The Effects of DTAI on Nursing Skills and Self-Efficacy

MEI-HUANG HUANG [1], AIH-FUNG CHIU [2], JU-LING LIU [3]
[1, 2] Department of Nursing, [3] Department of Senior Citizen Service Management
Meiho Institute of Technology
No.23, Pingguang Rd., Neipu Shiang, Pingtung County 91202
TAIWAN
tyan.huang@msa.hinet.net , aih_fung@hotmail.com , ling8282@ms21.hinet.net

Abstrac: This research is to evaluate the effects of Digital Technology Assisted Instruction (DTAI) applied in the Physical-Examining (PE) skill courses for nursing students. Both a "Learning Satisfaction with DTAI" survey and a "Self-efficacy" survey for these courses had been designed as tools in this study. Students of the third grade (five years program) in the nursing department of a technological college in Taiwan were recruited. One hundred and twenty-seven subjects who took the DTAI program on internet were assigned to be the experimental group, while the other 77 subjects with the traditional program to be the control one. All data were analyzed by SPSS 13.0 for Windows. The results were: (1) The practice time after classes, scores of the skill test, and scores of the "Self-efficacy" survey of the experimental group were significantly higher than those of the control group. (2) The average time of online-browsing through DTAI in the experimental group was 122.22 minutes. (3) The average score (5-points scale) of the "Learning Satisfaction with DTAI" survey was 4.37. (4). There were significantly positive correlations between the practice time after classes, scores of the skill test and scores of "Self-efficacy" ($p < .001$). (5) DTAI for the PE skill courses made a good impression for nursing students. DTAI was indeed a convenient and efficient tool without limitations to time or places, and still made a great improvement in learning effects. Moreover, the students get more confidence in problem-solving and nursing skill learning. Such intervention can be incorporated into the teaching instruction to improve the nursing skills and self-efficacy for the novices. Finally the destinations of teaching and learning can be achieved.

Keywords: Digital Technology Assisted Instruction (DTAI), Learning effects, Nursing students, Physical-Examining Course (PE), Self-efficacy

1. Introduction

With the great progress in the information technology, employers and employees in businesses or companies must be growth-up and follow the science and technology [1]. For the nursing information, which is an information system, combines computers, information and the nursing science. This system addresses the management of nursing data, information and knowledge in order to improve caring in nursing or clinical practices [2].

There will be a characteristic of elasticity in the instruction by means of computers and internet as a result of no limitation to learning places or time. Therefore, the instruction via internet can provide novices with more opportunities to learn or to perform assignments [3] [4]. As a learning tool, it is also suitable for skill learners [5], especially for nursing students [6]. And one who have more confidence or self-efficacy to learn will gain greater satisfaction at network learning [7] [8].

The Physical Examination (PE) skill courses are required curricula for nursing students in Taiwan. In these courses, skills about nursing practices, such as the skills of inspection, palpation, percussion and auscultation would be taught to them. Therefore, the present or potential problems of patients could be detected or examined. Then the nursing problems could be consequently resolved and the discipline of nursing could be developed [9] [10] [11].

In this study we reviewed related literatures and developed DTAI applied in the skill courses. We subsequently transmitted it to a web-based learning instructional platform as the complementary material of leaning for the nursing students. In the end of this study, we assessed the learning effects of DTAI by implementing it as a complementary learning material of classroom teaching in the experimental group, and then compared with the control group, in which a traditional classroom teaching method without DTAI was used. Besides the data of the practice time after classes, self-efficacy, scores of the skill

test (post-test) in both groups, and the degree of satisfaction with DTAI in the experimental group were collected. We expected that this study could help understanding the effects of DTAI and the correlation between the effects of DTAI and self-efficacy. Ultimately the skill learning in nursing could be improved and the results would provide the relative administrative departments or units with resources.

2. Purposes of the Study

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

(1). To develop DTAI applied in the PE skill courses and transmit it to a web-based instructional platform as the learning tool.

(2). To compare DTAI with the traditional learning method in term of the practice time after classes.

(3). To compare DTAI with the traditional learning method in term of the scores of the skill test.

(4). To compare DTAI with the traditional learning method in term of the scores of self-efficacy.

(5). To explore the learning satisfaction with DTAI in the experimental group.

(6). To explore the correlation between the practice time after classes, scores of the skill test and self-efficacy.

(7). To analyze the relative learning responses of DTAI in the experimental group.

3. Literature Review

3.1 Digital Technology Assisted Instruction (DTAI)

DTAI is an assistant instruction of curricula for information and skill learning [12]. It is a learning material developed by digital products or scientific equipments, such as computers, seeing, speech and hearing assistant technologies, accessibility designs, and so forth.

Moreover, principles of programmed instruction, which are designed methods, are always adopted in DTAI in order to decrease learning disabilities to novices and achieve learning objectives. In other words, input, storage, memory and pick-up functions of a personal computer can be merged into the skill instruction, so that we can reach the purposes of the individualized learning plan.

To help learning accessibly, instruments are developed for DTAI [13], such as CD, DVD, electronic books, personal digital assistant or other media [14] [15] [16]. DTAI instruments can transform abstract materials into more comprehensive concepts with digital services. And the digital instruction can attract students to

pay attention, arouse motives and enhance satisfaction with learning [8] [17] [18]. Moreover, novices and students can learn elastically, repeatedly and actively without limitations to places and time [19]. Eventually the purposes of self-oriented learning will be achieved perfectly [20].

Evidence-based literatures showed that computer assisted instruction could shorten 50% of learning time and promote 33-70% of proficiency in skills [21]. It also could provide the standard demonstration and details of skill operations. Otherwise, novices or learners can play media continuously or intermittently, fast or slow forward. Therefore they can get objective and impressive experiences. By means of the flexibility of DTAI and needs of learning, learners can adjust themselves to meet the learning processes in order to achieve the purposes of effective learning [4], especially in terms of skill learning [5] 。

To sum up, DTAI has become an important part of learning activities so far. Besides, with the increasing motives and abilities of learners, teachers' abilities and characteristics also can be shown on DTAI. This asynchronous internet assistant instruction, however, can not contribute immediate interactions and communications. It is easy to make sense of separation or isolation between teachers and students. Furthermore, if learners are not familiar with the operations of computers or internet access, the motives or desires of learning might be diminished [6] [22]. Thus these statuses may still restrict the application of DTAI.

3.2 Nursing Skills

Nursing is a practical discipline and nursing skills are important compositions in nursing processes. Therefore, a qualified nursing staff must possess the professional nursing skills [23], so do the nursing students. Skill learning stresses the accuracy of skill practices or operations, not only the facts or knowing of skills. Meanwhile, the teaching of skills is more various, complicated and dynamic than other general subjects. In order to perform the practices of skills, the methods of skill instruction are always emphasized [24].

The professional skills are the key points in nursing educations, which include the skills of inspection, palpation, percussion and auscultation in human body. However, these skills are complicated and composed of different steps and moves. The precision of skills are always requested. DTAI with principles of programmed instruction in nursing education can be a resolution.

As to nursing skill learning, which is an organized

activity based on actions, requires novices to recognize, imitate, and reiterate to get a persistent and precise behavioural change for individuals [25]. DTAI can provide novices a standardized simulation of skills and will be the best way to learn practical or clinical skills in nursing through observing and imitating. Moreover, nursing novices can access and browse on internet anywhere and anytime, depending on their individualized learning plans without any limitations. Thus the learning will be more active and effective, and achieve the objects as well. But more efforts are required in the future evaluation studies in nursing educations [26]. Therefore, this research is to assess if DTAI improves the nursing skills of novices.

3.3 Self-efficacy in Skill Learning

Self-efficacy is a crucial concept of Social Cognitive Theory, SCT, which was originally proposed in 1977 by Bandura, who initially applied its use in the field of social sciences. It refers to the degree of one's self-confidence or self-judgment about his ability to accomplish a certain action, a specific task or goal [27] [28]. That is, students with higher self-efficacy are more likely to engage in a difficult task, more likely to persist at a task and complete their objectives compared to students with low-efficacy [7] [8] [27] [29].

Self-efficacy is a key point to arouse motives [7] [30], and is an important predictor to the effects on learning [7]. Not only can it contribute to the learning behaviors, but also be one of the most determinants to get or maintain skills for novices [31]. So self-efficacy is a pivotal element for skill learning. The evidence-based literature showed that computer-assistant instruction could promote self-efficacy and skill operations in nursing curricula [32], however, the evidence was still not enough. For this reason we also assess self-efficacy of skills as a parameter to compare between the experimental group and the control one.

4. Research Design and Conduct
4.1 Research Design

This research adopted the pre-test and post-test non-equivalent groups design, which was a quasi-experimental design (Table 1).

Table 1   The pretest-posttest nonequivalent group

Group	Number of participants	Pre-test	Experimental processing	Post-test
Experimental	127	O1	X	O3
Control	77	O2	C	O4

4.2 Research Instruments

At first, we developed DTAI (Figure 1－5) for the PE nursing skills as an intervention. Then the "Learning Satisfaction with DTAI" and "Self-efficacy " surveys were designed in order to assess the learning satisfaction with DTAI and the confidence in correctly operating skills. Subsequently, we tested their reliability and validity by expert's inspection and a pilot. Finally we invited all subjects to record the practice time after classes and finish "Self-efficacy" surveys two weeks after the post-test. In addition, the subjects in the experimental group also fed back "Learning Satisfaction with DTAI" surveys, on-line browsing time, and gave comments about the DTAI.

Fig. 1: "Light reflex test" in optic nerve

Fig 2: "Rinne's test" in auditory nerve

Fig. 3: "Finger to nose test" in cerebellum

Fig. 4: "Triceps reflex" in deep tendon reflex

Fig. 5: "Facial expression" in facial nerve

4.3 Subjects and the Experimental Date

The subjects of this research were students who took the PE skill course were of the third grade (five years program) in the nursing department of a technological college in Taiwan. One hundred and twenty-seven (127) students applying for the DTAI as the complementary materials were assigned to the experimental group while the other 77 students without DTAI were as the control group. The instructional experiment was held for eight weeks from April 30th to June 23th in 2007.

4.4 Data Process and Statistical Analyses

The surveys of "Learning Satisfaction with DTAI" and "Self-efficacy" were designed. The former one was measured by a five-point scale, in which 5, 4, 3, 2, 1 point indicated very satisfied, satisfied, a little satisfied, not satisfied, and not very satisfied, respectively. For the latter was measured by a ten-point scale, indicating that the more scores one chose, the more confidence one had of the accuracy in skill operations. All Data were analyzed by SPSS 13.0. And the qualitative data were also described in this study.

5. Data Analysis

5.1 Homogeneity Analysis for Research Subjects

The demographic data in this study included age, province, religious belief and scores of the pre-test. We analyzed the homogeneity at the starting point with the independent sample t-test and the chi-square test. The results revealed that both groups were in the same starting level ($p > .05$).

5.2 Analyses of Learning Effects and Self-efficacy

5.2.1 Analyses of Learning Effects and Self-efficacy of Both Group

An independent sample t-test was used to analyze the effects of learning and the self-efficacy. The results showed that the experimental group gained significantly higher scores than the control one ($p < .05$) (Table 2).

Table 2 Analysis of effects with DTAI and Self-efficacy of both groups (n＝204)

	Experimental (n=127)		Control (n=77)		t value
	Mean	Standard Deviation	Mean	Standard Deviation	
Practice time after classes(minutes/week）	112.05	19.27	34.33	14.08	30.753***
Scores of skill test	82.63	8.16	70.05	10.04	9.766***
Sself-efficacy	81.49	13.39	74.29	14.69	3.589***

*** $p < .001$

According Table 2, there were significant improvement effects of DTAI on the practice time after classes and scores of the skill test (post-test) ($p < .001$), as well as an elevated self-efficacy ($p < .001$). These results were similar to previous researches, which pointed out the multimedia could arise a motive, perform a school work or an

achievement [4] [5] [19]. Besides, once one had more self-efficacy, one could practice more and proficiently to obtain a greater achievement. The results were the same as those studies conducted before [7] [8] [27].

5.2.2 Analyses of Covariance for the Experimental and Control Group

After examining with homogeneity of regression coefficient, the F value of the pre-test was 3.636 ($p = .058$), indicating that the data accorded with the basic assumption of interval independence, normalization, and the homogeneity of variance. Therefore, it was verified that the data could be analyzed with covariance (Table 3).

Table 3 Analysis of homogeneity of regression coefficient

	Experimental group (n=127)		Control group (n=77)		Homogeneity of regression coefficient	
	Mean	Standard Deviation	Mean	Standard Deviation	F value	p value
Pre-test	73.98	7.68	75.09	4.93	3.636	.058
Post-test	82.63	8.16	70.05	10.04		

Meanwhile, the consequence from analyses of covariance (ANCOVA) showed that the F value was 140.363 ($p < .001$). This result indicated that the subjects in the experimental group got better scores than those in the control group after eliminating the interference. The adjusted mean score in the experimental group was 82.902, and was 69.597 in the control group (Table 4, Table 5). That is, the DTAI had significant effects on helping students to gain higher scores in the skill test and make great achievements.

Table 4 Analysis of covariance (ANCOVA)

Variation source	SS	df	MS	F value
Covariance (score of pre-test)	3980.698	1	3980.698	66.276
Interval (learning method)	8430.566	1	8430.566	140.363***
Error	12072.578	201	60.063	
Total sum	1230949.250	204		

*** $p < .001$

Table 5 Adjusted mean score of skill test score (post-test)

Group	mean	Standard Deviation	95% Confidence interval	
			Lower limit	Upper limit
Experimental	82.902[a]	.689	81.544	84.259
Control	69.597[a]	.885	67.852	71.342

[a] the pre-test score=74.397.

5.3 Analyses of Learning Satisfaction with DTAI in the Experimental Group

The average online-browsing time of the DTAI in the experimental group reached 122.22 minutes. The mean average score was 4.37 and the range was 4.02 - 4.83. The one-sample t-test was adopted to analyze the learning satisfaction with DTAI in the experimental group with the test value of 3. The results showed that the scores of satisfaction with DTAI had reached significant level ($p < .001$). It indicated that the subjects were satisfied with DTAI into three dimensions of the contents, improving learning and the accuracy of skill operations (Table 6).

Table 6 Analyses of satisfaction with DTAI for the experimental group (n=127)

Items of satisfaction scale	Test value 3 degree of freedom 126		
	Mean	t value	p value
A. Content of DTAI	4.38		
1. The material cover all the contents of skills in neural system unit of physical examination course.	4.30	22.24	.000***
2. The material can clearly present the contents of skills in neural system unit of physical examination course.	4.25	19.50	.000***
3. The material is helpful in taking skill test for physical examination skill course	4.49	24.36	.000***
4. Through the demonstration of DTAI, one can know if doing right or wrong.	4.25	18.17	.000***
5. Through the demonstration of DTAI, one can know the right operating procedure.	4.39	22.25	.000***
6. Through the demonstration of DTAI, one can know to improve a skill.	4.38	23.32	.000***
7. The design of DTAI can provide repeatedly learning opportunity.	4.58	27.35	.000***
B. Learning by DTAI	4.42		
8. I like DTAI for learning assistance.	4.32	18.91	.000***
9. I am satisfied with the way of learning of DTAI.	4.23	17.33	.000***
10. I am satisfied with the elastic learning time provided by DTAI.	4.83	4.53	.000***
11. I am satisfied with the elastic learning place provided by DTAI.	4.40	20.82	.000***
12. I am satisfied with the learning environment provided by DTAI	4.32	20.96	.000***
13.DTAI improves my proficiency of skill operation.	4.69	5.27	.000***
14.DTAI builds up my confidence in skill operation.	4.20	16.71	.000***
15.I think DTAI is helpful in skill operation	4.41	24.11	.000***
16.I am willing to recommend DTAI to other students.	4.41	21.83	.000***
C. Skill operation improved by DTAI	4.33		
17.The accuracy of skill operation in Glasgow's Coma scale(GCS)	4.18	17.75	.000***
18. The accuracy of skill operation in general sensory function assessment.	4.32	21.23	.000***
19. The accuracy of skill operation in cortex function assessment.	4.58	3.91	.000***
20. The accuracy of skill operation in balance function assessment of cerebellum.	4.30	20.77	.000***
21. The accuracy of skill operation in coordination function assessment of cerebellum.	4.69	5.31	.000***
22. The accuracy of skill operation in muscle tone assessment.	4.35	21.58	.000***
23. The accuracy of skill operation in muscle power assessment.	4.38	22.92	.000***
24. The accuracy of skill operation in deep tendon reflex assessment.	4.02	12.76	.000***
25. The accuracy of skill operation in surface reflex assessment.	4.10	14.57	.000***
The total average of satisfaction	4.37		

*** $p < .001$

According to Table 6, the subjects in the experimental group graded high satisfaction scores with the DTAI program. Undoubtedly, DTAI could assist to understand the contents in skill learning, increase the practice time after classes, and improve the accuracy of skills. For these reasons, DTAI was a helpful instruction in the PE skill learning. The result was the correspondent with the previous studies [4] [5] [20].

5.4 Analyses of Pearson' Correlation

There were significantly positive correlations ($p < .05$) between the practice time after classes, scores of the skill test (post-test) and scores of

learning self-efficacy, respectively. The values of correlation coefficients ranged .287－.584 (Table 7).

Table 7 Analysis of correlation（n＝204）

	Practice time after classes(minutes/week)	Score of post-test	Learning self-efficacy
Practice time after classes (minutes/week)	1.000		
Score of post-test	.584***	1.000	
Self-efficacy	.278***	.413***	1.000

*** p ＜.001

The result in Table 7 showed that if the subjects owned higher self-efficacy, they would also spend more practice time after classes and got higher scores in the skill test (post-test) as well. The results were similar to the correlative studies before [7] [8] [27].

5.5 Comments about DTAI from the Experiment Group

In the end of this study, we interviewed subjects from the experimental group about DTAI. According to their comments, most subjects believed that DTAI was a useful, convenient and impressive tool in the skill learning. They could revise their ways to operate skills, understand and memorize the steps more easily, get more interests, pay more attention during learning, study in any places and time, increase learning confidences and improve the practice time and other learning effects. Therefore, the purposes of learning could be achieved.

6 Conclusions and Suggestions
6.1 Conclusions
(1). The practice time after classes, scores of the skill test, and scores of self-efficacy in the experimental group were significantly higher than those of control group.
(2). The average online-browsing time of DTAI in the experimental group was 122.22 minutes.
(3). The average scale (5-points scale) of satisfaction with DTAI in the experimental group was 4.37 and significantly positive ($p < .001$).
(4). There were significantly positive correlations between practice time after classes, scores of the skill test (post-test) and scores of self-efficacy for PE skills ($p < .001$).
(5). This DTAI for the NS unit in the PE skill courses made a good impression to the experimental group. It is a convenient and efficient tool for skill learners. DTAI not only help to increase the learning confidence in

problem-solving and nursing skill learning, but also improve the practice time and the achievement of skills. Finally the destinations of teaching and learning would be achieved.

6.2 Suggestions
(1). The technological colleges and other training institutes should design or apply DTAI, or even other materials for skill teaching and learning in the discipline of nursing. Not only can it help to raise the motives, but also can provide elastic learning environments without limitations to places and time. That is, as long as you have one computer with internet, we can learn more professionally, and the learning becomes more active.
(2). The learning confidence must be aroused and encouraged by means of various strategies in order to create more positive and active skill learning atmospheres, and achieve the target of mastering nursing skills.

References:
[1] Yang, K.F., Yu, S., Lin, M.S., & Hsu, C.L., Study of basic competence among public health nurses in Taiwan. Nursing Research, Vol.12, No.1, 2004, pp.1-10.
[2] McCargar, P., Johnson, J. E. & Billingsley, M., Practice applications .In V.K. Saba & K. A. McCormick, (eds.), Essentials of Computer for Nurses: informatics for the new millennium. (3rd ed , pp.231-300) New York: McGraw-Hill, 2001.
[3] Franck, L., & Langenkamp, M.L., Mandatory education via the computer: cost- effective, convenient, and creative. Journal for Nurses in Staff Development, Vol. 16, No. 4, 2000, pp.157-163.
[4] Herriot, A. M., Bishop, J. A., Kelly, M., Murphy, M., & Truby, H., Evaluation of a computer assisted instruction resource in nursing education. Nurse Education Today, Vol. 23, No.7, 2003, pp.537-545.
[5] Williams, C., Aubin, S., Harkin, P., & Cottrell, D., A randomized, controlled, single-blind trial of teaching provided by a computer-based multimedia package versus lecture. Medical Education, Vol. 35, No.9, 2001, pp.847-854.
[6] Chiou, S. F., Distance education: a new teaching method in nursing education. The Journal of Nursing , Vol. 48, No.4, 2001, pp.37-43.
[7] Linnenbrink, E. A.& Pintrich, P. R., The role of self-efficacy beliefs in student engagement and learning in the classroom. Journal of Reading & Writing Quarterly, Vol.19, No.2, 2003, pp. 119-137.

[8] Thompson, L. F., & Lynch, B. J., Web-based instruction: Who is inclined to resist it and why? *Journal of Educational Computing Research,* Vol.29, No.3, 2003, pp. 375-385.

[9] Jarvis, C., Physical examination and health assessment, 3rd ed., 2003.

[10] Huang, H. L., Yang, R. J., & Chen, H. M., Application and construction of physical examination in health center of elementary school. Chinese Journal of School Health, Vol.51, 2007, pp. 73-88.

[11] Huang, M. H., A research for the effects of peer tutoring on nursing skill learning in the courses of the human physical assessment. NPUST Humanities and Social Sciences Research, Vol.1, No.1, 2007, pp. 50-71.

[12] Roblyer, M. D., Integrating educational technology into teaching (3rd ed.). Upper Saddle River, NJ：Merrill / Pearson Education, 2003.

[13] Yeh, M. L., Chen, H. H., & Chang, C. H., Developing a computer- assisted instruction CD-ROM program for nursing. *Formosan Journal Medicine,* Vol.6, No.6, 2002, pp. 944-950.

[14] Hsieh, Y. C., Lee, J. Y., & Cheng, H. W., The production and publish of e-books: a case study of "graphic communication arts e-book". *Taiwan University of Arts,* Vol.3, No.1, 2007, pp. 137-163.

[15] Lu, C. C., Shih, P. C., & Tsai, C. W., The making and application of CD- ROM picture books integrate into "the nature and life science and technology" in the elementary school. Journal of National Taipei University of Education, Vol.19, No.2 , 2006, pp. 1~30.

[16] Johnson, D. L., The great e-book debate. *Computers in the Schools,* Vol.19 (1/2), 2002. pp.1-6.

[17] Chen, M. C., Comparing the student's learning performance between the multimedia-internet. Instruction and Conventional Instruction, Vol.64, 2003, pp. 49-64.

[18] Sankaran, S. R., & Bui, T., Impact of learning strategies and motivation on performance: A study in web-based instruction. *Journal of Psychology*, Vol.28, No.3, 2001, pp. 191-198.

[19] Kozlowski, D., Retuning to School: an alternative to "traditional" education. *Orthopaedic Nursing*, Vol.21, No.4, 2002, pp. 41-47.

[20] Rosser, J., Herman, B., Risucci, D., Murayama, M., Rosser, L., & Merrell, R., Effectiveness of a CD-ROM multimedia tutorial in transferring cognitive knowledge essential for Laparoscopic skill training. The *American Journal of Surgery*, Vol.179, No.4, 2000, pp. 320-324.

[21] Mohnsen, B., Stretching bodies and minds though technology. Education Leadership, Vol.55, No.3, 1997, pp. 46-48.

[22] Yang, C. S., Leading online instruction: the roles, responsibilities, and strategies of instructors. Instructional Technology & Media, Vol.73, 2005, pp. 46-61.

[23] Lee, Y. Y., Teaching psychomotor nursing skills. The Journal of Nursing , Vol. 47, No.3, 2000, pp. 77-82.

[24] Lee, J. J., & Tsai, S. T., The model for designing a computer multimedia system. Instructional Technology & Media, Vol.22, 1995, pp.10-15.

[25] Sykes, G., & Bird, T. Teacher education and the case idea. In G. Grant（Ed.）, Review of Research in Education.18. Washington, D.C.: American Educational Research Association, 1992.

[26] Lewis, M. J., Davies, R., Jenkins, D., & Tait, M. I., A review of evaluative studies of computer-based learning in nursing education. *Nurse Education Today.* Vol.21, No.1, 2001, pp. 26-37.

[27] Bandura, A., Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, Vol.84, No.2, 1977, pp. 191-215.

[28] Bandura, A., Organizational application of social cognitive theory. Australian Journal of management. Vol.13, No.2, 1988, pp. 275-302.

[29] Pajares, F., Self-efficacy beliefs in academic settings. Review of Educational Research, Vol.66, No.4, 1996, pp. 543-578.

[30] Schunk, D. H., Perceived slef-efficacy and related social cognitive performance. (ERIC Document Reproduction Service No. ED293866). 1988.

[31] Margolis, H., & McCabe, P. P., Self-efficacy: a key to improving the motivation of sruggling learners. *Preventing School Failure*, Vol.47, No.4, 2003, pp. 162-169.

[32] Madorin, S., & Iwasiw, C., The effects of computer-assistered instruction on the self-efficacy of baccalaureate nursing students. *Journal of nursing education*, Vol.38, No.6, 1999, pp. 282-285.