Support Education Reform

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## Abstract

The aims of this paper was to examine the sub-components activities of the ADDID model (a model of the learning reform process through the computer network system) to support education reform, particularly in terms of learning through the computer network system environment. The samples were ninety-five master teachers, who are experts in education reform according to the 1999 Thai National Education Act. The research methods were an in-dept interview for the first stage and used five-scale rating questionnaires for data surveying in the second stage. Moreover, the results were concluded using mean and standard deviation. The results of the survey show the master teachers were mostly agreed with the sub-components activities of the ADDID model (Mean = 4.63 – 4.75 and S.D. = 0.37 – 0.86). The result indicates that the ADDID model was more valid and can be used to aid learning through the computer network system environment and support education reform successfully.

**Keyword:** A model of the learning reform process through the computer network system (ADDID), master teacher, education reform

## Introduction

### 1. Education reform

Education reform is the name given to a political process with the goal of improving public education. Small improvements in education theoretically have large social returns, in health, wealth and well-being. Basically, reforms have taken different forms because the motivations of reformers have differed. A stated motivation has been to reduce cost to students and society. From the past until now, one goal for education reform was to reduce the expense of a classical education. Ideally, classical education is undertaken with a highly educated full-time personal teacher, this was available only to the most wealthy (ACCU-APPEAL, 2003).

For Thailand, during the 1990s, the focused was upon expanding access to education for its youth. Over the course of the decade, Thailand raised the level of compulsory schooling from six to nine years, and then finally to twelve years of free schooling (ONEC, 2004). This rising investment in education reflected beliefs that continued economic development would require a more knowledgeable and skilled labor force (Carnoy, 2003; Wasi, 1998). Moreover, new capabilities and attitudes would be needed for the nation to cope with the cultural exigencies of globalization (Fry, 2002). In the view of some Thai policymakers, however, expanded educational access had simply increased the number of students being exposed to the “pedagogy of the worksheet” (Pennington, 1999). Indeed, a chorus of influential voices contended that continued reliance on traditional educational methods had become an impediment to the nation’s social and economic development. Because in Thailand, the education system does not encourage students to show their capabilities. It is seen that the teacher is at the center of the learning process as teacher-centered learning. The chalk and talk style relying solely on lectures and rote memorization with limited subjects prescribed in the curricula and no alternative available seems to be ineffective. It has discouraged the development of creativity and individuality among students at all levels. As a matter of fact, a more diverse and flexible education system, truly conducive to developing the innate potential of each individual through the cultivation of creativity and individuality must be developed (Belihu, 2010).

Student-centered learning, also called child-centered learning can best be promoted through an open educational system which provides maximum freedom, the widest possible choice of subjects and the greatest possible diversity of educational content (The Nation Newspaper, 1999). This approach has many implications for the design of the curriculum, course content and interactivity of courses. Student-centered learning, that is, putting students needs first, is in contrast to teacher-centered learning, it is focused on each student's needs, abilities, interests, prerequisites, and learning styles, placing the teacher as a facilitator of learning. This classroom

teaching method acknowledges student voice as central to the learning experience for every learner, and differs from many other learning methodologies (Estes, 2004).

In order to have the student-centered learning supported by law, particularly in section twenty-two of the act which stated that: "Education shall be based on the principle that all learners are capable of learning and self-development, and are regarded as being most important. The teaching-learning process shall aim at enabling the learners to develop themselves at their own style and to the best of their potentiality" (ONEC, 2004). This statement assures that each individual has potential for learning and is regarded as the center of teaching-learning activities, which is relevant to what Jean Jacques Rousseau has mentioned before about student-centered learning. Several researches in medical science also indicated that every individual has learning potentiality since the human brain contains many nerve cells linked together by nerve cell fibers. The learning environment will develop the child's intelligence. The more they learn, the more these nerve cell fibers grow and expand (Kaewdang, 2001), that is the main concept of brain-based learning (BBL). This learning theory is based on the structure and function of the brain, which is another approach to support student-centered learning (Hallinger, 2010).

One approach to facilitate student-centered learning is the use of ICT to develop students at their own pace, because ICT enables information and knowledge to travel faster and further, it supports information and knowledge sharing on a large scale, it makes available information and knowledge for learning, and it has brought about revolutionary advances in distance learning. Moreover, ICT can significantly reduce learning costs (Maguire, 2007), nowadays for these reasons, education reform in all parts and at all sectors emphasizes on using ICT to support learning and teaching. In particular, there are millions of students and trainees participating in education and training programs to acquire knowledge and skills that may have future application. In the workplace and in everyday living, people seek specific knowledge and skill when and where they need it. ICT makes available and accessible just-in-time information and knowledge and also provides opportunities to continue life-long learning (Bottino, 2003).

For these reasons, educational institutes, administrators, teachers, educators, and all parties in the government and private sectors sought to help develop students in accord with their potential in organizing the learning process. For educational institutes to seek the appropriate ways to provide substance and arrange activities in line with the learners interests and aptitudes, bearing in mind individual differences. For learners to fully reap the rewards of their studies, they must be exposed to authentic experiences with practical work. For teachers, it is essential to disseminate a balanced integration of subject matter, integrity, values and desirable attributes. They must be able to create the environment, instructional media, and provides facilities for learners to learn. Therefore, both learners and teachers may learn together from different forms of teaching-learning media and use inside or outside sources of knowledge. The media themselves naturally extend to the actual learning place (ONEC, 2004).

The current teaching and learning environment is one part that needs a change due to technological influence. Several teachers and educators view technology as a center of the education reform while others realize certain necessities to point out the technological influence in teaching. At present, more teachers are using technology as teaching instruments. Winnie Tsang-Kosma said educators, parents and learners believe the applications of technology in the education system can raise the education level (Tsang-Kosma, 2000). Similar to what Yuen Pooworawan. said, technology currently plays an important role in students and becomes tools in collecting information, knowledge, and high-speed and large communications (Pooworawan, 2003). This also brings success to the modern ways of learning. The learning reform focusing on the student-centered learning needs to encourage students to learn happily and develop at their full potential. Learners know how to learn on their own pace, how to develop relationship skills and how to use technology to improve their knowledge. All of these follow the education philosophy and learning

theories. Learning organizations are now based on the applications of computer technology to produce learning materials.

## *2. The ADDID model*

In a study of the synthesis of a model for processing learning reform using computer technology by Pisutta Arreeraad and Monchai Tiantong. This model indicated the relationship of processes for developing activities under the learner-centered activities. The processes to synthesize the model consisted of five steps: 1) Literature review from related papers, 2) Interviews of twenty-seven related experts who are experts in education, learning

reform, and computer instruction, 3) Defining a framework and drafting a model, 4) Surveys of the opinions of twelve related experts to validate the drafted model, and 5) Revision of the model according to experts' opinions and conclusions. The study tools were rating-scale questionnaires, and open-ended questionnaires using mean and standard deviation for data analyzing. The findings of this study are called "ADDID model", and consisted of five steps: 1) A: Analysis to surveying the problems and the requirements, 2) D: Design the learning activities, 3) D: Development of computer learning instrument, 4) I: Implementation, and 5) D: Documentation. The results of the survey from twelve related experts on the synthesized ADDID model were at a high level as follows: the degrees of the suitability of the model, the learning process based on the learner-centered activities, and the modernization and implementation of the model. This study concluded that the ADDID model can be used to guide the education reform in all aspects for improving the quality of education according to the 1999 National Education Act of Thailand successfully (Tiantong, 2007).

In detail, the synthesized model for processing the learning reform using computer technology are as follows:

#### I. A - Analysis phase

- Literature review and cover research relating to the 1999 National Education Act, curriculum, course description, learning objectives, learning theories, evaluation, teaching material and framework of instructor.
- Survey actual condition, problems on teaching-learning management from instructors, learners, administrators and parents.
- Analyze the learning outcome from surveying the readiness and needs of the learning reform from instructors, learners, administrators and parents based on readiness, needs, interest and background knowledge of learners.
- Conclude an actual condition, problems, readiness, needs, learning outcome, interest of instructors, learners, administrators and parents on learning activities and present the possible strategy about learning activities.

The results of the analysis phase presents the conditions, problems, teaching-learning management, readiness, need and learning outcome of learning reform.

#### II. D - Design phase

- Integrating knowledge with learning activities by the experts. Interview or set a meeting for instructors or those who relate to integrate knowledge with learning activities, and the most appropriate learning activities referring to the learners' interest and needs.
- Design a model for learning activities using computer based instruction relying on mentioned theories, and set variety of different activities based on clear learning objectives, and relating to the contents assessed. The assessment instrument should be varied and authentic.
- Learning activities and instruments should be examined by the experts.

The results of the design phase presents the appropriate learning activities using computers.

#### III. D - Development phase

- The learning instrument of each activity consists of objectives, content, tests, teaching material and a handbook.
- The process of designing a learning instrument based on learners need and appropriateness.
- Try out the learning instrument with a small group to find out the weakness and strength of the learning instrument.
- Correct and develop the learning instrument.
- Examine the developed learning instrument with experts.

The result of the development phase presents a model for learning activities with computers.

#### IV. I - Implementation phase

- Arrange a learning environment, atmosphere, resource and materials by instructors, learners and those relating to it.
- Test and survey the aptitude of learners before learning with the developed instrument.
- Organize the developed learning activities and assess the learning performance with learners participating in assessment.
- Test and survey the aptitude of learners using the developed instrument after learning.
- Discuss, analyze and conclude.

The results of the implementation phase presents the qualified learning instrument using computers.

#### V. D - Documentation phase

- Make a report, supplementary document, material and handbook of learning activity.
- Collect and classify documents, learning instruments, handbook and material.
- Present and promote the research.

The results of the documentation phase presents a result report of a qualified model of the learning activities, instruments, handbooks and materials using computers.

The survey, however, was largely performed to see whether it suited and corresponded to the 1999 National Education Act, as well as to estimate the future applications of the model. The sub-components and the five operational stages of the ADDID model still need an in-depth examination. The researchers also aimed at getting the sub-components and the individual stages of the learning process model using the computer-based instruction to be examined by the highly experienced specialists of student-centered learning and teaching in the country, like model teachers, leading teachers and national teachers in the related fields.

Thus, the aims of this study was to survey the opinion of the master teacher on the sub-components activities of the ADDID model to support education reform.

In terms of master teacher, the qualified experts that the GEA consensus conference guidelines to come with a definition of a “master teacher” as follows: 1) a master teacher has clear, realistic and important goals that reflect the needs of the profession, society, learners and other faculty, 2) she/he is prepared to teach effectively, and takes advantage of new ways to deal with challenging issues, 3) she/he uses appropriate methods to teach or design an educational program, gets others meaningfully involved, and designs curriculum consistent with the current literature in the content area and in teaching, 4) she/he employs educational strategies that can serve as a model for others. Goals are outlined. Results are publishable or published, 5) she/he formally shares lessons learned or enduring materials with peers at the local, regional, or national level, 6) she/he acts as a peer reviewer for others on educational grants, journals, curriculum or awards, 7) she/he uses feedback from learners and peers to modify teaching materials, leadership style, or educational materials, 8) she/he provides leadership of educational programs, supplying vision and direction while incorporating effective group processes to achieve desired programmatic goals effectively and efficiently, and 9) she/he serves the educational community through active participation in and contribution to local, regional, national, and international educational organizations (AAMC, 2010; The University of Texas, 2011).

#### Methods

##### 1. Research procedure

1.1 Synthesize the learning reform model using a computer and information from papers and related research articles, starting with developing the drafted model, conducting in-dept interviews about the model with five master teachers in learning reform, and then summarizing the components of the synthesized model.

1.2 Select the master teachers with the best qualifications from the teachers appointed to be the national teachers, leading teachers, or the model teachers by the office of the secretary of the Education Council and focus only on the teachers who teach computers, science or mathematics.

1.3 Produce the instrument to collect data, which was the five-scaled questionnaire.

1.4 Evaluate the synthesized model by sending the copies of questionnaire to ninety selected master teachers.

1.5 Analyze the information and summarize the results. The average mean and standard deviation were applied to the data analysis.

##### 2. Population and sample

The population in this study were ninety-five master teachers divided into two groups: five persons for an in-dept interviewed in the first stage, and ninety persons for data surveying in the second stage.

#### Results

##### 1. The sub-components activities of the ADDID model

The sub-component activities of the ADDID model from the opinion of the master teachers are as follows:

##### I. A – Analysis phase, followed these steps:

1. Study papers and related research, journals and articles as follows:

1.1 The learning process organization stated in the 1999 National Education Act.

1.2 The basic education philosophy in learning reform includes progressivism and lifelong learning.

- 1.3 The learning theories that support the learning reform are behavioral learning theory, cognitive learning theory, information processing theory, constructivism theory and constructionism theory.
  - 1.4 The computer technology was applied as an instrument in producing the media.
  - 1.5 Learning organization consisted of learning model and method, learning assessment and evaluation, and producing learning materials.
  - 1.6 The goal of the curriculum was indicated in the course objectives, course description, learning objectives and learning goals.
2. Survey the present situations in organizing learning from people in related fields, like teachers, learners, administrators, parents and entrepreneurs in order to use this information in preparing and organizing learning. The survey would focus on the following:
- 2.1 The needs and potentials of the learners
  - 2.2 The conditions and problems of learning organization
  - 2.3 The preparation of the universities in organizing learning.
3. Survey the expectations of the learning organization from people in related fields, like teachers, learners, administrators, parents and/or entrepreneurs in order to use this information in preparing the learning organization. This depends on the preparation, needs, attention and previous knowledge of the learners. The survey would focus on the following:
- 3.1 Learning outcomes
  - 3.2 Scope of the contents
  - 3.3 Suitable learning materials
  - 3.4 Assessment and evaluation
4. Summarize the conceptual framework of learning organization based on the present status, learning reform, learning psychology theory, education philosophy, the importance of technology and the expectations of the learning organization. This depended on the preparation, needs, attention and previous knowledge of the learners and they could be used to design the learning organization.

The result of the analysis phase was the teacher could apply the basic framework in organizing the student-centered learning. This could be observed in previous research and in the survey with the teachers, learners, administrators, parents and/or entrepreneur in order to be used as the basis in designing the next stages of the learning organization.

#### *II. D – Design phase, consisted of the following:*

1. Design the student-centered learning model using the computer, which was based on the cognitive framework in the analysis phase. This student-centered learning model using the computer was the plan showing the relationship of the learning activities. In a course, there might be various activities such as lectures, demonstration, small group discussion, experiments, cooperated learning, self-study and CAI learning. In each learning activity, several instruments were applied in organizing the learning process and were developed using the computer. The design phase, thus, focused on the following:
  - 1.1 The expected learning outcome of the learners
  - 1.2 The contents of the lessons divided into modules.
  - 1.3 Methods and principles in organizing learning
  - 1.4 Learning media
  - 1.5 Assessment and evaluation
2. Design the learning activities and the instruments of the learning model. In each activity, consider to apply computer technology as a tool in developing education media.
  - 2.1 Determine the learning model and results as estimated by the learners.
  - 2.2 Set up the standard design. The standard screen design consisted of screen design, user interface, and documentation.
  - 2.3 Courseware Design was to design the lessons after the analysis of the contents. Consider the learning process to see how to present the contents and organize the lessons to meet the objectives. This process would be applied to produce the presentation materials with computer technology, including the contents of the lessons, activities and learning materials, quizzes, pretest and posttest, stimulation, feedback, reinforcement and interactive activities in the lessons.
  - 2.4 Lesson flowchart and storyboard design
    - 2.4.1 Lesson flowchart was to design the diagrams to present the relationship of the storyboard design and order of contents to see how they are related to each other and arrange them into a chronological order and use them as guidelines in developing the lessons.

- 2.4.2 The storyboard design was to describe the story of the lessons, consisting of contents divided into small sections according to their objectives. In designing, draw little frames from the first to the last. The storyboard design had description, pictures, questions and answers, and more, as stated in the learning stages.
3. The research also had the experts examine the developed learning model using the computer and the completed activities and instruments.
4. Improve the developed learning model using the computer and the completed activities and instruments correctly and appropriately.

The results at this phase were the final learning model using the computer consisting of the activities and instruments examined by the experts.

*III. D – Development phase, contained these steps:*

1. develop activities, learning instruments and instruction manual of each activity as designed in the learning model using the computer.
2. Try out the activities and learning instruments with a small student group to find weaknesses and get their feedback from the implementation.
3. Improve the activities and learning instruments and make them suitable for use.
4. The experts examined the developed activities and learning instruments to see their appropriateness and accuracy.

The result of this phase was the activities and instruments of the learning model using the computer, which were already examined by the experts.

*IV. I – Implementation phase, divided into these steps:*

1. Plan the guidelines to organize activities with related people and determine the steps in organizing the learning activities and prepare the environment atmosphere knowledge source and materials.
2. Test the knowledge and opinion of the learners before the course using the developed instruments.
3. Organize the learning activities and assess the learning outcomes according to the developed student-centered learning model using the computer.
4. Test the knowledge and opinion of the learners after the course using the developed instruments.
5. Discuss the results with learners to collect information about applications of the learning model using the computer.
6. Analyze and summarize the results of developing the learning model using the computer.

The result of this implementation was to find the efficiency of the learning model using the computer, learning achievement, effectiveness index, including the overall efficiency of the model and the efficiency of the individual activities.

*V. D – Documentation phase, consisted of the following steps:*

1. Write the results report and edit the instruction manual of learning activities and that of learning materials.
2. Collect the learning instruments and classify them into separate groups for learners' convenience.
3. Save and store the learning activities and other materials for future use.
4. Present and publish the results of organizing learning activities.

The result of this phase was the written report of the learning model, which described the results of organizing learning activities, the instruction manual of the learning activities and the instruction manual of learning materials.

In conclusion, all process/activities concerned the ADDID model are shown in Table 1.

Table 1. All processes/activities concerned the ADDID model

Stage	Process/activity	Outputs
A - Analysis	<ol style="list-style-type: none"> <li>1. study papers, articles, journals and related research (the 1999 National Education Act, education philosophy, learning theories, and computer technology)</li> <li>2. survey the present situations (needs and potential of the learners, conditions and problems)</li> <li>3. survey the expectations of learning</li> <li>4. summarizing the conceptual framework</li> </ol>	needs, goals, conditions, learning scope, learning outcomes, conceptual framework
D - Design	<ol style="list-style-type: none"> <li>1. design the student-centered learning model using the computer (learning outcomes, lesson contents, methods and principles, media)</li> <li>2. design the learning activities and instruments (standard screen design, courseware design)</li> <li>3. examine the develop learning model</li> <li>4. improve the developed learning model</li> </ol>	expected learning outcome, contents, methods, media, assessment and evaluation, lesson flowchart, storyboard, courseware
D - Develop	<ol style="list-style-type: none"> <li>1. develop activities and learning instruments using the computer</li> <li>2. try out the activities and learning instruments</li> <li>3. improve the activities and learning instruments</li> <li>4. examine the created activities and learning instruments</li> </ol>	activities and learning instruments
I - Implement	<ol style="list-style-type: none"> <li>1. plan the guidelines to organize activities</li> <li>2. test the knowledge and opinion of learners before the course</li> <li>3. organize the learning activities and assess the learning outcomes</li> <li>4. test the knowledge and opinion of learners after the course</li> <li>5. discuss the results with the learners</li> <li>6. analyze and summarize the results</li> </ol>	efficiency of the learning model using the computer, learning outcomes, learning achievement, effectiveness index
D - Documentation	<ol style="list-style-type: none"> <li>1. write the results report and edit the instruction manual</li> <li>2. collect the learning instruments</li> <li>3. save the learning activities on the storage or other materials</li> <li>4. present and publish the results</li> </ol>	report of the learning model, instructional manual of activities

### 2. The results of the model

The opinion level of ninety master teachers to examine the appropriateness of the model were expressed using the five-rating scale questionnaire as in Table 2.

Table 2. The analysis of the experts' opinion on the five stages of the learning reform model using the computer (the ADDID model)

The appropriateness of the stages of the ADDID model	Mean	Standard Deviation	Interpretation
A - Analysis phase	4.64	0.59	highly appropriate
D - Design phase	4.63	0.37	highly appropriate
D - Development phase	4.74	0.51	highly appropriate
I - Implementation phase	4.71	0.86	highly appropriate
D - Documentation phase	4.75	0.74	highly appropriate
The overall appropriateness of the stages	4.69	0.58	highly appropriate

In Table 2, the examination of the models performance by master teachers were at the very high level of appropriateness (Mean = 4.69, S.D. = 0.58).

### Conclusion

In general, teachers, educators, academic administrators, and researchers all seem to agree on the potential of computer technology to have a significant and positive impact on education, particularly on education reform that comprises any planned changes in the way a school or school system functions, from teaching methodologies to administrative processes (Cuban, 1988), because education reform could help all students learn more by demanding higher student proficiency and providing effective methods to help students achieve high standards, provide parents, schools, and communities with an unprecedented opportunity to debate and reach agreement on what students should know and be able to do, focus the education system on understandable, objective, measurable, and well-defined goals to enable schools to work smarter and more productively, reinforce the best teaching and educational practices already found in classrooms and make them the norm, and provide real accountability by focusing squarely on results and helping the public and local and state educators evaluate which programs work best (Gamage, 2004; Tan, 2007). However, the precise role of computer technology in education reform and how best to ensure that potential is important. Moreover, the use of computers in education will only create a positive impact on the community when the role of every stakeholder in education is clearly defined and effectively implemented. This can only be done by people with a sound knowledge of education and computer technology (Walker, A. & Dimmock, C, 2002).

For these reasons, the ADDID model (a model of the learning reform process through the computer network system) has been created and published for developing the lessons based on computer technology, such computer networks as the intranet, extranet or internet to support education reform which is the core principles of the 1999 National Education Act of Thailand.

This study focused on to surveying the opinion of master teachers on the sub-components activities of the ADDID model to support education reform. The results show the master teachers were very satisfied with the learning reform model using the computer in this research. The result of this study was a learning model finally passed at a high satisfaction level which was more reliable. In conclusion, this can be used with sub-components activities of the ADDID model to design and create the activities of student to complete lessons such as e-learning, computer-based instruction, etc. to support education reform successfully.

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