A study for the Effects of Multimedia Computer Assisted Learning in Certified Skill Test for Babysitting

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*Abstract-*The research is for the purpose of evaluating the effects of Multimedia Computer Assisted Learning (MCAL) in helping learners pass the certified skill test held by government. In order to achieve the goal of study, a CD-ROM based MCAL program were developed and adopted as the study tool. In addition, participants who intended to take the skill test in 2004, were recruited. A quasi-experiment research design was used for the study. Participants were randomly assigned to either an experimental group or a control group, twenty for each group. The experimental group was given the program of MCAL, while the control group was given the program of the traditional skill learning. Data was analyzed by SPSS 10.0 for Windows. The conclusions were shown as following: (1) The scores of satisfaction to MCAL in experimental group was significantly positive. (2) The scores for the babysitter's skill test in experiment group was significantly higher than that of control group.(3) The participants in experimental group spent significantly less time in completing the clean-up section, learning by playing game, and safely medical care section than those in control group. (4) The score of written test and score of skill test had significantly positive correlation, while the score of skill test and the time spent in completing a skill test were shown significantly negative correlation. (5) The MCAL can increase learner's motivation, boost the accuracy of skill, and in the end achieve more learning goals.

Key words: Multimedia Computer Assisted Learning, Babysitter, Skill Test

1.   Introduction

Having a certified skill license issued by the government is the best proof to testify a person's professional skill. Owning a certified skill license, not only a student can easily find a job, but also can have a job secured steadily. Since 1974, there have been 162 different kinds of skill tests held by the Taiwan government. And almost 600,000 people have taken certified skill tests. Up to May, 2006, the total percentage of passing rate is around 50.32%. Among those professional skill tests, there is a babysitter's skill test started in 1998. About 9000 people take this test every year, and until now, 40,710 people have passed this test. The babysitter's skill license is backed by the law, and guarantees that someone is professional in babysitting. In fact, it has become a basic qualification for seeking a job in the babysitting field. Besides, research shows that a certified babysitter usually has higher ability in child caring than those who are not certified [1,2]. Also, it is reported that a certified babysitter shows self-confidence in work and positive beliefs toward social values[3]. Thus, most of people interested in working as babysitters are eager to take the skill test and get licensed in Taiwan.

Learning by a multimedia system can cut down the learning time and enhance the level of proficiency[4]. Multimedia system can demonstrate a skill by displaying it on screen in different way, such as continuing, fast forward and backward, and still image. The multimedia learning system can also show the details of a skill, break it down into small parts, and step by step in order to help learners to observe and to imitate the skill. It can also help students learning at their own pace, encouraging them to learn actively, fulfilling individual's special needs, and showing high performance [5]. In short, it is the best tool for learning practical skills [6].

The contents for testing babysitting proficiency can be divided into four sections- the clean-up section, the mixing section, the learning by playing game section, and the safely medical care section, which includes total twelve major topics. The test itself contains complex procedures, ordinary operations, and detailed instructions [7]. This study is trying to find out the effects of MCAL in helping babysitters preparing for the certified skill test. A CD-ROM based MCAL program has been developed as an learning method in order to compare with traditional learning program.

2.   Purpose of Study

Based on the motives stated above, the purposes of this study include:

(1)   To develop a CD-ROM based MCAL program for the babysitter skill test.
(2)   To explore the learning satisfaction of MCAL.
(3)   To compare MCAL with traditional learning method in term of the operating time in the babysitter skill test.
(4)   To compare with the skill test scores between MCAL and traditional learning method.
(5)   To investigate the relationship among the scores of written test, skill test, and the operating time in the babysitter skill test.

3.   Literature Review

3.1 Multimedia Computer Assisted Learning

The purpose of Multimedia Computer Assisted Learning is trying to develop a learning material by combining two or more media, such as text, images, graphics, voice, animation, or video, into an interactive program by using computer as a tool [8]. It is easier to transform an abstract concept into a more understandable concept by using computer simulation [9]. It also can help students to learn at their own paces. Besides, it can effectively boost a learner's motivation by increasing visual and audio communications. And finally it helps learners more creative [10]. MCAL can increase learner's interests; enhance learner's motivation and active learning. It does not have any limits in age or requirements. Once a designer fully understand the learning topics and contents, he can easily develop a multimedia learning program for specific learners. Therefore, MCAL have already been applied to many learning fields [11].

3.2 Certified skill test for babysitter

As the rapid changes of society, the number of double-income family is getting higher every year. The percentage of career women in Taiwan is now 51.3%. And how to take care of their own children has become one of the major issues for the married women. A survey held by the Ministry of the Interior, Taiwan, in 2002, investigated the lifestyle of family women, shows that career women expect that government or private group could establish a more comprehensive child care system. Obviously, the demand for child care is now a common concern for many women in Taiwan. And the job, babysitting, involves another human's life and its quality can be measured by its service, babysitting has been put into

professional license system since 1998. Anyone who is over 20 years old and has taken training for a period of three months, completed 80 to 100 credits of courses, including Introduction to Child Care, Development for Young Child, Child Care, Health Care, Diseases Prevention and Care, Prevention from Accidental Injury and Emergency Treatment, Environment for Young Children, Parenting Education, and the Ethic of Profession, can acquire a certificate in babysitting training. Or anyone who graduates from related department of Early Childhood Care and Education, and pass physical examination are qualified for taking the babysitter's skill test.

The babysitter's skill test is held once a year. It includes two parts: written test and skill test. The skill test is standardized for its requirement and procedure. Every exam has one moderator vs. one participant. Each participant has to randomly pick a testing content from four main sections: cleaning, mixing, learning by playing game, and safely medical care section, which counts for total twelve topics. The testing time is 20 minutes for every section. The minimum scores to pass the written exam and skill test are 60 points. It is said that thorough practice before taking the skill test is the decisive factor to pass the exam, and it helps to overcome the anxiety during the test [7].

3.3 Applying MCAL in Skill Learning
Skill learning is an organized activity based on actions. It requires learner to have a sense of recognition, imitation, and reiterating practices. In order to get a persistent, and precise behavioral change for individual, a person has to go through a systematic, and a series of professional training [12]. A skill can be demonstrated on screen in details, step by step in many different ways with computer (for example by continuing, fast forward and slow forward, or image still). This way provides learners a standardized simulation of a skill. Through observing and imitating, a learner can get much more real experience. It is the best way to learn a practical skill. [13]. Moreover, computer-based learning packages allow students to decide the contents they want to learn, and go at their own pace. This puts control into the hands of the learners and allows them to work as an active participant. MCAL fulfills individual's need and helps users to achieve learning goal more effectively [5].

People who are taking the babysitter's skill test perceive it as a comprehensive set, with procedure that requires more attention in details. These test takers was hoping there were a video CD-ROM based learning material to help them preparing for the test. This study was based on the needs of those who were taking the babysitting skill test. First, we reviewed related literatures, and then we developed a CD-ROM based MCAL program. After that, we assessed this program by implementing it in an experimental group, and then compared the learning effects with a control group, in which a traditional skill learning method was used. The purpose of this study was trying to evaluate the effects of MCAL in preparing for babysitter's skill test.

4. Research Design and Implementation
This research adopts the pre-test and post-test equivalent group experiment design, which is a quasi-experimental design. The number of participants in the experiment is shown in table 1:

Table 1 The pretest-posttest equivalent group

Group	Number of participants	Pre-test	Experiment processing	Post-test
Experiment	20	O1	X	O3
Control	20	O2		O4

4.1 Research framework
The research framework is shown in figure 1. Before carrying out the experiment, we collect all participants' personal data, such as age, living area, and the scores of written test as the starting point. The experimental time is four weeks, and total eight hours for both experiment and control group. Study schedule is the same for both groups every week. Training materials are drawn from the contents of standard skill test. And instructor is same for both groups.
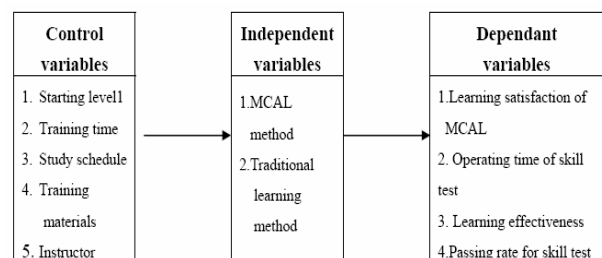

Fig. 1 Research Framework

4.2 Research instruments
We first develop the video CD-ROM for MCAL (as shown in Figure2-4). Then we design the "Learning Satisfaction of Multimedia Computer Assisted Learning" survey. After that we test its reliability and validity by expert's inspection and pre-test. One week

after the skill test, we invited all participants over the phone and asked them to write a comment about taking the skill test, and sent it back via e-mail as a follow-up analysis data.

Fig. 2 Have baby a bath shown in CD-ROM

Fig. 3 Prepare milk for baby shown in CD-ROM

Fig. 4 Practice CPR for baby shown in CD-ROM

4.3 Research Subject and Experimental Date

The subjects of this research are students, who are taking training courses for preparing babysitting skill test in a center for continuing education, a technical college in Taiwan. Participants are randomly assigned to experimental group and control group, 20 subjects for each group. And the experiment was held on every Friday, from 10am to 12am, four weeks from June, 4th, 2004 to June, 25th, 2004.

4.4 Data Processing

The survey of learning satisfaction was designed and measured by Likert five-point Scale, in which 5 point indicates a very satisfied, 4 point indicates satisfied, 3

point indicates a little satisfied, 2 point indicates not satisfied, and 1 point indicates not very satisfied. Data was processed and analyzed by SPSS 10.0. As for the records obtained by interview and observation method, they were analyzed in qualitative research.

5. Data process and statistical analysis

5.1 Homogeneity Analysis for Research Subjects

The data of research subjects in both experiment and control group, including age, living area, and score of written test, were analyzed for the homogeneity of starting point with independent sample t-test, chi-square test (χ^2). And the result showed that both groups had the same starting level shown in Table 2. The written score (pre-test) of the babysitter's skill test and the living area for both groups did not reach the significant difference (p>.05). It indicated that the starting level of the experimental group was same as the control group.

Table 2 Analysis of homogeneity of starting level for research subjects in both groups

	Experimental Group (n=20)		Control Group (n=20)			
	Mean	Standard Deviation	Mean	Standard Deviation	t value	p value
Age	24.10	1.62	26.50	2.97	-3.177	.003
Written test score	89.40	2.83	85.53	8.27	1.982	.059
Living Area	Number of Subjects	Percentage	Number of Subjects	Percentage	χ^2	p
Pingtung county	8	20.0%	12	30.0%	1.600	.206
Other county	12	30.0%	8	20.0%		

5.2 Analysis of Learning Effects

5.2.1 Analysis of Learning Satisfaction

The total average score from the survey of MCAL of learning satisfaction for the experimental group was 4.63. Using one-sample t-test, and set the test value as 3, it showed that subject's score of satisfaction to MCAL had reached significant level (p<.001) as shown in table 3. In other words, it indicated that learners were satisfied with the MCAL program, and agreed that it could help in learning and increasing the accuracy of skill operations. This result showed that MCAL could improve skill learning, and same as the studies conducted before[13].

Table 3 Analysis of satisfaction with MCAL for the experimental group n 20

Attitude Scale	Test value 3, degree of freedom 19		
	Mean	t value	p value
A. Content of MCAL			
(1). The material covers the four section of the skill test	4.60	14.24	.000
(2). The material can clearly present the content of the skill test	4.80	19.62	.000
(3). The material is helpful in taking the skill test.	4.50	13.08	.000
(4). Through the demonstration of MCAL, the learner can know if he is doing right or wrong.	4.50	13.08	.000
(5). Through the demonstration of MCAL, one can know the right operating procedure.	4.50	13.08	.000
(6). Through the demonstration of MCAL, one can know how to improve a skill.	4.40	12.46	.000
(7). The design of MCAL can provide repeatedly learning opportunity.	4.40	12.46	.000
B. Learning by MCAL			
(8). I like MCAL for learning assistance.	4.80	19.62	.000
(9). I am satisfied with the way of learning of MACL.	4.60	14.24	.000
(10). I am satisfied with the learning environment provided by MCAL.	4.70	16.17	.000
(11). MCAL improves my proficiency of skill operation.	4.60	14.24	.000
(12). MCAL builds up my confidence in passing the skill test.	4.70	16.17	.000
(13). I think MCAL is helpful in preparing the skill test.	4.60	14.24	.000
(14). I am willing to recommend MCAL to other students.	4.60	14.24	.000
C. Skill Operation Improved by MCAL			
(15). The accuracy of skill operation in clean section	4.65	15.08	.000
(16). The accuracy of skill operation in mixing section	4.80	22.05	.000
(17). The accuracy of skill operation in game section	4.68	16.30	.000
(18). The accuracy of skill operation in medical care section	4.87	25.18	.000
The total average of satisfaction	4.63	21.08	.000

5.2.2 Analysis of Operating Time of Skill Test

The average of operating time of research subjects in the four sections of skill test was 14.27 minutes. The safely medical care section has the shortest operating time among the four sections. And the mixing section takes the longest operation time as shown in the table 4. After analyzing the operation speed rate of both groups using independent sample t-test, we found that experimental group has shorter time than control group in clean-up section, game section, and medical care section ($p<.05$), while control group had shorter time than experimental group in the mixing section as shown in table 5. Participants in the experimental group had faster operating time in the clean-up section, learning by playing game section, and safely medical care section than those of in the control group, and there were significant difference ($p<.05$) between them. However, participants in the control group had significantly faster operating time in mixing section than those in the experimental group. It could be the fact that the participants in the control

group were older than those in the experimental group, and had more experience in cooking.

Table 4 The average of operating time (minute) in skill test

Variables	Minimum	Maximum	Mean	Standard Deviation
Clean-up section	15.00	20.00	17.83	1.65
Mixing section	12.00	20.00	18.63	1.94
Learning by playing game section	7.00	20.00	10.70	2.22
Safely medical care section	6.00	13.00	9.93	1.72
The average of operation time	12.25	16.00	14.27	.95

Table 5 Analysis of difference in operating rate in Skill Test (unit: minute)

Skill Category	Experimental Group (n=20)		Control Group (n=20)		t value
	Mean	Standard Deviation	Mean	Standard Deviation	
Clean-up section	17.15	1.46	18.50	1.57	-2.813**
Mixing section	19.30	.92	17.95	2.44	2.316*
Learning by playing game section	9.85	1.53	11.55	2.50	-2.592*
Safely medical care section	9.35	1.63	10.50	1.64	-2.225*
The total average of operating time	13.91	.75	14.62	1.00	-2.548*

* $p<.05$ ** $p<.01$

5.2.3 Analysis of Skill Test Score (Post-Test)

The average skill test score of all research subjects was 78.95. The passing percentage for the skill test was 85 %. The mixing section owned the highest average score, which was over 80. On the contrary, the safely medical care section got the lowest score. There happened participants failed in the four sections. The results were shown in table 6.

Table 6 The distribution of score in skill test (n=40)

Variables	Minimum	Maximum	Mean	Standard Deviation
Clean-up section	48.00	100.00	79.20	12.33
Mixing section	36.00	96.00	80.80	10.53
Learning by playing game section	52.00	96.00	79.20	10.53
Safely medical care section	46.00	96.00	76.59	11.38
The total average scores	64.50	89.00	78.95	6.01

5.3 Analysis of Covariance of Scores

After analyzing the data with independent sample t-test, and the Levene's Test of pre-test score of both groups, we found that the F value of pre-test is 22.99,

p=0.59 (>.05), which indicated that the analyzed data met the basic assumption of interval independence, normalization, and the homogeneity of variance. And as we reexamined the data with homogeneity of regression coefficient, we got the F value is =.288, and p=.635 (>.05). It suggested that the slope of interval regression was the same, which met the assumption of the homogeneity of regression coefficient. Therefore, it was verified that the data could be analyzed with covariance. Details were shown in Table 7 and 8.

As we eliminating the disturbance, the skill test score (post-test) reached the significant difference between the two groups, F value =2.715, p =.002 (<.05). The adjusted average score of experimental group was 81.52 which was higher than 76.37 of control group. Details were shown in table 9. Therefore, it indicated subjects in experimental group had better performance than those in the control group. This result pointed out the MCAL had significant effects in helping participants to gain higher scores in the babysitting skill test.

Table 7 Analysis of homogeneity of regression coefficient

Variation Source	SS	df	MS	F	Sig.
Homogeneity of regression coefficient	3.582	1	3.582	.131	.720
Error	987.458	36	27.429		

Table 8 Analysis of covariance (ANCOVA)

Variation Source	SS	df	MS	F	Sig.
Covariance(score of written test)	63.953	1	63.953	2.374	.132
Interval(learning method)	239.954	1	239.954	8.959	.005**
Error	903.262	37	24.412		

** $p < .001$

Table 9 Adjusted mean score of skill test score (post-test)

Group	Mean	Standard Deviation	95 Confidence interval	
			Lower limit	Upper limit
Experimental Group	81.520[a]	1.187	79.115	83.924
Control Group	76.374[a]	1.187	73.970	78.779

[a] the pre-test score(written test)   87.4625

5.4 Analysis of correlation
Analyzed by Pearson' product correlation as shown in table 10, the score of written test and the score of skill test had significantly positive correlation (p<.05), while the score of skill test and the rate of skill operating had significantly negative correlation (p<.01). That was, the higher the score of written test was, and the higher the score of skill test. Correspondingly, the higher the score of skill test was, and the higher the rate of skill operating was.

Table 10 Analysis of correlation   n   40

	Score of written test	Score of skill test	Rate of skill operating
Score of written test	1.000		
Score of skill test	.356*	1.000	
Rate of skill operating	.109	-.430**	1.000

* $p < .05$ ** $p < .01$

5.5 Comments about MCAL
One week after the babysitter's skill test, we interviewed and invited participants in the experimental group over the phone to write comments about MCAL and e-mail it back. According to the comments, most of participants believed that MCAL was useful in the skill test. The comments as following:
(1) It can assist learners in correcting wrong skills.
(2) The way of learning is more interesting than other methods. And it is easier to understand, which is helpful in building up learner's confidence.
(3) It can help learners to find out where to pay more attention during learning.
(4) It can help learners to easily memorize every operative step for skills.
(5) Participants suggest to put the contents on the web in order to view them at any time.

6 Conclusions and Suggestion

6.1 Conclusions
(1) The scores of satisfaction to MCAL in experimental group was significantly positive (p<.001).
(2) The scores for the babysitter's skill test in experiment group was significantly higher than that of control group (p<.01).
(3) The participants in experimental group spent significantly less time in completing the clean-up section, learning by playing game, and safely medical care section than those in control group (p<.05).
(4) The score of written test and score of skill test had significantly positive correlation (p<.05), while the score of skill test and the time spent in completing a

skill test were shown significantly negative correlation (p<.01).

(5) The MCAL can increase learner's motivation, boost the accuracy of skill, and in the end achieve more learning goals.

6.2 Suggestion

(1) **Recommendation for government:**
The Bureau of Employment and Vocational Training, Council of Labor Affair, should design and develop a CD-ROM based MCAL program. Not only can it help to raise the passing rate for the skill test, but also it can provide the public with right skills in babysitting.

(2) **Recommendation for training institute**
Training institutes should offer Distance Learning course mainly for preparing the babysitter's skill test, develop a networking, interactive learning package, and communicate with instructors in synchronizing or non-synchronizing way. Because it can help those who are going to take the skill test, and eventually assist them in passing the certified skill test.

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