

The Development of Teaching Model of Basic Computer Course for Undergraduate Students in Faculty of Education at Si Ayutthaya Rajabhat University Group

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Abstract - The purposes of this research were: 1) to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group, 2) to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group, and 3) to examining the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The research was divided into 3 phases.

Phase 1: to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The population were the undergraduate students of the Faculty of Education at nationwide Rajabhat University. The samples were the undergraduate students who were enrolled in the basic computer course of the first year in the first semester of 2014 with a sample size of 20 parameter per one variable. This research contained 20 variables. The sample of 441 students from five universities with a multi-stage random sampling. The instruments of this study were three parts: 1) learning achievement test of basic computer course with the

reliability level of 0.81, 2) skills assessment form of basic computer course with the reliability level of 0.88, and 3) questionnaire the casual factors that affected achievement of learning of basic computer course with the reliability level of 0.81. The statistics for data analysis were mean, standard deviation and statistical analysis of the influence of the causal factors.

Phase 2: to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The development of teaching model were 5 process as follows: 1) studying the textbooks, curriculum, academic papers, and related research, 2) drafting of the teaching model, 3) doing the Focus Group with 5 computer experts, 4) checking of the consistency and appropriateness of the teaching model by 5 experts, and 5) to improve the teaching model before the field trials.

Phase 3: to examine the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The population were the undergraduate students who were enrolled in the basic computer course of the first year in the first semester of 2015 at Si Ayutthaya Rajabhat University Group. The

sample of 39 second year students at Faculty of Education in English Major under the learning code 56810201 from the Simple Random Sampling by lottery. The instrument used in the research were 3 as follows: 1) The teaching plan of basic computer course, 2) achievement test of learning of basic computer course, and 3) assessment form of learning achievement of basic computer course. The statistics for data analysis were mean, standard deviation and t-test dependent.

The results of the research were found that: 1) The latent variables of the instructor factor, the learner, the process of teaching, and the achievement. Four factor is a causal relationship. The process of teaching (PRO) is a causal factor influencing instructor factor (INS), the learner (LEA), the achievement of learning (SUC) with the influence coefficients (path coefficient) of 0.97, -0.29, and -0.92 respectively. At the same instructor factor (INS) influenced on the learner factor (LEA) the achievement of learning (SUC) with coefficients of 0.85 and 0.97 respectively and the learner factor (LEA) influenced on the achievement of learning (SUC) with the influence coefficient of 0.79, 2) The teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group was composed of 4 factors as follows: (1) The theory/principle/concept of model; (2) The objectives of model; and (3) The step of learning activities which were 4 sub-steps as: (1) Initiation; (2) Iconic; (3) Implementation; and (4) Closure 4 Measurement and evaluation of model, and 3) The result of developing the teaching model of the basic computer course for the undergraduate students at Si Ayutthaya Rajabhat University Group appeared that the effectiveness of the cognitive domain (COG) mean = (47.72, SD = 3.96) the effectiveness of the psychomotor domain (PSY) (mean = 20.44, SD = 3.65) and The statistical t-test dependent found that the effectiveness of the cognitive domain (COG), the t-value was equal to -14.40 with

statistical significance of .01 level and for the effectiveness of the psychomotor domain (PSY), the t-value was equal to -91.24 with the statistical significance level of .01.

Keywords - Triple IC, Teaching Model of Basic Computer Course, Learning Achievement of Basic Computer Course

I. INTRODUCTION

Computers and information and communication technology (ICT) are tools to collect, process, and disseminate information regarding the education in the formats of texts, images, multimedia, or e-Learning as tools to support the operation of the schools and institutes such as registration system, library system, and the course schedule system. Therefore, the development of the knowledge and the skills to utilize computers and ICT are necessary for the local population to have advantage over the competitors.

As in the United States of America, a private company and a professional organization, together with the State Office of Education established a network of Partnership for 21st Century Skills which required the undergraduate students and graduates to have literacy in information, media, and ICT. These allow the American labors to compete in the global level [1].

Thailand focuses on ICT to develop the skills for the personnel domestically. This is considered from the National Education Act of 1999 which stipulates that schools and educational institutes must provide learning process of training the cognitive skills, management, confronting a difficult situation, and the application of knowledge. And the Ministry of Education has prepared a National Qualifications Framework for Higher Education by specifying that ICT becomes one of the compulsory courses for those who do not majoring in ICT as a general education course [2]. In addition, the National Economic and Social Development Plan has established guidelines for reforming the education system from primary education to lifelong learning by

focusing on adapting the curriculum and developing the teaching methods using technology [3].

The authors then studied the results of the states and problems of using ICT in teaching both in high school level and undergraduate level. It was found that there are issues with developing the students in terms of their knowledge and skills of utilizing computers and ICT. These studies are from: 1) a survey research exploring the state and problems of using ICT in teaching teachers from the leading secondary schools under the Institute for the Promotion of Teaching Science and Technology found that teachers are facing problems while using ICT in teaching [4], 2) a survey research exploring learning problems found in undergraduate students studying the Bachelor of Science in Computer Science program offered by the Rajabhat Rajanagarindra University. The results showed that the Vocational Examination measuring and evaluating the academic achievement of the students was difficult to answer. In addition, the textbooks and teaching materials are not available [5], and 3) a survey research exploring the factors that promote learning through network for Undergraduate Special Program offered at the Valaya Alongkorn Rajabhat University. It was found that teachers were emphasizing the lecturing type method of teaching resulting in the lack of opportunity for the students to practice in the classroom. Furthermore, the students are reluctant to raise questions when they do not understand the content [6].

As a response to the national education policy and the needs of society to push for education reform at all levels.

To provide the students with knowledge and skills and the skills to use computers and information technology and communications were concrete. The focus on adaptation courses and teaching methods. The authors have developed the teaching model for basic computer course for the undergraduate students at Si Ayutthaya Rajabhat University Group. This study is divided into third phases:

1) to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group, 2) to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group, and 3) to examine the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group.

II. RESEARCH FRAMEWORK

Phase 1: to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group.

The conceptual framework of the research has come from the study of theories, texts, and related studies. The results indicated that instructor factor, learner factor, and the teaching process are the causal factors that affect the academic achievement of the students. This can be explained by Structural Equation Model: SEM, consisting of four latent variables. These include the instructor, the learner, the teaching process, and the teaching effectiveness of the basic computer courses. There were 16 observable variables with a total of 20 variables, including: 1) the instructor factor as a latent variable comprised of 5 observable variables composing of 1.1) knowledge and skill [7]; 1.2) teaching skill [8]; 1.3) personalities [9]; 1.4) reinforcement [10]; and 1.5) feedback and editing [11], 2) the learner factor as a latent variable comprised of four observable variables composing of 2.1) fundamental and background knowledge [12]; 2.2) personal interest [8]; 2.3) attitudes [8]; and 2.4) motivation [13], 3) teaching process as a latent variable comprised of 5 observable variables composing of 3.1) the purpose of learning [7]; 3.2) content [14]; 3.3) in-class activities [7]; 3.4) instruction media [8]; and 3.5) measurement and evaluation [8], and 4) the academic achievement in the basic computer courses as a latent factor comprised of 3 observable variables composing of 4.1) cognitive domain; 4.2) affective domain; and

4.3) psychomotor domain [15].

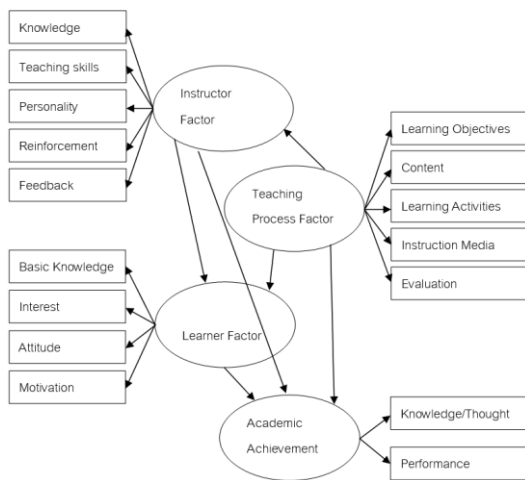


Fig. 1 The conceptual framework of the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University group.

Phase 2: to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group.

The conceptual framework of the research has come from the study of theories, texts, and related studies. The results indicated that ‘ICT for Teachers’ is a lesson inserted into the basic computer courses according to the Teacher’s Occupational Standards. The students need to learn academic standards and performance standards following the regulation issued by the Teacher Council [16]. Constructionism Theory and Intellectual Development Theory are theories that considered appropriated theories to assist in developing the basic computer courses teaching model. There are four steps that affect the academic achievement of learning standards and performance standards, including the introduction to the lesson (Initiation) [17], the learning from ideas (Iconic) [18], the creating of projects (Implementation) [19], and the summarization of the important ideas (Concepts) [20], in which the authors called "TRIPLE IC," by adopting the learning model to be used in conjunction with the lesson plan. The knowledge assessment and performance skills evaluation can describe the development of teaching basic computer courses model with

the System approach consisted of four systems including input data, process of model development, output, and feedback. 1) The data input has 5 types of information including: 1.1) the study of the state and problems of teaching basic computer courses [4-6]; 1.2) the study of the curriculum [21]; 1.3) the study of the causal factors that affect the teaching of the basic computer courses; 1.4) the research and development of teaching model [17, 19, 20-25]; and 1.5) theory / principles / learning concepts [17, 18], 2) The development of model process has four sub-processes including: 2.1) the analysis and synthesis of the input data; 2.2) drafting of the teaching model; 2.3) groups discussion with 5 specialists; 2.4) assessing the appropriateness of the model monitoring by 5 qualified experts; and 2.5) the improvement and the editing of the teaching model prior to the trial, 3) The output is the teaching basic computer courses model for the undergraduate students at Si Ayutthaya Rajabhat University Group. There are 3 aspects including: 3.1) theories / principles / teaching model concepts; 3.2) the teaching steps according to the model; and 3.3) the implementation of the model, and 4) The feedback (feedback) is the result or the development of the teaching basic computer courses model for the undergraduate students at Si Ayutthaya Rajabhat University Group. This considered the response to the drawbacks and the improvement to increase the quality which will render the teaching to be more effective [11].

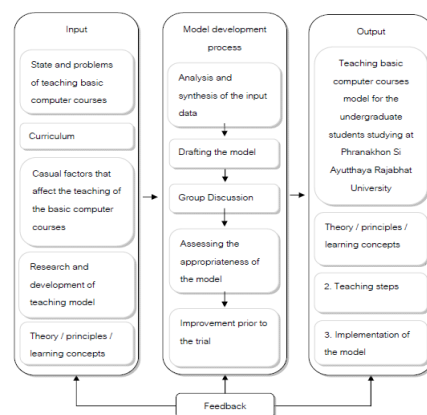


Fig. 2 The conceptual framework of the development of the teaching model in the basic computer course for the undergraduate students at Si Ayutthaya Rajabhat University Group.

Phase 3: to examine the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group.

The conceptual framework of the research has come from the study of theories, texts, and related studies. The results indicated that the teaching steps set out in the teaching basic computer model for the undergraduate students at Si Ayutthaya Rajabhat University Group [26] are correlated to the academic achievement of the undergraduate students at Si Ayutthaya Rajabhat University Group in terms of cognitive domain, affective domain, and psychomotor domain [27]. These can be explained by the correlation of the independent variables, which included the teaching basic computer model for the undergraduate students at Si Ayutthaya Rajabhat University Group, and the dependent variables, which included the academic achievement of the undergraduate students at Si Ayutthaya Rajabhat University Group in terms of cognitive domain, affective domain, and psychomotor domain.

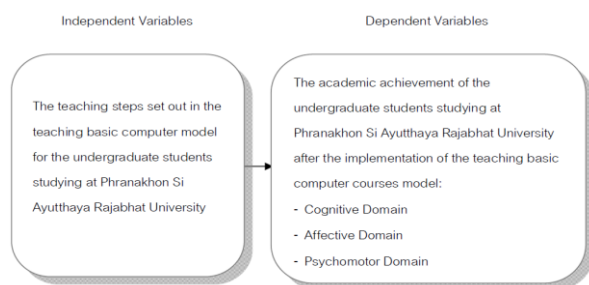


Fig. 3 The conceptual framework of the result of the teaching model of basic computer course for the undergraduate students at Si Ayutthaya Rajabhat University Group.

III. RESEARCH METHODOLOGY

Phase 1: to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The data derived from the texts, and related studies. The variables included four latent variables and 16 observable variables with a total of 20 variables. The population included the undergraduate students under the Faculty of Education, Si Ayutthaya Rajabhat

University nationwide. The sampling group was enrolled in the basic computer courses in the first academic semester, academic year 2014 with a sample size of 20 participants per one variable [28]. This study comprises of 20 variables. The multi-stage random sampling group from 5 different branches of Phranakhon Si Ayutthaya Rajabhat University including 89 participants from Valaya Alongkorn Rajabhat University, 116 participants from Rajabhat Rajanagarindra University, 86 participants from Thepsatri Rajabhat University, and 85 participants from Rambhaibarni Rajabhat University with a total of 441 participants. There were 3 instruments utilized in the study.

1. The teaching effectiveness test for undergraduate students at Phranakhon Si Ayutthaya Rajabhat University has one set including 8 topics with a total of 40 questions which were multiple choice questions. There were 4 options and the participants must choose the best answer. This was the test of the development of textbooks and researches. A panel of 5 experts examined the consistency of content (IOC). The acceptable score was ranged from 0.60 to 1.00. The quality was tested on the control sample of 30 participants using a Kuder Richardson: KR-20 which was 0.81, the difficulty (p) of the test ranged from 0.20 to 0.80, and the discrimination (r) of the test ranged from 0.20 to 0.67.

2. The causal factors affecting the teaching questionnaires for undergraduate students at Si Ayutthaya Rajabhat University Group have one set including 3 sections with a total of 66 questions. A rating scale of 5 levels was developed from texts and researches. A panel of 5 experts examined the consistency of content (IOC). The acceptable score ranged from 0.80 to 1.00. The quality was tested on the control sample of 30 participants using coefficient alpha type of confident value ranged from 0.97 to 0.98.

3. The basic computer skills assessment for undergraduate students at Si Ayutthaya Rajabhat University Group has one set including 1 section with a total of 5 questions. A rating scale was developed from texts and

researches. A panel of 5 experts examined the consistency of content (IOC). The acceptable score was equal to 1.00. The quality was tested on the control sample of 30 participants using coefficient alpha type of confident value which was equal to 0.88. The tests were investigated for the authenticity by a supervisor before an actual implementation. The statistical methods used to analyze data were mean value, standard deviation, and statistical analysis of the influence of the causal factors.

Phase 2: to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The data were collected from investigating the theories, texts, and related studies. The teaching basic computer courses model for the undergraduate students at Si Ayutthaya Rajabhat University Group consists of 3 parts including: 1) Theory / principles / concepts, 2) the teaching steps, and 3) the actual implementation of the model. The utilized data were divided into 5 sections including: 1) studying the state and problems of teaching basic computer courses, 2) the curriculum, 3) studying the causal factors that affect the teaching of the basic computer courses, 4) researching and developing the teaching model, and 5) theory / principles / learning concepts. The data were considered using 5 processes including: 1) analyze and synthesize the texts, documents, and related studies, 2) draft the teaching model for the undergraduate students at Si Ayutthaya Rajabhat University Group, 3) focus groups discussion with 5 specialists, 2.4) assess the consistency and the appropriateness of content (IOC), and 2.5) improve and edit the teaching model for the undergraduate students at Si Ayutthaya Rajabhat University Group prior to the trial by a supervisor.

Phase 3: to examine the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The data were collected from investigating the theories, texts, and related studies. The variables consisted of independent variables, which included the teaching basic computer model for the

undergraduate students at Si Ayutthaya Rajabhat University Group, and the dependent variables, which included the academic achievement of the undergraduate students at Si Ayutthaya Rajabhat University University Group in terms of cognitive domain, affective domain, and psychomotor domain. The population included the students who were enrolled in the basic computer courses in the first academic semester, academic year 2015. The sampling group was 39 second year students studying under the student group ID 56810201, English Major, Faculty of Education. The participants were collected by casting of the Simple Random Sampling. The study utilized 3 tools:

1. Learning management plan for undergraduate students at Si Ayutthaya Rajabhat University Group consisted of the teaching plans for learning lessons. One lesson has 6 components, including: 1) the key subject matter, 2) the purpose of learning, 3) the content, 4) learning activities, 5) instruction media, and 6) measurement and evaluation. There was one set of 13 chapters. A panel of 5 experts examined the consistency of content (IOC). The acceptable score was equal to 1.00.

2. The teaching effectiveness test of the basic computer courses for undergraduate students at Si Ayutthaya Rajabhat University Group consisted of one set including 13 chapters with a total 60 questions which were multiple choice questions. There were 4 options and the participants must choose the best answer. This was the test of the development of textbooks and researches. A panel of 5 experts examined the consistency of content (IOC). The acceptable score ranged from 0.80 to 1.00. The quality was tested on the control sample of 30 participants using a Kuder Richardson: KR-20 which was 0.81, the difficulty (p) of the test ranged from 0.20 to 0.80, and the discrimination (r) of the test ranged from 0.20 to 0.67.

3. The basic computer teaching effectiveness assessment for undergraduate students at Si Ayutthaya Rajabhat University

has one set including 13 chapters with a total of 89 steps. A rating scale of 5 levels was developed from texts and researches. A panel of 5 experts examined the consistency of content (IOC). The acceptable score ranged from 0.80 to 1.00. The assessment was corrected and examined by a supervisor prior to the actual implementation. The statistical methods used to analyze data were mean value, standard deviation, and T-Test Dependent for experimental group, pre-and post-classes.

IV. RESEARCH FINDINGS

Phase 1: to study the casual factors that affected the achievement of learning of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The results showed that:

1. Learner factor (LEA) as a latent variable has 4 observable variables including the motivation for achievement (ACH) with the mean = 3.87, SD = 0.73, the attitude (ATT) with the mean = 3.77, SD = 0.73, and the interest towards the course (INT) with the mean = 3.64, SD = 0.76 were considered at a high level while the background knowledge (ACH) mean = 3.38, S.D = 0.78 was considered a moderate level.

2. The instructor factor (INS) as a latent variable had 5 observable variables including personality (PER) with the mean = 3.97, SD = 0.72, the teaching (TEA) with the mean = 3.75, SD = 0.72, the reinforcement (PEI) with the mean = 3.73, SD = 0.75, the wisdom (WIS) with the mean = 3.66, SD = 0.70, and the feedback and improvement (FEE) with the mean = 3.62, SD = 0.78 were considered at a high level.

3. The teaching process (PRO) as a latent factor has 5 observable including the learning material and content (MAT) with the mean = 3.80, SD = 0.75, the instruction media (MED) with the mean = 3.80, SD = 0.75, learning activity (ACT) with the mean = 3.79, SD = 0.73, the purpose of learning (PUR) with the mean = 3.75, SD = 0.69, and measurement and

evaluation (MEA) with the mean = 3.72, SD = 0.79 level were considered at a high level.

4. The success of teaching basic computer courses (SUC) has 2 observable variables including knowledge and cognition (COG) with the mean = 3.32, SD = 0.91, and psychomotor (PSY) with the mean = 3.38, SD = 0.78 were considered at a moderate level.

The statistical mean and the standard deviation results of the causal factors that influence the teaching of the basic computer courses for the undergraduate students at Si Ayutthaya Rajabhat University Group showed that the latent variables of the learner, the instructor, the teaching process, and the academic achievement with the total of 4 factors were causally correlated. The process of teaching (PRO) is a causal factor influencing the instructor (INS), the learner (LEA), and the success of teaching basic computer courses (SUC) with the path coefficients 0.97, -0.29, and -0.92 respectively. Concurrently, the instructor factor (INS) has an influence on the learner factor (LEA) and the success of teaching basic computer courses (SUC) with coefficients of 0.85 and 0.97, respectively. The learner factor (LEA) has an influence on the success of teaching basic computer courses (SUC) with the influence coefficient of 0.79.

Phase 2: to develop of teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The results showed that: there were two theories which were considered appropriate for the teaching model including the theory of constructionist learning, self-creating of knowledge, developed by Seymour Papert and the theory of constructivist learning, intellectual development, introduced by Jerome Bruner. The principles of the theory lead to the process by which teachers take actions to give the learners the examples. Therefore, the learners can visualize and symbolize in order for them to observe and think (Iconic Stage). The students then will be able to perform and create projects by themselves with materials, equipment, and

technology which enable the abstract learning to be more concrete. The concept of the model consists of three parts: 1) The students must have basic knowledge, interest, attitude, and motivation for achievement, 2) The teachers must be knowledgeable in teaching skills, personality, reinforcement, and are able to conduct feedback and improvement for the basic computer courses, and 3) The teaching process consisted of the objectives, the content, the in-class activities, the instruction media, and the measurement and evaluation in which the theory / principles / teaching concepts of the basic computer courses for undergraduate students at Si Ayutthaya Rajabhat University Group were examined by the basic computer courses teaching specialists via the focus groups discussion. The result of the evaluation of the theory / principles / teaching concepts was considered to be appropriate. The evaluation was followed by the investigation of a panel of 5 experts regarding the consistency of content (IOC). The acceptable score was equal to 1.00.

The teaching steps of basic computer courses for the undergraduate students at Si Ayutthaya Rajabhat University Group that have been developed is called "TRIPLE IC." The four stages include: 1) Initiation, 2) Iconic or learning from ideas, 3) Implementation, and 4) Closure or the lesson summary. A panel of 5 experts examined the consistency of content (IOC). The acceptable score ranged from 0.80 to 1.00.

The implementation of the learning model by the instructor complied with the theory / principles / concepts of the model and the basic computer teaching steps for the undergraduate students at Si Ayutthaya Rajabhat University Group. The panel of 5 qualified experts verified the consistency and the appropriateness of the teaching model (IOC). The consistency is equivalent to 1.00, which passes the qualification.

Phase 3: to examine the result of applying the teaching model of basic computer course for undergraduate students at Si Ayutthaya Rajabhat University Group. The results

showed that: the effectiveness of the cognitive domain variable (COG) showed the mean = 47.72, SD = 3.96, the effectiveness of the psychomotor domain (PSY) showed the mean = 20.44, SD = 3.65. The statistical dependent T-test found that the dependent variables for the effectiveness of the cognitive domain variable (COG), the t-value was equal to 14.40 with the statistical significance level of 0.01 and for the effectiveness of the psychomotor domain (PSY), the t-value was equal to 91.24 with the statistical significance level of 0.01.

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