E-Practice for Statistical Analysis in Business Course

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ABSTRACT
The purposes of this study were to develop an E-Practice for statistical analysis in business course which was developed for undergraduate students in Business Administration Faculty at Rajamangala University of Technology Krungthep (RMUTK), to test hypothesis of learning achievement in two groups; experimental group and control group, and to evaluate satisfaction of this E-Practice. After the production of the E-Practice, three experts tested and evaluated the E-Practice, which overall parts of satisfaction were evaluated at high level. The hypothesis of learning achievement tested between experimental group 20 students and control group 20 students. It was found that the learning achievement of the experimental group outperformed the control group with the statistical significance at .01 (p-value < .01). After that, all groups of students studied the E-Practice and evaluated satisfaction. It was found that overall parts were evaluated at high level.

Keywords: Statistical Analysis in Business, Business Statistics, E-Learning; E-Practice

INTRODUCTION
The trend of technology has continuously developed, and the computer plays an important role. Nowadays, a computer is use to do many things as human do. People use it in meaningful ways, for example, for business, entertainment, and especially education. Because the technology is increasing very fast so it has affected the way of learning. It has been changed. It is not limited only in the classroom. Students can independently learn whatever they want from everywhere and every time as long as they have technology in their hands. The computer is effective and it is the one of tools for the new way of learning in this era, for example, computer aided instruction (CAI) especially E-Practice. E-Practice is category of computer aided instruction; electronic practice, which is more interesting than traditional learning media because students can learn and review by themselves whenever they need. E-Practice is not only static text but also dynamic text, textboxes, choices, animation, sound and multimedia that attract the attention of students.

The problem of statistical analysis in business subject is elusive, so this E-Practice can help students to understand more. Besides, it can save time for teachers in case of checking homework.

As a result, the E-Practice for statistical analysis in business course was developed on iOS application platform. It consisted of practices of the statistical distributions, the confidence intervals, the hypothesis testing, and the analysis of variance. It is drill and practice, which is designed in a non-sequential way of the computer assisted instruction. So, the students can select any preferred lessons.

REVIEW OF RELATED LITERATURE

Several papers have reported the achievement of the computer assisted instruction. Suwit Seavarun (2000) reported that a computer assisted instruction package on business statistics indicated the achievement of the students, which increased significantly at .01. Besides, Taksina Walailak (2000) reported that a computer assisted instruction package of mathematics subject on function and statistics helps the learner gain high achievement. Boonruen Pruksasithorn (2001) also reported that a computer assisted instruction for the data structure course on sorting and searching in the experimental group was significantly higher than the control group at .01.

However, the main objective of this study was to develop E-Practice which was only practice for Statistical Analysis in Business Course. It was not developed the lessons not only because many researchers have developed them but also teachers who support learners' need is mainly important. Moreover, Suwit Seavarun, Taksina Walailak, and Boonruen Pruksasithorn developed lesson and only choice pattern in practicing. So, the difference of this study is type of practicing; textboxes and radio buttons. In addition, answers of practices are animated step by step.

OBJECTIVES OF THE STUDY

The objectives of the study are:

1. To develop E-Practice for statistical analysis in business course.
2. To compare the learning achievement between experimental group and control group.
3. To evaluate the satisfaction toward the use of E-Practice.

HYPOTHESIS OF THE STUDY

The hypotheses of study are:

H1: The learning achievements of the students between the experimental group and the control group are different at statistical significance level at .05.

H2: E-learning satisfaction will be evaluated at high level.

METHODOLOGY

1. Study content and practice of statistical analysis in business course.
2. Choose population and samples. The population consists of undergraduate students in Business Administration Faculty of RMUTK who enroll statistical analysis in business course. The sample consists of 20 students of experimental group and 20 students of control group (Table 1).

Table 1. Scope of sample.

Group	GPA	Gender		Total
		Male	Female	
Experimental group	4.00-3.50	3	3	20
	3.49-3.00	4	4	
	2.99-2.50	3	3	
Control group	4.00-3.50	3	3	20
	3.49-3.00	4	4	
	2.99-2.50	3	3	
Total		20	20	40

Three experts, who test and evaluate the E-Practice before sample groups test the E-Practice, consist of two professional statistics and an application developer. Additionally, the practices consist of the statistical distributions, the confidence intervals, the hypothesis testing, and the analysis of variance.

3. Study programs. These programs consist of graphic program, animate program,

sound program and main program for developing E-Practice.

4. Design script and user interface.
5. Develop E-Practice. For example, a result follows by Figure 1, 2, and 3.
6. Check error and evaluate satisfaction of three experts and few students, which follows by Table 2.
7. Study achievement of experimental group and control group. Both groups were taught by same teacher and same content. Additionally, only experimental group studied E-Practice but control group did not study E-Practice. Next, both groups tested same examination to compare the learning achievement, which follows by Table 3. (However, the examination did not test validity, reliability, and discrimination because the examination was subjective test, so it could not measure) After that, control group studied E-Practice and all samples evaluated satisfaction, which follows by Table 7.
8. Write handbook for user manual.

RESULTS AND DISCUSSION

E-Practice was developed. As a result, the examples of E-Practice for statistical analysis in business course follow by Figure 1, 2, and 3. The overall satisfaction of three experts was found at high level ($\overline{x}$ = 4.07, $S.D.$ = .50), which shows in Table 2. The result of learning achievement in two groups, which was 20 students of experimental group and 20 students of control group was found the learning achievement of experimental group was higher than control group with the statistical significance at .05 and .01 (p-value < .01) (t = 3.82, p-value = .001), which shows in Table 3. In GPA 3.50-4.00 case, the result of learning achievement was found the learning achievement of experimental group

Figure 1. Main menu

Figure 2. Example practice of E-practice

Figure 3. Example answer of E-practice

was higher than control group with the statistical significance at .05 (p-value < .05) (t = 2.56, p-value = .029), which shows in Table 4. In GPA 3.00-3.49 case, the result of

learning achievement was found the learning achievement of experimental group was higher than control group with the statistical significance at .05 and .01 (p-value < .01) (t = 3.48, p-value = .004), which shows in Table 5. In GPA 2.50-2.99 case, the result of learning achievement was found the learning achievement of experimental group was higher than control group with the statistical significance at .05 and .01 (p-value < .01) (t = 8.14, p-value = .000), which shows in Table 6. Moreover, the overall satisfaction of sample was found at high level ($\bar{x}$ = 4.36, $S.D.$ = .62), which shows in Table 7. The result of this research is similar to those of Suwit Seavarun, Taksina Walailak, and Boonruen Pruksasithorn.

Table 2. Satisfaction of three experts

Topic	Mean (S.D.)	Result
Content and presentation part	4.00 (.00)	high
Encouragement part	4.00 (.63)	high
Interface part	4.00 (.65)	high
Management part	4.25 (.45)	high
Total	4.07 (.50)	high

The above Table 2 shows satisfaction of three experts. Three experts tested and evaluated E-Practice which was found the content and presentation part at high level ($\bar{x}$ = 4.00, $S.D.$ = .00), the encouragement part at high level ($\bar{x}$ = 4.00, $S.D.$ = .63), the interface part at high level ($\bar{x}$ = 4.00, $S.D.$ = .65), the management part at high level ($\bar{x}$ = 4.25, $S.D.$ = .45), and the overall parts at high ($\bar{x}$ = 4.07, $S.D.$ = .50).

Table 3. Achievement of experimental group and control group

Group	N	Mean (S.D.)	t (p-value)
Experimental group	20	33.70 (2.89)	3.82 (0.001)**
Control group	20	28.75 (5.35)	

Table 4. Achievement of experimental group and control group (Only 3.50-4.00 GPA)

Group	N	Mean (S.D.)	t (p-value)
Experimental group	6	36.33 (2.25)	2.56 (.029)*
Control group	6	33.67 (1.21)	

Table 5. Achievement of experimental group and control group. (Only 3.00-3.49 GPA)

Group	N	Mean (S.D.)	t (p-value)
Experimental group	8	34.00 (1.85)	3.48 (.004)**
Control group	8	29.75 (2.92)	

Table 3 shows achievement of experimental group and control group. The t-test was conducted to compare the effect of achievement on E-Practice between experimental group and control group. There was a significant effect of the average of score at the p-value < .01. The average of score of experimental group is 33.70 and control group is 28.75.

Table 4 shows achievement of experimental group and control group. The t-test was conducted to compare the effect of achievement on E-Practice between experimental group and control group. There was a significant effect of the average

of score at the p-value < .05. The average of score of experimental group is 36.33 and control group is 33.67.

Table 5 shows achievement of experimental group and control group. The t-test was conducted to compare the effect of achievement on E-Practice between experimental group and control group. There was a significant effect of the average of score at the p-value < .01. The average of score of experimental group is 34.00 and control group is 29.75.

Table 6. Achievement of experimental group and control group. (Only 2.50-2.99 GPA)

Group	N	Mean (S.D.)	t (p-value)
Experimental group	6	30.67 (1.51)	8.14 (.000)**
Control group	6	21.67 (2.25)	

Table 6 shows achievement of experimental group and control group. The t-test was conducted to compare the effect of achievement on E-Practice between experimental group and control group. There was a significant effect of the average of score at the p-value < .01. The average of score of experimental group is 30.67 and control group is 21.67.

Table 7. Satisfaction of all group

Topic	Mean (S.D.)	Result
Content and presentation part	4.50 (.50)	highest
Encouragement part	4.10 (.71)	high
Interface part	4.30 (.72)	high
Management part	4.64 (.48)	highest
Total	4.36 (.62)	high

Table 7 shows satisfaction of all sample groups. All groups of sample studied and evaluated E-Practice which was found the content and presentation part at highest level ($\overline{x}$ = 4.50, $S.D.$ = 0.50), the encouragement part at high level ($\overline{x}$ = 4.10, $S.D.$ = .71), the interface part at high level ($\overline{x}$ = 4.30, $S.D.$ = .72), the management part at highest level ($\overline{x}$ = 4.64, $S.D.$ = .48), and the overall parts at high ($\overline{x}$ = 4.36, $S.D.$ = .62).

CONCLUSION

E-Practice was found at high level of the overall satisfaction of three experts whenever all samples was found the overall parts at same level. Additionally, the learning achievement of experimental group was higher than control group.

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