EXPLORING AN APPROPRIATE INSTRUCTIONAL DESIGN MODEL FOR CONTINUING MEDICAL EDUCATION

Soghra OMRANI
PhD. Faculty of Humanities Payam-e-Noor University, Tehran, IRAN

Hashem FARDANESH P. HD.,
Department of Education, Tarbiat Modarres University, Tehran, IRAN

Nima HEMMATI
Student Scientific Research Centre, Tehran University of Medical Sciences, Tehran, IRAN

Corresponding author Naser HEMMATI M. D.
Department of Anesthesiology, Imam Ali Hospital, Kermanshah University of Medical Sciences, Kermanshah, IRAN

ABSTRACT

Instruction, even when designed and based on sound instructional principles, oftentimes does not stimulate learners' motivation to learn. The result may be that learners may not be motivated to pursue lifelong learning and use the knowledge and skills learned to deliver patient care.

The purpose of this study was to identify an appropriate integrated instructional design model for Continuing Medical Education using electronic learning method and compare it with traditional method. In this quasi-experimental study 60 General physicians and assistants according to the recall of Kermanshah University of Medical Sciences in Iran and by available sampling method in two 30- staff groups were participated. One group learned through traditional learning method and the other group by e-learning method and by Macromedia flash CS5 software that was based on the integration of instructional and motivational design models; consisting of slides and case studies focusing on the pathogenesis, diagnosis, and clinical management of Acute Respiratory Failure. The data were collected by pretest, posttest, and physicians' motivation questionnaires. There was no significant difference between pretest scores of the two groups (11.37 ± 1.42 VS. 11.73 ± 0.69, $P > 0.05$) but there was significant difference between posttest learning scores (15.2 ± 1.29 VS. 17.53 ± 0.94, $p < 0.05$) and motivation of physicians (126.10 ± 3.97 VS. 160.63 ± 22.41, $p < 0.05$) in both groups. The physicians' learning and motivation were different in these two instructional methods; therefore, it is recommended that instructional and motivational design be used in future electronic continuing medical education programs.

Keywords: Instructional Design Models, Motivational Design Models, Learning & Motivation, Traditional Continuing Medical Education and Electronic Continuing Medical Education.

347

INTRODUCTION

Developing life-long learners, who are intrinsically motivated, display intellectual curiosity, find learning enjoyable, and continue seeking knowledge after their formal instruction has ended; has always been a major goal of education(Small, 1997). Lifelong learning has been identified as an element of professionalism in medicine. Continuing Medical Education (CME) is a necessary component in physician life-long learning. Based on the measured educational needs of physicians, CME activities help to improve the competence and performance of physicians and ultimately impact patient care (Sherman, 2009). However, traditional CME has not been effective at altering the behaviors of physicians. One reason for this failure of traditional CME programs may be their inflexibility.

In traditional CME, the clinician does not choose the topic, the pace of the program, or the place of learning, and the CME material cannot be easily delivered to the point of care where the clinician needs the information. Computers and computer networks have the potential to accomplish these goals (Peterson, 1999).

Computer-based multimedia presentation helps people learn information more rapidly than traditional classroom lectures (Kalili, 1994). And can deal with these challenges in the health sector especially in developing countries to support meaningful learning opportunities. In addition, Web-based and CD-ROMs technologies allow for an increased ability to participate in continuing education by providing flexibility in the time and place of education (Sheppard, 1998). Many educators cling to traditional lecture/textbook methods for learning. Earlier meta-analysis and subsequent research studies identified that students' using technology enhanced learning demonstrated cognitive gains of at least equal to (Babenko et al., 2004)-(Cohen, 1994) or even greater than students' learning with traditional classroom methods (Jefferies, 2001). The most consistent, significant result of using technology-enhanced learning was decreased student learning time (Saucier et al., 1996), (Murray, 1996).

Although most studies have confirmed the effectiveness of e-learning to educate students and CME, but employing this method of training is not flawless. The main issues raised; were related to course content instructional design (Sklar, 2000). Many online medical resources lack design features that organize content and simplify usage; a dearth of well-designed applications in medical education has been noted (Chu, 1998). In 2000, 96 CME sites were available; in 2001 this number had more than doubled to 209, with 18263 hours of CME credit offered online. However, 28% of these sites contained only text. Only 17% of the sites were interactive, and 7% were guideline-based. It is claimed that most online CME offerings do not make use of unique computer capabilities to offer multiple pathways to learning and interactive responses (sklar, 2002). Studies have shown that traditional CME lectures and simple information dissemination, similar to the text-only online sites, do not usually change physician practice patterns (Davis, 1997).

Design is essentially a rational, logical, sequential process intended to solve problems. Designing effective instructional materials is one way of improving the quality of educational opportunities.

The concept of instructional design (ID) has been described in many different ways; and refers to the systematic process of translating principles of learning and instruction into plans or specifications for instructional materials or activities. It is clear that designing and developing instructional materials is a thorough and complex process aimed at solving particular instructional and learning problems (Davis, 1995).

Today, in the field of ID, many ID models have been raised. What is important is the approach and model for ID to be established the primary basis to ensure effectiveness of training. One of the models known in the field of ID is Component Display Theory (CDT). Merrill's CDT Theory describes the micro elements of instruction (single ideas and methods for teaching them). This theory only looks at the cognitive domain. The theory works to separate content from instructional strategy, with an overarching result of providing a process by which content could be "plugged in" to appropriate strategies aligned with certain content types and performances. It is believed that different learning outcomes require different instructional strategies. Also the optimal instruction includes multiple forms of information presentation. There are four types of content (Facts, Concepts, Procedures and Principles) which should have a specific teaching method and teaching the three types of performance level (Remembering, Using and Finding) should be based on the same level (Merrill, 1983). Following extensive research in micro and macro-level of ID, "Elaboration Theory" proposed. A sequencing approach that is consistent with Merrill's Component Display Theory (that is, each theory enhances the other) was used.

The main Idea of this sequential approach was that the instruction is made out of layers and that each layer of instruction elaborates on the previously presented ideas. By elaborating on the previous ideal, it reiterates, thereby improving retention. This layering has a zoom lens sequencing approach that runs from simple to complex and repeated general-to-specific (Reigeluth, 1979).

Note that this is a macro strategy of ID that focus on the organization and sequencing of subject matter content by addressing the four design problem areas: selection, sequencing, synthesizing, and summarizing. It works in conjunction with component-display theory, which deals with the micro aspects of instruction and works out the details of elaboration (Reigeluth, 1983).

On the other, Instruction, even when designed and based on sound instructional principles, oftentimes does not stimulate learners' motivation to learn. The result may be that learners may not be motivated to pursue lifelong learning and use the knowledge and skills learned to deliver patient care (Wongwiwatthananukit, 2000). It is clear that the motivation is one of the aspects of ID. The goal of the many ID theories that have been developed is providing an effective and efficient instruction. However, in these theories the aspect of motivation has been generally ignored.

Using motivational design to create motivational strategies and then incorporating these into the instruction can result in complementary enhancement of student learning and achievement (Keller & Kopp, 1987). It is indicated that the identification and understanding of ID strategies that promote learner motivation would useful for enhancing learning and performance.

The use of technology to provide various stimuli to create appealing learning environment has become possible. However, simply adding color, graphics, or animation were not the only motivation strategies. A fancy web site could still be completely ineffective at guiding a learner towards an instructional goal if is not created with sound ID theory in mind (small, 1997).

Motivational design refers to arranging resources and procedures to bring about changes in motivation. Motivational design is based on the motivation to learn and refers specifically to strategies, principle, and processes for making instruction appealing (Keller, 2006). Today, the only coherent and comprehensive design model accommodating motivation is Keller's systematic and widely applied ARCS (Attention, Relevance, Confidence, and Satisfaction) model. These four components can influence a person's motivation to learn (Wang, 2000). Motivational Design Theory asserts that instructional material should be configured with the strategies which increase these four components of the students for an ID which ensures the continuity of learning motivation (Keller & Kopp, 1987). The ARCS model has two important ways:

> Strategy selection in the ARCS model is done systematically from a set of categories and subcategories based on a comprehensive synthesis of concepts and theories in human motivation.
> The ARCS model is a problem solving approach (song, 2001).

This problem-solving approach of the ARCS model fits well with the nature of the CME and type of learner (adult learners). A review of literature indicated that there is little empirical knowledge on how to motivate e-leaners, particularly in self-directed e-learning setting. Hence, we need to pay attention to improving the motivational quality of web-based instruction in order to address the issue of learner motivation. Improving the motivational appeal of courses can result in complementary gains in learners' successes in learning, in developing the goal to pursue life-long learning, and in using the knowledge and skills they have learned to deliver patient care. Applying Keller's ARCS model of motivation to the design and presentation of web-based courses helps learners understand the importance of a lesson or instruction.

This research project guided and grounded based on three Keller's assumptions. The assumptions are that the instructional designer has responsibility for the motivation to learn and can use a systematic process to design motivating instruction and that motivation must be considered in all parts of an instructional message (Fleming, 1993).

Because the design of e-learning content has a prominent role in learning, the main focus of this study was also to design instructional materials with increasing attention to the electronic Continuing Medical Education (eCME). since this research is about the integration of the ID models (Merrill and Reigeluth) with motivational design (Keller), this study focused on improving the quality of courseware design used in the research. The overall purpose, then, of this study was to examine the effect of certain ID practices, elements, strategies, and methodologies based on the selected models intended to improve the learning and motivation of learners and finally, exploring an appropriate ID model for eCME.

METHOD

Participants
A quasi-experimental study was conducted on 60 general physicians and assistants in June 2011. The participants enrolling in the program were randomly assigned to experimental (n=30) and control (n=30) in two groups. It should be noted that the number of general physicians and assistants in two groups were almost identical. Thus the error caused due to the awareness of participants was denied. The participants were unaware that two teaching methods were compared during the programs.
Approval for the study was granted

Ethical approval
This study was approved by the Kermanshah University Ethical Committee of Iran.

Instrument
The data were collected from a pretest, posttest, a questionnaire for demographic information and another questionnaire for motivation to learn. The demographic information included the variables gender, age, marital status, years of experience and ability to use computers.

At the beginning of the sessions, pretest exams and at the end of the sessions, posttest exams were taken from the participants to evaluate their learning level. These exams were held on pencil and paper method. Each exam contained 20 multiple-choice questions. The questions were written at application level, using the Merrill's model. The differences between the pre- and post-test scores were considered as their learning outcome. The two groups had same tests that were written by two content specialists based on articles published in journals and books, as well as on their teaching experience. The pre- and posttest both contained the same test questions. The entire questionnaire was pilot tested with a small group of physicians from academic and clinical setting to identify missing or ambiguous items and to ensure clarity. These data were not included within the final data set for analysis. For each correct answer, the score was '1' and for each incorrect answer the score was '0'. Sum of the scores were converted to a percentage of the possible total score. Acceptance criteria for passing program were determined score of 12 out of 20. All expert reviewers felt that the test instrument was the right length and covered clinically relevant information. The reliability coefficient using Kuder-Richardson method was 66%.

The motivation questionnaire was used to measure the level of participants' motivation after completion of traditional and electronic learning. The questionnaires asked participants to rate each of the 48 Likert- scale statement was supposed to rate one of four motivational factors by assigning 4 points for "Agree," 3 points for "Almost agrees," 2 points for "disagree" and 1 point for "Strongly disagree". The first 10 items assessed attention, the next 12 items measured the relevance and 11 the next items considered confidence and ultimately the final 15 items assessed the satisfaction based on participants' comments about the programs and adapted from the Keller's ARCS model. At the end of motivational questionnaire, an open-ended comment section enabled participants to include information that was not covered by the survey questions. The Cronbach's α coefficient was 91%.

The Steps of Designing Program

The study was conducted in three main stages. The first step was to determine which cognitive approach of ID model should be used. In this regard, after study of literature and review of existing models with a cognitive approach and consultation with experts, finally, combining the three following models was selected for the programs' ID:

Because of the expected participants after completion of CME program what they have learned to operate in the workplace and new situations (Application-level) and efficiently learn the theoretical concepts in education with cognitive approach and the learning program was consisted of two topics hypoxemic and Hypercapnic (both micro and macro levels). Therefore, Merrill's and Reigeluth's models for ID and Keller's models for motivational design were used due to the comprehensive and usefulness of these models to other cognitive models of ID. In the second step, an appropriate and new course should be selected to raise awareness of physicians to the new topics and solve some problems. Thus, CME officials and university experts were interviewed for selecting topics. And they were asked to introduce the required courses for the CME which are purely theoretical and with applications level. Finally, the topic of Acute Respiratory Failure was chosen that meets the above requirements.

The next major step should be done in this stage were designing and integrating program on selected models, storyboard development of electronic content, necessary decisions about the media needed in different parts of content, construction of all assets (the program uses multimedia resources: photographs; animation; videos; texts and narratives), and composition of different parts of the course that was based on the storyboard. The computer-based multimedia package was developed by using Adobe Flash CS3 as well as Action Script 3.0. The program was created and burned onto CD-ROM. Then produced instructional material was assessed with a small group of Kermanshah University physicians in a pilot study and there was no need to modification. The aim of pilot study was only to modify the program. These data were not included within the final data set for analysis.

Each of the learning programs was presented to participants in two different days. On the date scheduled, the traditional group (control) attended in the classroom, and received lecture based teaching. While the second group (experimental) received individual e-learning in a computer room based on Merrill's, Reigeluth's and Keller's instructional and motivational design models. It should be noted that the CD was placed on the university server system, providing access to the participants for experimental group from the library campus computer location. The two groups had similar content in terms of text.

Participants were tested at the end of programs. It should be noted that the lecture- based group immediately before and immediately after the lesson, completed a knowledge test as a group, this theoretical class on Acute Respiratory failure was given by assistant professor in the Anesthesia department with considerable experience in the subject and whose teaching skills are recognized throughout the university. This assistant professor had no knowledge of other program. To receive CME credit, participants in electronic group had to complete a test immediately before and after viewing the program; each participant has a computer and studied independently with self-pace learning.

All participants were required to complete the assessments independently, without conferring with colleagues.

The questionnaires to the participants after the study period were marked and they were awarded a graduation certificate.

In this research, the time of study and learning of participants in traditional learning was calculated after the pretest, completed post-test conducted as a group; and e-learning group after the pretest, and provide educational content to the participants until the end of learning, and post-tests performed by each participant with self-pace learning.

DATA AND ANALYSIS

After collecting all data from the assessments, statistical analysis was performed using SPSS Version 11 and consulting with an expert in the field of medical statistics. Quantitative variables are shown as mean ± SD and qualitative variables as frequency and percentage. Statistical tests appropriate to the type variable were included Levene's test to compare the variances of two groups before the independent t-test; independent t-test to compare mean scores of quantitative variables such as learning scores, age, and etc. between experimental and control groups; paired t-test to compare pretest and posttest in each group; Chi-square test to compare the distribution of qualitative variables such as marital status, gender and years of experience between the two groups; Fisher's test to compare the capabilities of computers, between the two groups. The P.value < 0.05 was considered significant.

RESULTS

There were no significant differences between demographic information of two groups (Table: 1).

Table: 1
Distribution of characteristics in two groups of subject

variable		control	Experimental	t	P. Value
Age (years)		34.33±3.65	33.38±3.62	0.559	0.578
years of experience		7.47±3.47	7±3.05	0.553	0.837
Marital Status	Married Single	19(63.3%) 11(36.7%)	22(73.3%) 8(26.7%)	0.823	0.405
Gender	Female male	13(43.3%) 17(56.7%)	16(53.3%) 14(46.7%)	0.766	0.438
the ability to use computers	medium Professional	27(90.1%) 3(9.9%)	28(93.3%) 2(6.7%)	0.460	0.856

Prior to the teaching, there were no significant differences between groups in the scores for the multiple- choice questions and the average scores achieved in the pretest exam in two groups were not statistically significant (11.37±1.42 VS. 11.73±0.69, P>0.05) but there was significant difference between posttest scores (15.2±1.29 VS. 17.53±0.94, p<0.05) in both groups (table 2).

Table: 2
Comparison of mean average (±SD) learning in two groups

learning	control	Experimental	t	p.value
Pretest	11.37±1.42	11.73±0.69	1.267	0.212
posttest	15.2±1.29	17.53±0.94	7.98	0.001

As could be seen, in table 3, the participants' motivation scores related to four component of Keller's model (attention, relevance, confidence and satisfaction) had a statistically significant difference between the two groups (126.10±3.97 VS. 160.63±22.41, $p < 0.05$).

Table: 3
comparison of mean average (±SD) motivational component in two groups

Variable	control	Experimental	t	p.value
attention	24.7±2.29	33.58±4.88	9.015	0.001
relevance	30.76±1.04	39.80±6.47	7.544	0.001
confidence	29.76 ±2.17	37.10±5.05	7.30	0.001
satisfaction	40.86±2.71	50.17±7.34	6.51	0.001
motivation	126.10±3.97	160.63±22.41	8.31	0.001

Participants in this study using e-learning and multimedia formats needed less time for reading and learning than traditional method. The time required for control group based on the CME programs was 6 hours in a day and in experimental group was about 120± 18 minutes.

DISCUSSION & CONCLUSION

This study is a part of a comprehensive study on the status of implementation of e-learning in the area of medical continuing education that compared e-learning method with traditional method. Review of previous research can show that most studies have been conducted to assess only one or two indicators in this study, namely the impact of an ID model, or one of the motivational component of Keller's ARCS model (satisfaction and interest to learn), or the impact of technology on CME participants' learning. In the present study we attempted to have a comprehensive insight into all aspects of learning, based on pedagogical principles and principles of ID, human motivation and technology capabilities that provide individual learning, Interactive environment, any time and any place of learning.

No significant differences were found based on the demographic information obtained on evaluation form. So we can say that the results of compared two groups were not affected by these features.

In the pretest study, the pretest scores between the two groups were not significantly different, which indicated the same degree of knowledge before the programs. For this study, effectiveness was measured by evaluating the change in the participants' scores (posttest vs. pretest scores). The difference between pretest and posttest scores in two groups was statistically significant.

354

These findings indicate the success of teaching with two methods and demonstrate that after training awareness of all participants increased and both methods were equally effective in increasing knowledge as measured by differences in pretest and posttest scores. Although our e-learning program enhanced the knowledge of physicians, the effectiveness of different forms of e-learning, persistence of obtained knowledge over time and the impact of e-learning on professional practice should be further explored.

Previous studies of the impact of e-learning content on gains in student knowledge have provided variable results. Although some studies have shown slight improvements in student learning, (Jenkins, 2008; cook, 2005) others have shown no significant differences (Hammoud, 2006).

This finding is supported in previous research by Belfry and Winne (1988) who found that students had a more positive attitude toward Computer Based Training (CBT) than toward lectures. They also scored higher in tests and learned the material they needed to know in less time than traditionally instructed students. Cohen and Dacanay (1994) and Fieschi et al. (1994) examined 29 studies where 22 of the study populations receiving CBT had higher examination scores than those with traditional training. In six of the studies favoring CBT, the difference between computer-based and traditional training was statistically significant. Also, Fordis et al. (2005) found that web-based CME can lead to behavior change as well as sustained knowledge gains that are superior to traditional approaches.

There were significant differences between participants in control and experimental groups with respect to their motivation to learn. The latter group had a higher level of motivation to learn and called for further courses in the same way. This means that the application of appropriate ID which can be an effective factor and a key criterion in increasing motivation of CME participants. The results of this study showed that there was a discernible improvement in learner motivation associated with each ARCS element that had been altered using instructional techniques designed to improve learner motivation. The implication of this result is that attention to motivation by instructional designers and others involved in the production of learning materials will have a positive effect on learner motivation. To our knowledge, this finding is consistent with the research results of the following:

Meyer and Sternberger (2005) conducted a study in interactive cardiovascular anatomy and physiology CD-ROM with Bandura's instructional strategies and Gagne's nine classical principles offers a sound, logically organized, and motivational ID model influencing self-reliance and self-efficacy, and compared it with conventional method and found the participants had overall satisfaction with the course design; (Meyer L., Sternberger 30). Also, is similar to studies performed by Muth et al. (2006); .Mathur et al. (2005) and MacDonald (2001) only in terms of participant's satisfaction and interest in Computer Assisted Learning than traditional and other teaching methods like auditory teleconference.

In the field of non-medical education, Chyung, Winiecki, and Fenner (1999) used the ARCS model in combination with a systematic needs assessment process to design and implement interventions that would decrease the dropout rate in a distance learning program.

Their results indicated that there were improvements in both learning and motivational reactions in all four motivational categories (attention, relevance, confidence, and satisfaction). Also, there was a significant reduction in the dropout rate, from 44 to 22%. A study of motivation and performance in a distance learning class, by Chang and Lehman (2002), provides another example from an e-learning environment. They used the ARCS model to guide the development of a set of tactics designed to facilitate easy scanning of online text, reduce the word count on a screen compared to the original word count in a printed text, improve the quality of quizzes as a motivational tool, and incorporate more interactive features. The investigators found a significant improvement in learner perceptions of motivation and in scores on a comprehension test (Keller, 2008).

Participants in this study using e-learning and multimedia needed less time for reading and learning than traditional teaching method. Hulsman et al. (2002) noted that their CBT course on communication skills for medical specialists was given over three hours rather than the conventional two or three days. Kulik (1994) found time reductions of 34 percent in 17 studies of CBT use in higher education and a 24 percent time reduction in 15 studies of adult education.

This result suggests that participants in the experimental group with less time spent learning could to learn much better than the control group. It also shows that e-learning content with well-designed can be effective or a supplement component to medical continuing education. Given that participants in CME programs in developing countries and in Iran to participate in a program spend 8-6 hours a day but in computer-based training, especially with CD-ROMs it takes time to learn maximum two or three hours and the learners can set their own time and place to learn. Thus, not only will save learners time and money but also save the costs of running these courses for educational institutions. On the other hand, e-learning content easily updates by faculty members and can pay their other academic duties.

Based on the findings of this study, it could be argued that according to survey results using an appropriate ID model for the development of e-learning content has a dramatic effect on learning and motivation for CME. Multimedia program produced by the Kermanshah University of Medical Sciences showed that could be suitable as an educational tool for teaching Acute Respiratory Failure. All participants found their program useful. After teaching, participants who had experienced the multimedia package performed significantly better than those who had experienced the lecture based teaching (P=0.001). The following results present some of the prominent aspects which influenced greatly the participants' learning and motivation process and they agreed with them are:

> The interactive nature of the whole program and its usefulness to physician learning. In e- learning ID, the participants could view and review the visualizations and texts again and again. The higher interactivity in experimental group allowed learners to manipulate the representation, so that learners were in complete control of the speed, orientation, and time. This has been linked to increased engagement and learning, more positive attitudes, greater motivation, and increased perception of personal control; many of the participants who had been allocated to the computer group reported liking it because it was self-paced and because they were able to re-visit material at will.

- ➢ The examples, non-examples, frequently questions and answers and practice and feedback about the types of disease that was distributed in the program and the quizzes at the end of each courses, encouraged participants to think and information process with a meaningful way, created a mental challenge and would encourage active learning.
- ➢ The enhancement of understanding of the main concepts and being better than any textbook read. Multimedia CD-ROM resources provided a medium different from textbooks that stimulated participants learning, and retained their attention, as well as meet the educational objectives of the course;
- ➢ Multimedia presentations (animation, graphics, photographs, narrative, and videos of disease) in the course that stimulated the learner's interest;
- ➢ Provide learners with content that is relevant to their live and work and useful to them;
- ➢ Included learning activities that simulated real-world situations;
- ➢ Provided learners with content that the difficulty level of which is just right for them and considering participants' learning styles and individual differences;
- ➢ Provided learners with hands-on activities that engaged them in learning and created opportunities to interact with content;
- ➢ Provided learners with enough feedback on their performance;
- ➢ Design the pages that are easy to navigate with linear (program control) and nonlinear (learner control) layouts;
- ➢ Design the course in a way that the learner is satisfied with the overall learning experience.

A primary limitation of this exploratory study is related to generalization. This research project was conducted in Kermanshah University of Medical Sciences and physicians who participated in CME. Additional studies are needed to compare the effects of using such tools in medical and health education on long-term competency. Further studies are recommended to evaluate the effectiveness of these research ID methods in other fields of education and other areas such as teaching university students. It should be noted that evaluation of the results obtained from this research program was used for the next versions.

BIODATA and CONTACT ADDRESS OF AUTHORS

Ms. Soghra OMRANI is a PhD student of Distance Educational Planning in Tehran university of Payam-e-Noor. Her interests are eLearning, Instructional Design, Instructional Planning and Development and Teaching Methods. She has also designed a number of distance education materials. Her research interest is motivational design of instruction. She is currently researching on medical education and its problems in Iran.

Soghra OMRANI
Ph.D., Faculty of Humanities,
Payam-e-Noor University, Tehran, IRAN
Phone: +989123579575
Email: Omrani_47@yahoo.com

Dr. Hashem FARDANESH received his education at education Ph.D. from the University of Southern California, USA in Psychology and Instructional Technology and he is working as an associated professor in Tarbiat Modares University in Iran. His interests are Instructional Theory, Instructional Design, Instructional Planning and Development, Teaching Methods, Teaching Paradigms and learning theories.

Hashem FARDANESH Ph.D.,
Department of Education,
Tarbiat Modarres University, Tehran, IRAN
Phone:+982182884628
Email: fardan_h@modares.ac.ir

Nima HEMMATI is a Medical student of Tehran University of Medical Sciences, Tehran, IRAN. His interests are research methodology, analysis, medical education and regenerative medicine. He is an active member of student scientific research center of Tehran university of Medical sciences, Tehran, Iran.

Nima HEMMATI,
Student Scientific Research Centre,
Tehran University of Medical sciences, Tehran, IRAN
Phone: +989126493482
Email: Hemmati.nima@yahoo.com

Dr. Naser HEMMATI is an assistant professor of Kermanshah University of Medical sciences, Kermanshah, Iran. He is currently working in Imam Ali hospital as a cardiac anesthesiologist. His current goal is designing an appropriate instructional material for his students.

Corresponding author Naser HEMMATI M.D.,
Department of Anesthesiology,
Imam Ali Hospital, Kermanshah University of Medical sciences, Kermanshah, IRAN
Phone: +989121014521
Email: Drhemati_37@yahoo.co

REFERENCES

Babenko-Mould, Y., Andrusyszyn, M. A. And Goldenberg, D. (2004). Effects of computer-based clinical conferencing on nursing students' self-efficacy. *Journal of Nursing Education*, Vol, 43. No, 4. pp. 149-155,

Belfry, M. J. and Winne P. H. (1998). A review of the effectiveness of computer-assisted instruction in nursing education. *Computers in Nursing.* Vol. 6, No. 2, pp.77–85.

Chu, L. F., and Chan B. K. (1998). Evolution of web site design: implications for medical education on the Internet. *Comput Biol Med*. Vol. 28, No. 5, pp.459–72.

Cohen, P. A. and L. S. Dacanay. (1994). A meta-analysis of computer-based instruction in nursing education. *Computers in Nursing. Vol. 12, No.* 2, pp. 89–97.

Cook DA. Dupras DM. Thompson WG. Pankratz V.S. (2005). Web-based learning in Residents' Countinuity Clinics: A Randomized, Controlled Trial. Academic Medicine: *Journal of the Association of American Medical Colleges*. Vol. 80, No. 1. pp. 90-7.

Davis DA, Thomson MA, Oxman AD, Haynes RB. (1995). Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA*. Vol. 274, No. 9. pp. 700-705.

Davis, DA., and Taylor-vaisey. A. (1997). Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. Vol. 157, No. 4, pp. 408-416.

Fieschi, D., M.Fieschi, G. Soula, and P.Degoulet. (1994). Evaluation of computer-assisted instruction methods. An analysis from twenty-six studies from 1989 to 1992. *Pathologie Biologie*. Vol. 42, No. 2. pp. 183–90.

Fleming M. and Levie W. H. (1993). *Instructional massage design: Principles from the behavioral and cognitive sciences* (2nd Eds). Englewood Cliffs. NJ: Educational Technology Publications). 1993; pp. 3-523.

Fordis M, King JE, Ballantyne CM, and et al. (2005). Comparison of the instructional efficacy of Internet-based CME with live interactive CME workshops: a randomized controlled trial. J Am Med Assoc. Vol. 294. pp. 1043-1051.

Hammoud, M., Gruppen, L., Erickson S.S., Cox S.M., Espey, E., Goepfert A., and Katz NT. (2006). To The point: Reviews in Medical Education Online Computer Assisted Instruction Materials. *American Journal of Obstetrics and Gynecology*. Vol. 194, No. 4, pp. 1064-9.

Hulsman, R. L., Ros, W. J. G., Winnubst, J. A. M., and Bensing, J. M. (2002). The effectiveness of a computer-assisted instruction program on communication skills of medical specialists in oncology. *Medical Education Journal*. Vol. 36, No. 2, pp. 125-135.

Jefferies, P. (2001). Computer versus lecture: A comparison of two methods of teaching oral medication administration in a nursing skills laboratory. *Journal of Nursing Education*. Vol. 40, No. 7, pp. 323-329.

Jenkins, S., Goal, R., Morrell., and Dean S. (2008). Computer-assisted instruction versus traditional lecture for medical student teaching of dermatology morphology: A randomized control trial. *Journal of the American Academy of Dermatology*. Vol. 59, No. 2, pp. 255-9.

Keller, J. (2006). *What is Motivational Design?* Florida State University, pp. 1-12.

Keller, J. M., and Kopp, T. W. (1987). An application of the ARCS model of motivational design. In C.M. Reigeluth (Ed.), *Instructional theories in actions: Lessons illustrating selected theories and models* Hillsdale, NJ: Lawrence Erlbaum. pp. 289-320.

359

Keller, M. J. (2008). First principles of motivation to learn and e-learning. *Open and Distance Learning Association of Australia*. Vol. 29, No. 2, pp. 175–185.

Khalili A., Shashaani L. (1994). The effectiveness of computer applications: a meta-analysis. *J. Res Comput Educ*. Vol. 27. pp. 48 –61.

Kulik, J. A. (1994). Meta-analytic studies of findings on computer based instruction. In Technology Assessment in *Education and Training*. E. L. Baker and H. F. O'Neil, eds. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 3-9.

MacDonald, P. (2001). Integrating Multimedia Technology into Continuing Nursing Education: Examining the Effectiveness. A Master thesis of Adult Education. ST. Francis XaVier University, pp. 1-133.

Mathur S., and Stanton S. (2005). Canadian Physical Therapists' Interest in Web-Based and Computer-Assisted Continuing Education. *Physical Therapy*. 2005; 85(3): 226-237.

Merrill, D. (1983). Component Display Theory. In C. M. Reigeluth (ed), *Instructional Design Theories and Models: An Overview of their Current States*. Hillsdale, NJ: Lawrence Erlbaum.

Meyer, L. H., and Sternberger, C. S. (2005). Self-efficacy, Self-reliance, and Motivation in an Asynchronous Learning Environment. *World Academy of Science. Engineering and Technology*. Vol. 8, No, 4, Pp. 225-229.

Murray, M. L. and d Higgins, P. (1996). Computer verses lecture: Strategies for teaching fetal monitoring. *Journal of Perinatology.* Vol. 16, No. 1, Pp. 15-9.

Muth and Bruskiewitz. (2006). A Comparison of the Acceptability and Effectiveness of Two Methods of Distance Education: CD-ROM and Audio Teleconferencing. *American*   Vol. 70, No. 1, pp. 1-8.

Peterson, M., and et al. (1999). Realizing the Promise: Delivering Over the Internet Pulmonary Continuing Medical Education. *American College of Chest Physicians, Special Report.* Vol. 115, No.5. Pp. 1429-36. Available at: **http://chestjournal.chestpubs.org/site/misc/reprints.xhtmlCollins**

Reigeluth, C. M. (1979). In search of a better way to organize instruction: The elaboration theory. *Journal of Instructional Development*, 2 (3), 8-15.

Reigeluth, C. M. and Stein, F. S. (1983). The Elaboration Theory of Instruction. In C. M. Reigeluth (ed), *Instructional Design Theories and Models: An Overview of their Current States*. Hillsdale, NJ: Lawrence Erlbaum.

Saucier, B. L. Steven, K. R., and Williams, G. B.(1996). Critical thinking outcomes of computer-assisted instruction versus written nursing process. *Nursing & Health Care Perspectives*. 2000; vol. 21, No. 5, pp. 240-246.

Sheppard L, M. S. (1998). Technology in education: what is appropriate for rural and remote allied health professionals? *Aust J Rural Health*. Vol, 6. pp. 189–193.

Sherman L. (2009). Changing Continuing Medical Education: An Opportunity to Improve Physician Education and Patient Care around the World.1999; 115(5):1429-36. *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing* Vol. 9. pp. 170-174.

Sklar B. Online CME update. 2002. Update. 2002. Dec, [2003. Sep 4]. http://www.cmelist.com/slideshows

Sklar, M. (2000) The Current Status of Online Continuing Medical Education. University of California, San Francisco. Master's Thesis in Medical Information Science. pp.1-100.

Small, R. V. (1997). *Assessing the motivational quality of world wide websites*. ERIC Clearinghouse on Information and Technology. (ED 407 930).

Small, R. V. (1997). *Motivation in Instructional Design*. ERIC Digest. (ED409895). pp. 1-5.

Song H. and Keller M. (2001). Effectiveness of Motivationally Adoptive Computer-Assisted Instruction on the Dynamic Aspects of Motivation. *ETR&D.* Vol. 49, No. 2, pp. 5-22.

Wang, Jun. (2000). An investigation into the Motivational Design Qualities of Web-Based Instructional Materials. A dissertation, the University of Tennessee. Knoxville. pp. 1-108.

Wongwiwatthanananukit, S., Popovich, N.G. (2000). Applying the ARCS Model of Motivational Design to Pharmaceutical Education. *American Journal of Pharmaceutical Education*. Vol. 64, pp. 188-196.