

A Development of Instructional Model in Op-Amp and Linear IC Course of Diploma Electronic Students Using Distance Communication Technology and Information Technology

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Abstract - This research aimed to 1) develop instructional model for Op-amp and Linear IC Course, 2) gain the efficiency of instructional model comparing to standard criteria of 80/80, 3) study the learning achievement of the students, 4) study the teaching efficiency, and 5) evaluate the satisfaction of the students who studied via instructional model. The population was experts on educational technology and 120 diploma electronics student of Lamphun Technical College. The samples were 5 experts for quality evaluation and 46 diploma electronics students of Lamphun Technical College, derived from simple random sampling. The data was statistically analyzed by mean, standard deviation, and t-test for dependent group. The research findings were that: (1) the instructional model of Op-amp and Linear IC Course using distance communication technology and information technology is called HCL Model: Hyflex Constructionism Learning Model. The instructional model is flexible to learning environment using technology and learning process of constructionism that the learners studied both inside and outside the classroom, anytime and anywhere. The instructional model consisted of 4 components: 1) input, 2) process, 3) output, and 4) feedback. The instructional management composed of 11 steps, and 23 elements: 1) Analysis with 4 elements; 1.1 curriculum analysis, 1.2 content analysis, 1.3 learner analysis, and 1.4 basic system analysis, 2) Design and Development with 8 elements; 2.1 identify the learning purposes, 2.2 development of instructional objectives, 2.3 collecting and designing content, 2.4 selecting learning activities, 2.5 creating instructional communication, 2.6 selecting content delivering, 2.7 preparing learning resources, and 2.8 creating instructional method, 3) preparation with 3 elements; 3.1 orientation, 3.2 knowing the purposes, and 3.3 limitation, 4) Searching, 5) Data collection, 6) Planning, 7) Implementation with 4 elements; 7.1 surfing information, 7.2 trying out, 7.3 experiment result, and 7.4 the traceability view, 8) Evaluation with 3 elements; 8.1 progress, 8.2 process, and 8.3 product, 9) Presentation, 10) Published Works, and 11) Check with 2 elements; 11.1 progress and 11.2 process. The efficiency of instructional model evaluated by experts found that the efficiency was at the level of “most” (mean = 4.75, S.D. = 0.07), (2) The efficiency of instructional model (HCL Model) in Op-amp and Linear IC Course of Diploma Electronic Students Using Distance Communication Technology and Information Technology gained the standard criteria of 80/80 with 80.65/81.20, (3) The learning achievement of learners using HCL model was significantly higher at the level of .05 and the efficiency index was at .043, (4) The co-efficiency of variation that showed the instructional efficiency was

at 1.26, and (5) the satisfaction of the students to HCL Model was at the level of “much” (mean = 4.17, S.D. = 0.35).

Keywords - HCL Instructional Model, Op-amp and Linear IC Course, Learning Achievement

I. INTRODUCTION

Office of Vocational Education Commission (OVEC) aimed to reform the educational system by setting the policy in educational reform in the second decade (2009-2018) for Thai people for Lifelong Learning with high quality. The main three purposes were to develop the education quality and standard for Thai people, to increase the opportunity of education nationwide with high quality, and to enhance the participation of all for quality in society under 4 frameworks of educational reform; Quality of New Thai generation, Quality of Thai Teachers, Quality of Institutions and Learning Resources, and Quality of Educational Management [1]. In addition, the research of scenario of vocational education in Thailand during the next decade (2011-2021) found that the curriculum of vocational education should provide for the labor market in varieties of dimension; informal, non-formal education, dual vocational education, transfer of professional experience, and distance learning. The instruction should be flexible and response to the learners' and workplace's need [2]. This is to conclude that technology for instruction in the 21st century can be applied in dual vocational education, transfer of professional experience of vocational students. The appropriate instructional management is to use technology. The researcher intended to develop the instructional model using distance technology and information technology for the learners to learn anytime, anywhere for lifelong learning. The use of technology in learning management is the new alternation for education system to develop the efficiency of education system. The researcher applied this approach to develop the instructional model called HCL model for op-amp and linear IC course (3105-2003) using distance technology

and information technology as the educational reform in second decade (2009-2018) to response the lifelong learning.

II. RESEARCH FRAMEWORK

The development of instructional model using distance technology and information technology in the 21st century to response the concept of anytime, anywhere for lifelong learning used the instructional model called ADDIE Model [3] and the theory of constructionism [4] and mixed with Hyflex Learning [5] to support the teachers to manage the instruction individually.

III. RESEARCH METHODOLOGY

Population: the population was 5 experts derived from purposive sampling, and the 120 diploma electronic students of Lamphun Technical College. The samples were 46 diploma electronic students of Lamphun Technical College derived from simple random sampling.

Research instruments were: 1) research synthesis form, 2) instructional model using distance technology and information technology, 3) evaluation form of instructional model using distance technology and information technology, and 4) learning achievement pretest of 18 units that evaluated the quality with IOC between 0.67-1, difficulty between 0.20-0.80, discrimination between 0.20-1.00, and reliability = 0.95 [6], 5) skill test of 18 units that evaluated the quality with IOC between 0.67-1, difficulty between 0.25-0.78, discrimination between 0.21-0.54, structural validity between 0.31-0.66, Eigen value between 7.67-16.49, reliability = 0.87 and Coefficient rB = 0.88 [6], 6) learning achievement posttest of 18 units that evaluated the quality with IOC between 0.67-1, difficulty between 0.20-0.80, discrimination between 0.20-1.00, and reliability = 0.95 [6].

IV. RESEARCH FINDINGS

The study to develop the instructional model using distance technology and

information technology called Hyflex Constructionism Model or HCL Model which is flexible to learning environment and enhance the knowledge construction as the theory of constructionism which can be used inside and outside the classroom anytime and anywhere shown on fig. 1.

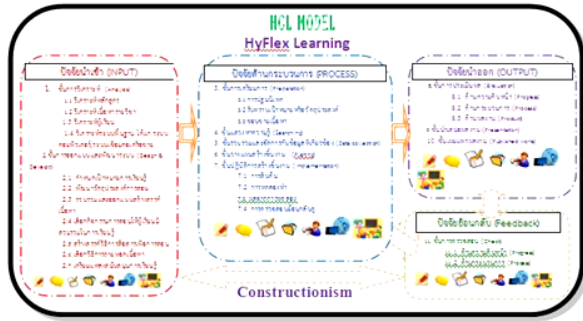


Fig 1. HCL MODEL

HCL Model composed of 4 components; 1) Input, 2) Process, 3) Output, and 4) Feedback. The instructional management composed of 11 steps, and 23 elements: 1) Analysis with 4 elements; 1.1 curriculum analysis, 1.2 content analysis, 1.3 learner analysis, and 1.4 basic system analysis, 2) Design and Development with 8 elements; 2.1 identify the learning purposes, 2.2 development of instructional objectives, 2.3 collecting and designing content, 2.4 selecting learning activities, 2.5 creating instructional communication, 2.6 selecting content delivering, 2.7 preparing learning resources, and 2.8 creating instructional method, 3) preparation with 3 elements; 3.1 orientation, 3.2 knowing the purposes, and 3.3 limitation, 4) Searching, 5) Data collection, 6) Planning, 7) Implementation with 4 elements; 7.1 surfing information, 7.2) trying out, 7.3 experiment result, and 7.4 The traceability View, 8) Evaluation with 3 elements; 8.1 progress, 8.2 process, and 8.3 product, 9) Presentation, 10) Published Works, and 11) Check with 2 elements; 11.1 progress and 11.2 process, shown in fig. 1. The evaluation by experts on HCL Model in instructional management in op-amp and linear IC course using distance technology and information technology gained the quality at the level of “most” in all functions and contents (mean = 4.75, S.D. = 0.07) and the

efficiency of instructional model (HCL Model) in op-amp and linear IC course of diploma electronic students using distance communication technology and information technology gained the standard criteria of 80/80 with 80.65/81.20 as shown in table I.

TABLE I
THE EFFICIENCY OF INSTRUCTIONAL MODEL (HCL MODEL)

	Pretest Score	Score between Learning 18 units	Posttest Score	E1	E2
Score	100	270	100		
Total Score	3075	10017	3735	3710	3735
mean	66.85	217.76	81.20	80.65	81.20

Table I showed the efficiency of instructional model (HCL Model) using distance communication technology and information technology gained the standard criteria of 80/80 with 80.65/81.20.

The result on learning achievement found that the learning achievement was significantly higher at the level of .05 with $t = 18.23$ as shown in table II.

TABLE II
THE LEARNING ACHIEVEMENT OF LEARNERS

No. of Sample N = 46	Pretest Score	Posttest Score
Total Score	3075	3735
\bar{X}	66.85	81.20
S.D.	5.15	1.02
t-test	18.229	

*Level of Significance .05, $df = 45$ (1.6794)

Table II showed the learning achievement of learners the study of instructional efficiency analyzed by co-efficiency of variation found that co-efficient of variation (CV) after the learning process was at 1.26 with mean at 81.20, and S.D. = 1.02.

The effectiveness index: E.I. was shown in table III.

**TABLE III
THE EFFECTIVENESS INDEX
OF INSTRUCTIONAL MODEL**

No. of Samples N = 46	Pretest Score	Posttest Score
Total Score	3075	3735
\bar{X}	66.85	81.20
(Effectiveness Index: E.I.)	0.43	

The satisfaction of the students to HCL Model was at the level of “much” (mean = 4.17, S.D. = 0.35). Considering on any item, the capability to learn anytime, anywhere, the satisfaction was at the level of “most” (mean = 4.72, S.D. = 0.61), the less was that learning can be done both inside and outside the classroom, the satisfaction was at the level of “most” (mean = 4.67, S.D.= 0.85), the learners constructed the knowledge form practical, the satisfaction was at the level of “most” (mean= 4.57, S.D.= 0.61), the application in daily life, the satisfaction was at the level of “much” (mean = 4.26, S.D.= 0.77), the creation of learning responsibility, the satisfaction was at the level of “much” (mean = 4.17, S.D.= 0.77), the support of learning inquiry, the satisfaction was at the level of “much” (mean = 4.11, S.D.= 0.77), the learner can individually study, the satisfaction was at the level of “much” (mean = 4.07, S.D.= 0.61), the learner participated in learning management, the satisfaction was at the level of “much” (mean = 4.00, S.D.= 0.56), the instructional model can improve learning achievement, the satisfaction was at the level of “much” (mean = 3.98, S.D.= 0.68), the immediately feedback and knowledge construction, the satisfaction was at the level of “much” (mean = 3.98, S.D.= 0.72), the fond of learning, the satisfaction was at the level of “much” (mean = 3.96, S.D. = 0.94), the ability to apply in other subjects, the satisfaction was at the level of “much” (mean = 3.85, S.D.= 0.63), and the creation of creativity, the satisfaction was at the level of “much” (mean = 3.69, S.D. = 0.43).

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

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