

PRACTICES IN INSTRUCTIONAL SYSTEM DESIGN FOR EFFECTIVE OPEN AND DISTANCE LEARNING MATERIALS

Benny A. Pribadi

Universitas Terbuka, Indonesia
agus.benny@gmail.com

D. G. S. Doluweera

The Open University of Srilanka
sandhyadoluweera2010@gmail.com

Yu Minsheng

The Open University of China
yuminsheng@hotmail.com

ABSTRACT

The aim of this study is to analyse different practices of implementing the procedures of instructional system design in creating effective open and distance learning materials. Instructional system design consists of several systematic and systemic phases which are commonly used in designing and developing learning materials to facilitate students' learning. Research fellows of the Universitas Terbuka Indonesia, the Open University of China and the Open University of Sri Lanka were involved in the study of analysing the practices of implementing instructional design procedures in designing and developing open and distance learning instructional materials in each institutions. Focus group discussion and document analysis were used to find the essence of using the Instructional System Design to design and produce learning materials. It was found that the implementation of the instructional system design procedures has common important components that can be shared to create a high quality open and distance learning instructional materials.

Keywords: *Open and distance learning, learning materials, instructional system design*

INTRODUCTION

One of the main characteristics of an Open and Distance Learning (ODL) system is the separation between students and teachers (Moore and Kearsley, 2005). As such, it is necessary for ODL institutions to use instructional system design (ISD) in preparing learning materials to convey the knowledge and skills that should be learned by the students. The ODL institutions in this sense have to provide students with high quality of learning materials. There are many types of learning materials where ISD can be utilised to enable students to acquire necessary learning competencies. These learning materials can be generally classified into three categories: printed materials, multimedia, and network or web based learning materials. These materials provide some significant contributions to facilitate students' learning achievement. In general learning materials used in ODL has characteristic

such as: (1) purposeful; (2) structured; (3) paced; and (4) engaging (Endean, 2003). The use of the ISD model provides a systematic direction in creating effective and efficient learning materials for ODL. ISD in this sense can be viewed as systematic and holistic procedures implemented to produce high quality learning materials.

This paper analyses the practices of three ODL institutions in implementing their respective ISD models to create learning materials. Focus Group Discussion method and document analysis were used to find the essence of using ISD models to design and to produce ODL learning materials. Fellow researchers of Universitas Terbuka (UT) Indonesia, Open University of China (OUC) and Open University of Sri Lanka (OUSL) were involved in this study. Practices concerning the use of ISD procedures in the design and development of printed learning materials at UT, OUC and OUSL were described and analysed.

INSTRUCTIONAL SYSTEM DESIGN AS A FIELD

ISD is defined as the practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing (Merrill, et. al. 1996). Reiser and Dempsey (2007) defined ISD as a systematic process that is employed to develop education and training programs in a consistent and reliable fashion. In general the purpose of implementing the ISD is to ensure that the education and training programs will be able to attain their predetermined standards. It is a systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It involves an entire process from analysing the learning needs and goals to the development of a delivery system to meet those needs. The system includes instructional material and activities, try-out and evaluation of all instruction and learner activities (University of Michigan, 1996).

ISD activities involve several systematic steps such as: (1) creating students' appropriate learning activities; (2) guiding students to appropriate knowledge; (3) helping students to rehearse, encode, and process information; (4) monitoring student performance; and (5) providing feedback as to the appropriateness of the student's learning activities and practice performance. ISD is the technology of creating learning experiences and learning environments which promote these instructional activities. Merrill, Drake, Lacy, and Pratt (1996) noted the roles of ISD in creating student learning experiences such as: (1) increase and enhance the possibility of learning; (2) make the acquisition of knowledge and skill more efficient, effective, and appealing; and (3) encourage the engagement of learners so that they learn faster and gain deeper level of understanding.

Majority of the ODL institutions have been implementing ISD models or procedures to create their own learning materials. Instructional designers who work for ODL institutions usually use a specific ISD model in designing and developing learning materials appropriate to the institutional needs. An ISD model is defined as "systematic guidelines, instructional designers follow in order to create a workshop, a course, a curriculum, an instructional program, or a training session." (McGriff, 2001). There are many ISD models which can be implemented to create quality ODL learning materials. For example, Jerold Kemp's Model, Walter Dick and Lou Carey model, the ARCS motivational design model and the ADDIE

model. An example of a comprehensive ISD model which is mostly used to design and develop ODL learning materials is the Systematic Instructional System Design model proposed by Dick, Carey and Carey (2009). The Dick and Carey ISD model consists of the nine systematic and systemic steps to create effective and efficient ODL learning materials. The steps of the ISD model include: (1) identify instructional goal (s); (2) conduct instructional analysis; (3) identify entry behaviour; (4) write performance objectives; (5) develop criterion referenced test; (6) develop instructional strategy; (7) develop and select instructional materials; (8) develop and conduct formative evaluation; and (9) develop and conduct summative evaluation. These steps are shown in Figure 1.

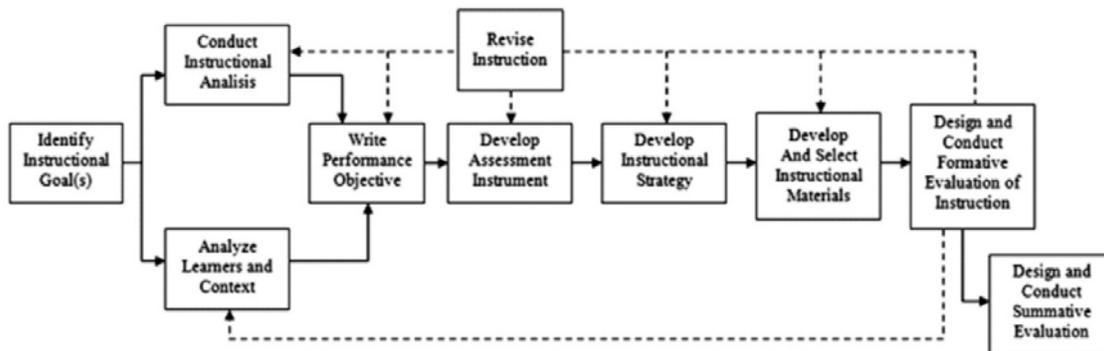


Figure 1: The Dick and Carey Instructional Design Model
(Source: http://etec.ctlt.ubc.ca/510wiki/Dick_%26_Carey_Systems_Model_of_Instructional_Design)

Description of a number of other instructional design models along with the Dick and Carey Model can be found at:

<http://www.instructionaldesigncentral.com/#!instructionaldesignmodels/ys2pz>

ISD PROCEDURES AT UT, OUC AND OUSL

Most ODL institutions apply a specific ISD model to develop their learning materials. The use of the ISD model assures that the learning materials will be able to facilitate the ODL students in achieving predetermined competencies. UT, OUC, and OUSL implement ISD procedures in producing learning materials of high standard for their students. They implement ISD using different approaches. The selection of ISD procedures is usually based on the varying institutional conditions and needs.

UT

UT implements several basic ISD steps to create its instructional program and learning materials. The ISD procedures for creating the instructional materials consists of the following steps: (1) analyse the national curriculum of the study program; (2) develop course online after conducting an instructional analysis; (3) decide the types of media used to deliver the content (print, multimedia, online); (4) write the module draft; (5) review the module draft (Content Expert, Media Expert, Instructional Designer); (6) revise the module draft as the learning material; and (7) publish the final version of instructional modules to deliver the course.

Analysis of the curriculum is conducted to determine the skills and the competencies that the students must be able to demonstrate after completing the course. This instructional goal is analysed by implementing the process of instructional analysis. This step produces instructional objectives used by the students to attain predetermined instructional goal. The stated instructional goal and objectives will facilitate the instructional designers in selecting

appropriate instructional method, media and strategy to deliver the instructional content to the students. The instructional goals and objectives are used to outline the content of printed materials in a modular system. The outline of the module is reviewed and revised before a draft is written. After a series of review and revision processes which are carried out to ensure high quality of the learning materials, the materials are published and distributed to the students.

OUC

OUC uses a systematic procedure to develop its learning materials. The ISD procedures used to design and develop the instructional materials at OUC consists of the following phases: (1) conduct research; (2) analyse the ODL programs to be offered; (3) determine the type of learning materials to deliver the programs; (4) select the materials from the other universities to be used in the programs; (5) conduct a workshop to integrate learning materials to be used; (6) conduct a formative evaluation process; (7) revise the materials based on evaluation results; and (8) implement the materials.

Conducting research is the first step which is intended to provide information regarding students' learning needs. The outcome of this analysis is used as a basis for determining the study programs to be offered. The next step is to determine the learning material used to convey the instructional content. The university has to select appropriate learning materials. OUC conducts a workshop to produce a high quality of learning materials that can be used to facilitate the ODL students' learning activities. Formative evaluation step is applied during the development phases of the learning materials to ensure the quality of the learning material before it is used in a real setting. The formative evaluation results are used to revise the materials before it is used by the intended students.

OUSL

OUSL implements a series of procedures to design and to develop its instructional materials. The ISD procedures are implemented in the following steps: (1) analyse the curriculum provided by the Ministry of Higher Education and the University Grants Commissions; (2) develop course content (by senior professors who are very competent in the field of study (university course development committee)); (3) assign professors from an external conventional university to write the learning materials (faculty course development committee); (4) distribute the materials to the relevant department at OUSL; (5) review of the developed content by professors/experts at OUSL; (6) assign an Educational Technologist, Media and IT expert as a course team; (7) print copies of the prototype and distribute it among the students and evaluate the material; (8) analyse the result and revise the material; (9) review the material (by OUSL department); and (10) publish the finalised learning material.

COMMON PROCEDURES OF THE ISD

Analysis of the ISD procedures at all three ODL universities reveals that in general the ISD models used consist of five generic stages which include: *analysis, design, develop, implement* and *evaluate*.

Analysis is the first step in conducting instructional design to create an effective instructional program. Implementing this initial step in designing learning materials will help the designer to determine the learning needs of the students. The results of this step will direct the designer to determine students learning competencies and to design learning programs that can be used to facilitate students' learning process. In addition, this step will help the designer to obtain important data and information regarding the instructional strategies and

methods that can be used in the program. The instructional goal in this sense is the competencies which the students must achieve after completing the course. Instructional goal and objectives are considered as the two most important factors in designing and developing ODL learning materials. All three Asian ODL institutions, UT, OUC and OUSL conduct the process of need analysis to provide accurate information regarding the competencies of the students after completing the courses. The need analysis procedures are used to identify ODL students' learning needs and specifications that will be included in the programs. UT analyses the national curriculum to offer relevant study programs for prospective audiences. OUC conducts students' research to offer programs for prospective students. The Open University curriculum given by the Ministry of Higher Education and the University Grants Commissions is analysed by OUSL to offer prospective programs for the students.

Design is the second step in implementing ISD to create ODL learning materials. In this step, the designer conducts an instructional analysis. Dick et al. (2009) define the instructional analysis as "... a set of procedures that, when applied to an instructional goal, result in the identification of the relevant steps for performing a goal and the subordinate skills for a student to achieve the goal". After determining the instructional goal, it is necessary for the designer to conduct an instructional analysis. In conducting the instructional analysis, the designer identifies several relevant sub-competencies which are necessary for the students to achieve the predetermined instructional goal. In addition, by conducting the process of instructional analysis, the designer will know the pre-requisite learning behaviour before students enrol in certain courses. The student entering behaviour describes the skills and the knowledge that the students must know or be able to do before they begin the instruction. In this stage, UT, OUC and OUSL implement the instructional or goal analysis to identify the instructional objectives. The design phase of the ISD includes the selection of the instructional methods, media and instructional strategies used to facilitate learning process. Appropriate methods, media and instructional strategies implemented in the materials will help ODL students to attain learning competencies effectively. Both UT and OUSL use printed instructional materials or modules to deliver learning content to their students. OUSL implements a longer ISD process to produce effective learning materials. UT designs, describes and outlines offered courses after conducting the analysis phase of ISD. The OUC plan the study programs to be offered based on the analysis stage of implementing the ISD. While, OUSL course contents are designed by competent senior professors under the supervision of the University Course Development Committee.

Development is the next generic step in which designers produce the learning materials based on a predetermined design. Designers have to consider the instructional goal and objectives that must be attained by the students after completing the course. Bates (2011) proposes criteria for selecting learning materials or media used in an ODL setting called **ACTIONS**. It consists of the following factors: **A**ccessibility, **C**ost, **T**eaching and learning, **I**nteractivity and user-friendliness, **O**rganizational issues, **N**ovelty, and **S**peed. The outputs of this development step are the learning materials which are ready to be used by ODL students. The materials have to meet the specifications of the design phase. In the development stage, all the three ODL institutions implement the production stage to provide high quality learning materials. All three universities, UT, OUC and OUSL conduct formative evaluation procedures to ensure the quality of their learning materials. UT delivers the content for its programs through print, multimedia and online. This phase is followed by writing the module draft. Reviewing and revising the module draft are done by Content Experts, Media Experts and Instructional Designers. Finalised instructional modules are published to fulfil students' demand. OUC assigns professors from other conventional universities to write the learning materials supervised by the Faculty Course Development Committee. The content of the materials goes to the relevant departments at OUC, followed by a workshop to create learning materials and a formative evaluation process for quality

assurance. Materials were revised based on the evaluation results. While OUSL select writers to create learning materials, professors or content experts are appointed to review and revise the content. This step also involves the educational technologist, media and IT expert. OUSL print the limited prototype of the learning materials and evaluate them formatively. The next step is to analyse the result of formative evaluation and revise the materials.

Implementation is the process of using the produced materials. The instructional materials are used for the first time by its intended users. Formative evaluation technique is implemented in this phase. The purpose of using the formative evaluation is to find information regarding the strengths and the weaknesses of the instructional program or the material. This information can be used as a feedback to revise the program to make it better at conveying the content of the course or the study programs. Dick et al. (2009) proposed three stages of the formative evaluation, which consists of the following steps: (1) one-to-one evaluation; (2) small group evaluation; and (3) field trial evaluation. The three ODL institutions have to assure that the learning materials used to deliver the content are of very high quality. UT, OUC and OUSL implement their developed learning material by publishing and distributing them to their students.

Evaluation is the final procedure in implementing ISD. It is a process of collecting required and relevant data to make decisions (Stufflebeam, 2005). There are two types of evaluation that can be used to assess the quality of instructional materials – summative and formative evaluation. Summative evaluation is usually applied after the instructional programs or the learning materials are used for a certain period of time. The aim of using the summative evaluation approach is to decide the continuation of using the materials to support the learning process of the ODL students. UT has a policy to conduct summative evaluation 5 years after the materials were used. The formative evaluation is usually done during the design and the development stage of the learning materials. The purpose of implementing the formative evaluation is to gather data describing the strengths and the weaknesses of the program before its real implementation. The collected data will be used to improve the quality of the produced instructional materials. Formative evaluation steps were implemented by all three ODL institutions in order to ensure the quality of their learning materials. A series of try out and revisions of the programs are done during the design and development stages of designing and producing ODL learning materials. During the evaluation stage, designers have to assure that arising problems are resolved and the objectives are met. It is necessary for designers to foresee possible changes in the future delivery of the program or course. This stage has to be an integral part in the continuation of analysis and effective implementation of future courses and programs.

Implementing the five basic phases of the ISD – *analysis, design, develop, implement, and evaluate* will facilitate ODL institutions to provide high quality learning material for their students.

CONCLUSIONS

ISD consists of several systematic and systemic steps or procedures which are used to create effective instructional programs. The field of the instructional design has been used continuously in many ODL institutions. ODL institutions rely on the use of various learning materials to convey course contents to their students, and therefore must implement appropriate ISD procedures to produce good quality instructional materials. Various ISD models are used by ODL institutions to design and produce learning materials that can facilitate their students' learning process. UT, OUC and OUSL use different ISD procedures to create their learning materials. Analysing the different ISD procedures revealed that there

are some common components. The common steps of the ISD procedures include: *analysis*, *design*, *develop*, *implement* and *evaluate*. Implementing the five generic phases in ISD procedures can help ODL institutions to provide high quality learning materials for its students.

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