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Design of electronic teaching materials for self-learning in the subject: research methodology of Thailand

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ABSTRACT

The objectives of this research are to: study the characteristics of electronic teaching materials required by the researchers. The samples included the teachers under the Office of Basic Education Commission, the participants in the training program to create the new generation of researchers (chicks), graduate students in master's and doctoral levels and professors in higher education totaling 679 persons. The tools used in research were the questionnaire and observation form. The results of research were as follows.

The samples wanted the operation in the form of mixed materials that consist of cartoons, videos, pictures and sounds with the length of each episode not exceeding 15 minutes and wanted a service to answer questions from the experts online.

Keywords: Learning Application; Digital/Electronic media; Research Methodology;

INTRODUCTION

One of the major problems that makes Thailand have less economic and innovation development than neighboring ASEAN countries is caused by research and innovation. Developing research and innovation, researchers are required to create new body of knowledge, new products and new procedures. Compared to the number of researchers in developed countries, Thai researchers are ranked the second from the bottom. Based on the comparison of the number of researchers per one million people in 2007, the results are as follows. The number of researchers in Singapore is 5,955, in Japan is 5,409, in Sweden is 4,979, in the US is 4,673, in Korea is 4,672, in China is 1,037,

in Thailand is 316 and in Ethiopia is 21 respectively (How many researchers in Thailand?, 2007). Nowadays, the number of researchers in Thailand cannot be increased to reach the number of researchers in other countries. From the mentioned problem, National Research Council of Thailand (NRCT) has begun to develop the personnel involving research in government and private sectors. It provides New Researcher Project and Training for the Trainers Project. Such projects require huge amount of budget for each training. However, the projects cannot increase the number of researchers as rapidly as expected. It is essential for educational personnel to develop themselves to be researchers. This is because the important roles of educational personnel are teaching and researching. In addition, students in master's degree and doctoral degree lack research experience. They cannot apply theoretical knowledge into conducting research. To provide persons involved with research to study on their own can be an option that allows researchers to be more convenient and to increase skills and knowledge at any time.

Studying via electronic instructional media is an educational innovation. It has widely known in Thailand. Many people have experienced such service and its popularity is likely to increase in the future (Deerajwiset & Harbon, 2014). The idea of using electronic instructional media as tools to develop educational potential is an appropriate idea. Many instructional media developers have conducted research and found that it is instructional media that meets standard criteria and enables learners to have good learning outcomes (Khaosa-art, 2017; Weeraphan, 2015; Meesee & Meesee, 2015; Artsap et al., 2015; Jadebutr & Ninphan, 2013). In other countries, electronic books are used and researched for its effectiveness. It is found that students who used electronic books had higher level of reading ability than level of class they were studying. Furthermore, their development of reading comprehension was better when reading electronic books together with paper books (Kelley, 2011; Marrone, 2015). Development of blended learning, multimedia and storytelling enable learners to have good learning outcomes and higher learning achievement (Jindanurak, 2016; Waichomphu & Juspalo, 2017; Thongsuwan & et al., 2017; Panim, 2016).

As mention earlier, the researcher studied characteristics of electronic instructional media that can effectively serve users in order to design electronic instructional media for research methodology course.

RESEARCH OBJECTIVES

To study characteristics of electronic instructional media that user want.

MATERIAL AND METHODS

3.1 Sample size determination:

To determine the sample size, the researchers applied Yamane's formula (Yamane, 1967) at the level of precision at 95% or sampling error at 5%.

$$N=N/(1+N(e^2)) \qquad\qquad (1)$$

Where n is the sample size, N is the population size (total prospect size), and e is the standard error. The total number of personnel involved in research activities from the three sources above (N) was 1,016,693 to quantify the sample size of this study (n).

n = 399.84 or 400.

3.2 Sampling technique:

A non-proportional quota sampling was used to allocate 400 samples to the three target population of 200 graduate students, 100 OBEC teachers, and 100 university lecturers.

Questionnaires were distributed to the target population through graduate colleges, schools, and academic events held in Bangkok and other provinces in Thailand. Purposive sampling was used in collecting the questionnaires. The target person that agreed to answer the questionnaires would be considered as part of the sample.

3.3 Data Collection:

The questionnaire was designed to meet the objectives of the study, the variables of which are as follows;
-   Biodata; sex, education level and occupation
-   Area of research and involvement
-   Digital devices and their usage

Preferable design of electronic media and application for research methodology learning including; presentation styles (human or cartoon animation), length of presentation, type of quiz or test.

The questionnaires were gathered from June to August 2018. The graduate students, OBEC teachers, and university lecturers who responded

came from 3 graduate colleges (one private university and 2 government universities), 10 schools (5 schools in Bangkok and 5 schools in Hat Yai, Songkla), and 5 academic events (4 training courses and 1 international conference), respectively.

A total of 679 questionnaires (n) were returned and this number was greater than 400; thus, the sampling error was reduced from 5% to 3.84% (by replacing **n** and N in equation (1)).

RESULTS

The results that can be used as data for designing electronic instructional media are as follows.

Section 1 General information of a respondent

1.1 Age and gender of a respondent: According to the responses from the sample of 679 persons, it was found that there were 478 females and 201 males or 70 percent (478 females) and 30 percent (201 males) respectively. The results are shown in Table 1.

Table 1. The respondents classified by age group and sex

| Age group | | Sex | | | Total | |
| | Male | | Female | | | |
	Number	%	Number	%	Number	%
1 < 30	52	25.87	142	29.71	194	28.57
2 31 − 40	88	43.78	181	37.87	269	39.62
3 41 − 50	40	19.90	97	20.29	137	20.18
4 51 − 60	16	7.96	43	9.00	59	8.69
5 > 60	2	1.00	5	1.05	7	1.03
6 N/A	3	1.49	10	2.09	13	1.93
Total	**201**	**1.00**	**478**	**100.0**	**679**	**100.0**

According to Table 1, the males aged not over 30 years old were 25.87 percent, aged 31 − 40 years old were 43.78 percent, aged 41 − 50 years old were 19.90 percent, aged 51 − 60 years old were 7.96 percent, aged 61 years old and above were 1.00 percent and aged not specified were 1.49 percent. The females aged not over 30 years old were 29.71 percent, aged 31 − 40 years old were 37.87 percent, aged 41 − 50 years old were 20.29 percent, aged 51 −

60 years old were 9.00 percent, aged 60 years old and above were 1.05 percent and not specified were 2.09 percent.

1.2 Education: The respondents' education levels are as follows.

Table 2. education level

	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Lower Bachelor Degree	6	2.99	15	3.14	21	3.09
Bachelor Degree	23	11.44	145	30.33	168	24.74
Graduate students Master Degree	47	23.38	109	22.80	156	22.97
Master Degree	60	29.85	129	26.99	189	27.84
Graduate students Doctoral Degree	18	8.96	26	5.44	44	6.48
Doctoral Degree	47	23.38	54	11.30	101	14.87
Total	201	100.0	478	100.0	679	100.0

According to Table 2, the males had master's degrees at the highest level or 29.85 percent and had bachelor's degrees and doctoral degrees at 23.38 respectively. They had bachelor's degrees at 11.44 percent, were doing doctoral degrees at 8.96 percent and had lower than bachelor's degrees at 2.99 percent. The females had bachelor's degrees at the highest level or 30.33 percent, had master's degrees at 26.99 percent, were doing master's degrees at 22.80 percent, had doctoral degrees at 11.30 percent, were doing master's degrees at 5.44 percent and had lower than bachelor's degree at 3.14 percent.

Section 2 Needs of elements of electronic instructional media for self-learning.

The researcher asked the sample to collect data for creating electronic instructional media in the following aspects.

2.1 Actors of electronic instructional media are as follows.

Table 3. The presenters

Item	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Real Human	65	32.34	95	19.87	160	23.56
Human cartoons	64	31.84	126	26.36	190	27.98
Animal cartoons	9	4.88	25	5.23	34	5.01
Mixed above	35	17.41	152	31.80	187	27.54
Others	-	-	6	1.26	6	0.88
N/A	28	13.93	74	15.48	102	15.02
Total	201	100.00	478	100.0	679	100.0

According to the above table, the first ranked answer among the respondents was that they wanted to use cartoon characters as actors. The second ranked answer was that they wanted to use animal cartoon characters and human cartoon characters as actors. The third ranked answer was that they wanted to use people as actors. The percentages were 27.98, 27.54 and 23.56 respectively.

2.2 Meaning can be described as follows

Table 4. The compositions

Item	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Texts and sound	34	16.92	72	15.06	106	15.61
Picture, text and sound	95	47.26	276	57.74	371	54.64
Others	2	1.00	11	2.30	13	1.91
N/A	70	34.83	119	24.90	189	27.84
Total	201	100.00	478	100.0	679	100.0

According to the above table, it was found that more than a half of the sample or 54.64 percent wanted to use both images, letters and sound. It means that they wanted to focus on images, not on letters. About 15.61 percent of the sample wanted to have letters and sound to describe the scenes.

2.3 Image design in electronic instructional media: the researcher asked the sample what characteristics of images they liked. The data was processed as follows.

Table 5. Presentation styles

Item	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Still graphic picture with narration	65	32.34	88	18.41	153	22.53
Cartoon textbook for self-reading	26	12.94	60	12.55	86	12.67
Cartoon moving picture with narration	76	37.81	240	50.21	316	46.54
Picture with text for reading	6	2.99	22	4.60	28	4.12
Others	22	10.95	59	12.34	81	11.93
N/A	6	1.99	9	1.88	15	2.21
Total	201	100	478	100	679	100

The above table shows that the sample most wanted to have animated cartoons, still images, graphic design and still images similar to those in common comic books with the percentages of 46.54, 22.53 and 12.67 respectively

2.4 Length of instructional media is as follows.

Table 6. Duration for each topic

Item	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
5 – 15	139	69.15	352	73.64	491	72.31
16 – 30	39	19.40	80	16.74	119	17.53
31 – 45	6	2.99	15	3.14	21	3.09
46 -60	6	2.99	8	1.67	14	2.06
Appropriate	2	1.00	4	0.84	6	0.88
Others	5	2.49	11	2.30	16	2.36
N/A	4	1.99	8	1.67	12	1.77
Total	201	100	478	100.0	679	100.0

The above table shows that the sample most wanted to have instructional media to be 5- to 15-minute long at 72.31 percent. They wanted to have instructional media to be 16- to 30-minute long at 17.53 percent.

2.5 Characters of test are as follows.

Table 7. The exercises/test kits

Item	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Multiple choice questions	57	28.36	113	23.64	170	25.04
Short answers	10	4.98	8	1.67	18	2.65
Matching	13	6.47	18	3.77	31	4.57
Mixed	63	31.34	148	30.96	211	31.08
An answer is in the topic	19	9.45	75	15.69	94	13.84
Case study	30	14.93	75	15.69	105	15.46
Others	6	2.99	30	6.28	36	5.30
N/A	3	1.49	11	2.30	14	2.06
Total	201	100.0	478	100.0	679	100.0

Table 7 shows that characters of test the sample wanted included mixed tests, multiple choices and case study or 31.08, 25.04 and 15.46 respectively.

DISCUSSION

The results could be applied for designing new electronic instructional media which enables learners to learn through senses, reading, listening and seeing. Such instructional media allows learners to recognize the content from what they read, listen and see at 50 percent. On the other hand, learners could recognize the content from what they read only at 10 percent (Edgar Dale,1969: 107). This is consistent to a majority of people's behavior. That is, people do not like to read books yet they would rather like to see and listen. What's more, universities will reduce their roles in teaching and learning in the future, with the aim of enabling more informal learning. Degrees from universities mean nothing. Learners will seek knowledge via online sources based on individual interest. They will work and learn at the same time.

CONCLUSION

This research is a survey research, exploring characteristics of electronic instructional media that can effectively serve users. The results showed that the first three needs of elements of electronic instructional media that the sample needed were that they wanted to use human cartoon characters, a mixture of human cartoon characters and animal cartoon characters and human cartoon characters as presenters at 27.98, 27.54 and 23.46 respectively. More than a half of the sample or 54.64 percent wanted to have multimedia, a mixture of images, letters and sound. They wanted to have electronic instructional media in a form of animated cartoon with the length of not more than 15 minutes per episode (72.31 percent). They most wanted to have a mixture of test at 31.08 percent. The test should be a mixture of multiple choice and case study. In addition, there are suggestions that electronic instructional media should be easily comprehensible and accessible and the content shall be comprehensive and varied.

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