Design of an E-Learning Content Model for Student Guidance Based on Multiple Intelligence

Thongchai Kaewkiriya[1], Nattavee Utakrit[2], and Monchai Tiantong[3]
King Mongkut University of Technology North Bangkok, Thailand
[1]tkaewkiriya@gmail.com, www.it.kmutnb.ac.th
[2]nattaveeu@kmutnb.ac.th, www.it.kmutnb.ac.th
[3]drmonchai@gmail.com, www.it.kmutnb.ac.th

***Abstract* - The problem with e-Learning systems are that students are often given learning contents that do not match individual aptitudes. This paper aims to design an e-learning content model for student guidance which is based on multiple intelligences. Design of the e-learning content model was divided into seven parts as follows. The first part covered the learning activities. Second part was analysis of the learning activity. Third part was discussion of multiple intelligence. Fourth part was creation of learning subjects. Fifth part was the search for experts to evaluate the learning activity. Sixth part was the matching of class activities to the aptitude based on multiple intelligence. The last part was e-learning output content. According to the experts' evaluation, the concept model received an average satisfaction level total of 4.05/5.**

***Keywords* - E-Learning Content, Multiple Intelligence, Learning Activity**

I. INTRODUCTION

Currently, many educational institutions implement e-learning systems [1] which are used widespread for learning and teaching as e-learning systems are very convenient and saves a lot of cost when studying. In addition, students can learn from anywhere, anytime when connected to a network.

Effective learning and teaching relies on many factors such as availability of the teacher, student, tools that aid learning and teaching, and also learning contents which is especially important. Modern e-learning contents are now similar, if not the same as classroom based learning and teaching.

However, the fact that each student has different skills and abilities still remains. Currently, there has not been any research focusing on the design of e-learning contents that can also identify skill levels of students.

In the past, Tantirangsri and Boonrawd [2] proposed the development of computer contents which could help teaching through the internet by using the ADDIE Model with a graphic program. While Faisanoi [3] proposed the development of online contents that used cooperative learning techniques competitively which followed the Bloom Theory.

However, research [2, 3] presented the design and development of online contents which could not identify skill levels of learners. Sirindhorn [4] proposed the development of online contents from the topics of internet usage via adaptive learning techniques for students' abilities. However, this research only focused on the adjustment to be suitable for students and could not identify students automatically.

Moreover, Kaewkiriya and group [6] also proposed how to build a model to predict students' aptitude based on multiple intelligence. Research [5, 6] proposed the creation of the model to introduce students to learning according to their aptitude referring to Multiple Intelligence, but they did not propose a full design of learning contents which could match the different skill levels of learners.

According to the above mentioned issues, this research aims to propose the design of e-learning content which is based on the aptitude of Multiple Intelligence by analyzing learning activities.

Kaewkiriya and group [5] proposed a framework which attached an introduction system according to the aptitude of Multiple Intelligence.

II. BACKGROUND

The theory of Multiple Intelligent [7] states that each learner has a different aptitude to learning. The cognitive aptitude of a human can be divided into nine factors; Verbal Linguistic Intelligent, Logical Mathematical Intelligent, Musical Rhythmic Intelligent, Body Kinesthetic Intelligent, Visual Spatial Intelligent, Interpersonal Intelligent, Intrapersonal Intelligent, Naturalist Intelligence, and Existential Intelligence.

From all of these 9 factors, each person should have a different or unique intellectual score. Moreover, Gardner [7] further divided these factors into three sub groups: 1) Analytic skill, 2) Interactive skill, and 3) Introspective skill.

III. METHODOLOGY

Description of the proposed method in this research now follows.

A. Framework for Student Guidance

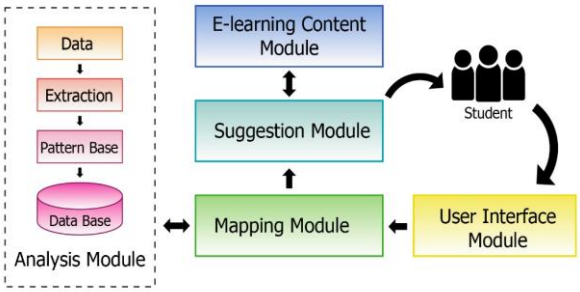

Fig 1. Framework for Student Guidance

Fig. 1. shows the framework for student suggestion which is divided into five modules as follows;

1. The pattern base module is a module that stores learning styles of students according to the multiple intelligences. This process consists of four stages. Step one collects data from questionnaires completed by students. Step two uses data from the first step to analyze and extract learning styles to the multiple intelligence via data mining. Step three is the end result from step two. Step four is the database storage process.

2. The suggestion module is a module that guides students to which learning content applies to them such as Analytic Content, Introspective Content, or Interactive Content.

3. The e-learning content module is a module that stores learning content collected from the analysis based on nine multiple intelligences factors which are divided into the three following groups: 1) Analytic content assigned to students who have aptitude in analysis and mathematical calculation, 2) Introspective content assigned to students who have the aptitude in imagination and arts, and 3) Interactive content assigned to students who have aptitude in communication and interactive with others. The design process of the above has been described in the concept design of e-learning content section.

4. The mapping module is a module for mapping data between student's profiles and

pattern base's data. The mapping process will be compared to learners with a pattern base.

5. The user interface module is a module that is the intermediary between the user and the system through the display screen.

B. Concept Design of E-Learning Content

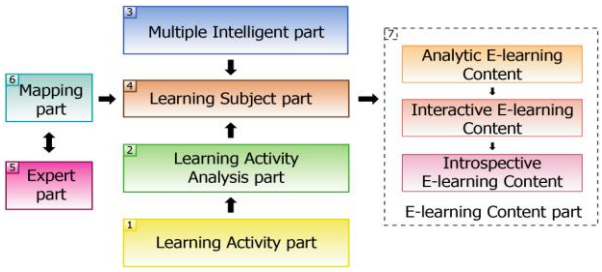

Fig 2. Concept of the Model for E-Learning Content

Process of model synthesis consists of four steps: 1) Information reviews and study, 2) Analysis step, 3) Model design based on MI theory, and 4) Evaluation by experts. Fig. 2. shows the design of e-Learning content which can be divided into the following seven parts;

1. The learning activity part is the collection of class activities to be conducted in the classroom for analysis in step 2. The analysis of the class activities must comply with the aptitude of the learners.

2. The learning activity analysis focuses on the feedback from the learning activity part. The analysis of class activities must be evaluated by five experts. The evaluation will consider consistency between class activities and aptitude based on multiple intelligence.

3. The multiple intelligence part is the main step for the model, this approach has nine parts divided into three sub groups; Analytic, Interactive and Introspective.

4. The learning subject part analyzes subjects and class activities focusing on aptitude base on multiple intelligence.

5. The expert part is responsible for the evaluation of appropriateness and consistency of class activities focusing on aptitude base on multiple intelligence. Five experts are required for the evaluation of performance.

6. The mapping part matches class activities to the aptitude based on the multiple intelligence. The matching is also reviewed by experts stated in part five.

7. The e-learning content part builds the lessons from the aptitude results. This is generated from matches from part 2 and 4, shown in Fig. 2.

IV. EVALUATION

This research used experts to evaluate the models. The model evaluation process consisted of the three following steps. Step 1, selection of a group of experts. Experts asked to evaluate the model were teachers who graduated with a Ph.D in the field of computers, educational technology and/or related areas. Step 2, create a questionnaire. A questionnaire was created using the five scale rating system [8] in order to determine the appropriateness of the synthetic model. There were eight questions in the questionnaire which aimed to grade the appropriateness of learning activity, learning activity analysis, multiple intelligence, learning subject, experts, mapping, e-Learning content, and the overall synthetic model. Step 3 was to explain the synthetic model to the experts. After the synthetic model was presented to the experts, they were then asked to rate each area of interest. Results of the overall evaluations are shown in table I. It was found that the experts were overall satisfied with the developed synthetic model.

TABLE I
RESULT OF EVALUATION

No.	Appropriateness Rating	$\bar{x}$	S.D.
1	Learning Activity	4.2	0.45
2	Learning Activity Analysis	3.8	0.45
3	Multiple Intelligence	4.6	0.55
4	Learning Subject	4.4	0.89
5	Experts	3.4	0.55
6	Mapping	3.6	0.55
7	E-Learning Content	4.4	0.55
8	Overall	4.0	0.71
Total		**4.05**	**0.68**

Results found that multiple intelligence ($\bar{x}$ = 4.6) was the highest ranking in the concept model design. Detail of expert ($\bar{x}$ = 3.4) was the lowest. Finally, overall appropriateness ($\bar{x}$ = 4.05) was the evidence that this concept model achieved development goals successfully.

V. CONCLUSIONS

The objective of this research was to design an e-learning content model for student guidance based on multiple intelligence. The conceptual model was divided into seven sections: 1) classroom learning activity collection, 2) learning activity analysis, 3) multiple intelligences, 4) learning subject, 5) expert selection, 6) mapping, and 7) e-learning output content.

Results from the evaluation by experts graded the overall appropriateness at 4.05/5 with S.D. equaling 0.68, which proves this concept model achieved development goals successfully.

For future research, an investigation into the wider range of factors that affect e-learning will be conducted such as interface, media and devices.

REFERENCES

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

[1] E-Learning System. (2015). <http://en.wikipedia.org/wiki/E-learning>. Accessed 8 November 2015.

[2] Tantirangsri, J. and Boonrawd, P. (2012). "Developing Web-Based Instruction using the ADDIE Model on the subject of Usage in Graphic Program". The National Conference on Computing and Information Technology (NCCIT).

[3] Faisanoi, S., Janruang, J., and Karnka, S. (2015). "The Development of E-Learning by a New Team Games Tournament Cooperative Learning Techniques, based on Bloom's Taxonomy". The National Conference on Computing and Information Technology (NCCIT).

[4] Watcharaphuetphol, S. and Janruang, J. (2015). "Development of E-learning for the Internet and Applications based on Adaptive Learning Techniques". The National Conference on Computing and Information Technology (NCCIT).

[5] Kaewkiriya, T., Utakrit, N., and Tiantong, M. (2013). "A Conceptual Framework of Synthesize on an Adaptive e-Learning Guidance System Base on Multiple Intelligence". International Journal of Information and Electronics Engineering, Vol. 3, No. 6.

[6] Kaewkiriya, T., Utakrit, N., and Tiantong, M. (2016). "The Design of a Rule Base for an e-Learning Recommendation System Base on Multiple Intelligences". International Journal of Information and Education Technology, Vol. 6, No. 3.

[7] Gardner, B. and Korth, S. (2010). "A framework for learning to work in teams". Journal of Education for Business, Vol. 74, No. 1.

[8] Susan, J. "Likert Scales how to (ab) use them". Medical Education. Vol. 38, Issue 12.