

Available online at www.sciencedirect.com**SciVerse ScienceDirect**

Procedia - Social and Behavioral Sciences 67 (2012) 545 – 552

Procedia
Social and Behavioral Sciences

The 3rd International Conference On e-Learning
ICEL2011, 23-24 November, Bandung, Indonesia

Instructional Design Models for Online Instruction: From the Perspective of Iranian Higher Education

Rouhollah Khodabandelou^{a*} and Siti Akmar Abu Samah^b

^aFaculty of Educational Studies, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

^bUniversity Publication Centre, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

Abstract

Today, online instruction is a new approach among many higher education institutions and is also becoming more prevalent in higher education. In terms of importance and effectiveness of online instruction in academic achievements, motivation and attitudes of students, this study investigates current uses of instructional design (ID) models in designing and developing online instruction for higher education. The purpose of this study is to understand how ID models are being used in the design and development of online instruction. It is also to identify which elements of an ID model are necessary in developing online instruction. In order to address the research objectives, a Delphi research methodology was employed. The population of this study consists of academicians who are actively involved in the instructional design activities of online instruction with particular focus on the Iranian higher education. The instrument to gather the data for this descriptive research was a survey questionnaire. A survey questionnaire was designed and executed to collect the necessary data which will then be coded and analyzed using SPSS.

© 2012 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer-review under responsibility of i-Learn Centre, Universiti Teknologi MARA, Malaysia

Keywords: online instruction; distance educatio; instructional design models;

*Corresponding author. Email address: khodaband@gmail.com

1. Introduction And Problem Statement

Online instruction which is a form of distance education based on Internet technologies, has emerged as a major global trend. (Gunawardena et al, 2006). Today online instruction is a new method among many higher education institutions and also it is becoming more prevalent in higher education. New instructional theories focus on contemporary learning such as problem-based learning, project-based learning, and cooperative learning (van Merriënboer, Kirschner & Kester, 2003), although some research suggests that online instruction is being designed and developed within the framework of traditional ID models (Li, 2003; Sun, 2001). "Little attempt has been made to develop a theoretical or a conceptual framework of online instruction in order to understand its pedagogical features in a logical way" (Jung, 2001, p. 526). This study will explore current uses of ID models in designing and developing online instruction in higher education in order to contribute current research to the instructional design profession and raise some important topics about instructional design and online instruction.

A review of literature in the area of instructional design and online instruction have confirmed that online instruction is as effective as traditional classroom instruction (Cavanaugh, 1999; Davies & Mendenhall, 1998; Tucker, 2001) even result of some studies have shown that online instruction is more effective than traditional instruction (Bernard et al, 2004).

In terms of importance and effectiveness of online instruction in academic achievements (Smith, 2005; Li, 2003; Li & Yang, 2007), motivations and attitudes (Richardson, 2007; Valenta et al, 2001; Hussain, 2007) of students, of one side and importance of instructional design in students' learning, performance and achievement (Tennyson & Rasch, 1988; Eunsook, 1997; Wiggins, 1999; Isman, 2005) on the other side, this study investigates current uses of ID models in designing and developing online instruction in higher education. A few researches have sought to understand to what extent existing ID models are suitable for developing online instruction. Many of the current ID models used are decades old, and have been developed before online courses were offered in higher education, and are not being used as systematically as they were designed (Li, 2003; Sun, 2001). According to Li (2003), Sun (2001), and Royal (2007) instructional designers have used traditional ID models, specifically the ADDIE and Dick and Carey models. Many of the current design models were developed during the past decades (Reigeluth, 1999).

ID models developed several decades ago may be incompatible with current perspectives on developing online instruction in higher education. It is unknown which existing ID models are being used in the development of online instruction and, what factors influence choice of these ID models for online instruction as well as to what extent instructional designers believe these ID models are appropriate for developing online instruction. In this study we attempt to answer these questions:

- 1- Which instructional design models are currently used for online instruction?
- 2- What factors affect the choice of instructional design models for online instruction?
- 3- Which elements of ID models are necessary in design and developing online instruction?

2. Literature Review

Sun (2001) investigated members of the Association of Educational Communications and Technology (AECT) to determine which instructional design (ID) models were suitable to design and develop web-based instruction (WBI). The result of research showed that majority of survey respondents were using existing ID models to design and develop WBI, many were not using all elements of the respective ID models. Sun (2001) noted that "Half of the participants believed that the current ID models were not appropriate for Web-Based Instruction" (p. 119).

In a similar study, Li (2003) found that while most survey respondents (64%) believed that existing ID models were appropriate for WBI, 76% of the population surveyed stated that they did not follow all steps

in the chosen ID models. In both studies, the Dick and Carey model (Li, 2003; Sun, 2001) was the most frequently used ID model, yet most respondents who used the Dick and Carey model were not using all components of this model.

3. Methodology

In order to address the research questions, a one round Delphi research methodology was employed. In this method, the researcher seeks agreement or consensus of experts on the research question. According to Skulmoski, Hartman, & Krahn (2007), Delphi method is an iterative process to collect and distill the anonymous judgments of experts using a series of data collection and analysis techniques interspersed with feedback. The Delphi method is well suited as a research instrument when there is incomplete knowledge about a problem or phenomenon.

In order to construct a Delphi study, a group of experts is essential. Unlike the traditional interview, the physical attendance of the expert participant is not required to serve as a panel member (Erffmeyer, Erffmeyer et al. 1986). This approach granted panel members more freedom and flexibility to participate in a series of discussion on intended issues without constraints of physical location (Erffmeyer, Erffmeyer, & Lane, 1986). The implementation of mail or electronic communication added even more flexibility to experts with busy schedules (Van Zolingen & Klaassen, 2003). This study was utilized the one round Delphi methodology to understand which ID models are being used in the design and development of online instruction in higher education.

The population this study consists of Iranian researchers, professors, and graduate students who are actively involved in the instructional design activities of online instruction. Since online instruction is a new area of study, there is no comprehensive list of population. However, the researchers found 27 experts in instructional design for online instruction in Iran and sent them the instrument via Zoomerang.com but just 19 of them return the questionnaires. On the other hand the number of sample in this study was 19 individuals who is suitable for this study.

3.1 Instrument

The instrumentation to gather the data for this descriptive research was an online survey questionnaire. The original questionnaire was designed and developed by Royal (2007) for his study. The questionnaire was divided into two parts. The first part of the survey obtained demographic data of the respondents. In the second part of the survey, the questionnaire tried to answer the research questions by designing and developing some multitude questions.

3.2 Data Collection

The survey was sent via Zoomerang.com to participants who were expert in instructional design for online instruction during the July and August 2009. Participants were asked to respond to all questions in each section. The demographic information for participants has 5 items such as years of experience in designing online instruction, highest degree, major of highest degree and having instructional design training. Part II of survey relates to the research questions. In order to ensure confidentiality and reduce the effects of response bias, participants were provided with a cover letter that had a written description of the purpose and importance of the study. They were informed that participation in the study was voluntary and their responses would not be personally identifiable.

4. Result

The survey to participate in the Delphi study asked prospective participants to provide demographic information about themselves. The following demographic information is provided for participants. Most participants (47.4%) had more than five years of experience researching or working in instructional design, although two (10.5%) had 9 years in the profession (see Table 1). All of the participants (100%) had training in instructional design field.

Table 1. Years Researching or Working in Instructional Design

Experience (Year)	Frequency	Percent
1-2	3	15.8
3-5	7	36.8
5+	9	47.4
Total	19	100.0

The majority of participants (78.9%) had completed doctoral studies. Six individuals (31.6%) reported that the field of study for their highest degree was in instructional systems/instructional technology, five (26.3%) in educational technology, two (10.5%) in curriculum and instruction, two (10.5%) in education, two (10.5%) in educational administration, one (5.3%) in educational administration and one (5.3%) unknown.

4.1 Research Question 1 Findings

The first research question asked, " Which instructional design models are currently used for online instruction and why?" Participants were asked how frequently they use an ID model to design or develop online instruction. More than one-third of the respondents (42.1%) indicated that they always use an ID model to design or develop online instruction (see Table 2). Only one participant (5.3%) stated that s/he did not use an ID model to design or develop online instruction.

Table 2. Frequency of Use of ID Models

	Frequency	Percent	Cumulative Percent
Always	8	42.1	42.1
Usually	9	47.4	89.5
Occasionally	1	5.3	94.7
Seldom	1	5.3	100.0
Total	19	100.0	

In this study, researchers were provided a list of ID models and asked how often they use each ID model to design or develop online instruction (see Table 3). Participants were asked to state how frequently they use each of the 21 ID models presented, using a five-point Likert scale from 1 to 5, with 1

representing always and 5 representing never. The five most commonly used ID models were ISD (Instructional Systems Design) ($\bar{X} = 1.52$, $\sigma = 0.84$), ADDIE ($\bar{X} = 1.68$, $\sigma = 0.82$), Gagné, & Briggs ($\bar{X} = 1.73$, $\sigma = 0.81$), Morrison, Ross, & Kemp ($\bar{X} = 1.74$, $\sigma = 0.81$) and Dick, Carey, & Carey ($\bar{X} = 1.94$, $\sigma = 1.26$), and The three least commonly used ID models were Just-in-time Design ($\bar{X} = 4.78$, $\sigma = .53$), Rapid Prototyping ($\bar{X} = 4.78$, $\sigma = .53$), and R2D2 (Recursive, Reflective, Design, & Development) ($\bar{X} = 4.63$, $\sigma = .59$). The mean (\bar{X}) and standard deviation (σ) for each ID model are listed in Table 3. Participants were also asked to state any other ID models that they use to design or develop online instruction that were not on the list provided. There were no additional ID models added by panelists.

Table 3. Frequency of Use of Specific ID Models

	<i>N</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Mean</i>	<i>Std. Deviation</i>
ISD (Instructional Systems Design)	19	4	1	1.52	0.84
ADDIE	19	4	1	1.68	0.82
Gagné & Briggs (nine events of instruction model)	19	4	1	1.73	0.81
Morrison, Ross, & Kemp	19	4	1	1.74	0.81
Dick, Carey, & Carey	19	5	1	1.94	1.26
Jerrold Kemp	19	5	1	2.47	1.19
ARCS (Attention, Relevance, Confidence, Satisfaction)	19	5	1	2.52	1.17
Smith & Ragan	19	5	1	2.73	1.21
ASSURE	19	5	1	3.21	1.13
Gerlack & Ely (classroom model)	19	5	1	3.26	1.28
Crawford	19	5	1	3.47	1.17
Knirk & Gustafson	19	5	2	3.73	1.09
Hannafin & Peck	19	5	2	3.84	1.11
Hall, Watkins, and Eller	19	5	2	3.89	1.04
EOD (Event Oriented Design)	19	5	2	3.94	0.97
Layers of Necessity Model	19	5	3	4.21	0.85
Seels & Glasgow	19	5	2	4.36	0.95
Rothwell	19	5	3	4.56	0.60
R2D2	19	5	3	4.63	0.59
Just-in-time Design	19	5	3	4.78	0.53
Rapid Prototyping	19	5	3	4.78	0.53

4.2 Research Question 2 Findings

The second research question asked what factors affect the choice of instructional design models for online instruction. In this question, panelists were asked to rate the 6-statement what extent these factors contribute to their choice to use the ID models to design and develop Online Instruction using a five-point Likert scale from 1 to 5, with 1 representing always applies and 5 representing never applies. Consensus was not achieved in this area. The two most important statements what factors contribute to choice to use the ID models to design and develop online instruction were time ($\bar{X} = 1.73$, $\sigma = 0.80$) and Ease of Use ($\bar{X} = 2.00$, $\sigma = 1.10$). The factor least contributing to choice of an ID model was Institutional Mission ($\bar{X} = 4.15$, $\sigma = 0.89$). The mean (\bar{X}) and standard deviation (σ) for each item are listed in Table 4.

Table 4. Factors Influencing Choice of ID Models

	<i>N</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Time	19	4	1	1.73	0.80
Ease of Use	19	5	1	2.00	1.10
Familiarity with the ID model	19	4	1	2.05	0.97
Resources	19	5	1	3.05	1.47
Budget	19	5	2	4.15	1.06
Institutional Mission	19	5	3	4.15	0.89

Participants were also asked to add to the list of factors affecting choice. Four additional items were mentioned: "audience", "content and learning objectives", "teaching styles" and "delivery mode".

4.3 Research Question 3 Findings

Which elements of ID models are necessary in design and developing online instruction? Panelists were asked to rate 10 instructions or design steps using a five-point Likert scale from 1 to 5, with 1 representing always and 5 representing never. The instruction or design step that panelists most often followed was Design and conduct summative evaluation ($\bar{X} = 1.36$, $s = 0.49$). The instruction or design step that was least followed was conduct instructional analysis ($\bar{X} = 2.31$, $s = 0.82$). The mean (\bar{X}) and standard deviation (s) for each item are listed in Table 5.

Table 5. Instructions or Design Steps

	<i>N</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Design and conduct summative evaluation	19	2	1	1.36	0.49
Identify instructional goal(s)	19	4	1	1.63	0.83
Develop instructional strategy	19	3	1	1.63	0.68
Design and conduct formative evaluation of instruction	19	4	1	1.68	0.88
Write performance objectives	19	4	1	1.73	0.80
Revise Instruction	19	3	1	1.78	0.71
Develop and select instructional materials	19	4	1	1.78	0.78
Analyze learners and context	19	4	1	1.89	0.87
Develop assessment instruments	19	4	1	1.94	0.91
Conduct instructional analysis	19	4	1	2.31	0.82

5. Discussion and Conclusion

The results of the study showed that the four most commonly used ID models were ISD (Instructional Systems Design), ADDIE, Gagné & Briggs, and Morrison, Ross, & Kemp. In Li's (2003) study, ADDIE, Dick and Carey, and the Gagné and Briggs ID models were the most commonly used by respondents in designing and developing Web Based Instruction. Also in Royal's (2007) study ADDIE, Gagné and Briggs, Dick, Carey, and Carey, and ISD were the most commonly used by respondents. Meanwhile, Sun's (2001) study, the Dick and Carey and Gagné and Briggs were the most commonly used ID models in designing and developing WBI. It is very good to see such consistency in the finding of this research and the previous researches. On the other hand, we can say the findings of this research are supported by previous research in this field.

In the second research question, participants were asked to rate the extent to which several factors contributed to their choices to use one or more ID models in the design or development of online instruction. Time, Ease of Use and Familiarity with the ID model were consistently ranked as the top three factors that participants stated influence choice of ID models for online instruction. While in Royal's study Familiarity with the ID model, time, and content and learning objectives were consistently ranked as the top three factors, and in Li's (2003) study Time, Resource, and Course subject were the most important factors that influence on the use of ID models for design and develop of web based instruction. Finally, in Sun's (2001) study time, Familiarity with the ID model, and content and learning objectives were the most important factors for designing and developing of WBI.

In the third research question according to the finding, the use of instructional design model is very important for the design, and development of online instruction. It is commonly agreed that "Design and conduct summative evaluation", "Identify instructional goal(s)" and "Develop instructional strategy" are of extreme importance of success of the course. Sun's (2001) research study did not have comparable instructions or design steps, but Li's (2003) study included analyze instructional goal as an essential step in designing and developing WBI. While Royal's (2007) study included to identify instructional goal(s) as an essential step in designing and developing WBI.

References

- Bernard, m et al (2004). How Does Distance Education Compare With Classroom Instruction? A Meta-Analysis of the Empirical Literature. *Review of Educational Research*. 74 (3). 379-439.
- Cavanaugh, C. S. (1999). The effectiveness of instructive distance education technologies in K- 12 learning: A meta-analysis. (ERIC Document Reproduction Service No. ED 430 547).
- Davies, R.S., & Mendenhall, R. (1998). Evaluation comparison of online and classroom instruction for HEPE 129 – Fitness and lifestyle management course. Report. 26.
- Erffmeyer, R., E. Erffmeyer, et al. (1986). "The Delphi technique: an empirical evaluation of the optimal number of rounds." *Group & Organization Management* 11(1-2): 120.
- Eunsook, H (1997). Effects of Instructional Design with Mental Model Analysis on Learning. ERIC Document Reproduction Service No. ED347994.
- Gunawardena, C. Layne, L. Carabaja, K. Frechette, C. Lindemann, K. & Jennings, B.(2006). New Model, New Strategies: Instructional design for building online wisdom communities. *Distance Education*. 27. (2). 217 – 32.
- Hussain, I. (2007). A Study of student's attitude towards virtual education in PAKISTAN. *Turkish Online Journal of Distance Education*; 8, (2).

- Isman, A. (2005). Effects of Instructional Design on Learning. *The Turkish Online Journal of Educational Technology*, 4 (4), 47-53.
- Jung, I. (2001). Building a theoretical framework of Web-based instruction in the context of distance education. *British Journal of Educational Technology*, 32(5), 525-534.
- Li, H. (2003). An investigation of a new instructional design procedure for Web-based instruction (WBI): A Delphi study. *Dissertation Abstracts International*, 64 (07).(UMI No. AAT 3097823).
- Li, H. (2003). An investigation of a new instructional design procedure for Web-based instruction (WBI): A Delphi study. *Dissertation Abstracts International*, 64 (07). (UMI No. AAT 3097823).
- Liv, Y., & Yang, H. (2007). Impact of online instruction on students' approaches to studying. *International Journal of Technology in Teaching and Learning*, 3(2), 95-106.
- Reigeluth, C.M. (1999). What is instructional-design theory and how is it changing? In C. M. Reigeluth (Ed.), *Instructional-design theories and models (Volume II): A new paradigm of instructional theory* (pp. 5-29). Mahwah, NJ: Erlbaum.
- Richardson, J. T. E. (2007). Motives, attitudes and approaches to studying in distance education. *Higher Education*, 54, 385–416.
- Royal, C. (2007). Exploring the use of Instructional Design Models for Web-based Instruction in Higher Education: A Modified Delphi Study. *Dissertation Abstracts International*. (UMI No. AAT 3274760).
- Skulmoski, G., Hartman, F., & Krahn, J (2007). The Delphi Method for Graduate Research. *Journal of information technology education*; 6. 1-21.
- Smith, R. O. (2005, May). Working with difference in online collaborative groups. *Adult Education Quarterly*, 55(3), 182-199.
- Sun, X. (2001). An investigation of instructional design models for Web-based instruction. *Dissertation Abstracts International*, 62(02). (UMI No. AAT 3004521).
- Tennyson, R. & Rasch, M. (1988). *Instructional design for the improvement of learning and cognition*. ERIC Document Reproduction Service No. ED295667.
- Tucker, S. (2001). Distance education: Better, worse, or as good as traditional education? *Online Journal of Distance Learning Administration* [Online serial], 4(4). Retrieved Jun 09, 2008, from: <http://www.westga.edu/%7Edistance/ojdl/winter44/tucker44.html>.
- Valenta, A., Therriault, D., Dieter, M., & Mrtek, R. (2001). Identifying student attitudes and learning styles in distance education. *Journal of Asynchronous Learning Networks*, 5(2), 111-127.
- Van Merriënboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist*, 38(1), 5-13.
- Van Zolingen, S. and C. Klaassen (2003). "Selection processes in a Delphi study about key qualifications in Senior Secondary Vocational Education." *Technological Forecasting and Social Change* 70(4): 317-340.
- Wiggins, M (1999). Instructional Design and Student Learning. *Reference Services Review*. 27(3) 225-228.