

Proposing a Layer Model for e-Learning Design

Katsuaki Suzuki¹, John M. Keller²

Kumamoto University (Japan), Florida State University (U.S.A.)

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Abstract:

A In this paper, “Layer model for e-Learning Design” is proposed for clarifying the purposes of various instructional design (ID) techniques and models. Newcomers into the field often think of ID as an equivalent of navigation and display design. However, the aims of ID are not only concerned with usability, but also other issues. By putting the usability as Layer 1, the model tries to separate various design techniques in five layers, in order to show the breadth of concerns covered in ID.

1 A Layer Model for e-Learning Design

The design and development of e-Learning contents and systems is a complex process and there are many different models, or processes, that are used to build effective and interesting e-Learning courses. The purpose of this paper is to build upon a layered model for e-Learning design, that was first introduced by Suzuki ^[1]. This layered model is proposed as a frame of reference for clarifying the purposes of various instructional design (ID) techniques and models and to illustrate how they can be meaningfully organized in terms of purpose and impact. This organizational structure has several benefits: it clarifies the relationships among the various design activities in e-Learning development, it can provide guidance to e-Learning designers, and it can help managers of e-Learning development who must coordinate a team of designers.

In this model there are five levels. Layer 1, which can be considered to be the baseline level, is actually at the midpoint of the five levels. There are two layers below it and two above. This organization is guided by the concepts of Herzberg’s “motivation – hygiene” theory of motivation. He postulates that certain activities, called hygiene factors, help avoid discontent or annoyance and keep people happy, while other kinds of factors, called motivators, contribute to meaningful work experiences and stimulate people to achieve. This theoretical foundation is reflected in the following layer descriptions.

2 Layer 1: Operatability

Newcomers into the field of ID especially those with an educational technology background, often think of it as equivalent to navigation and display design to accomplish high usability, or operatability. Formative evaluation and rapid prototyping are examples of ID techniques to attain high usability. Good usability features help avoid learner annoyance (a hygiene factor) and has limited effects on learning and motivation; thus, it is located in the model as the center layer. Usability is extremely important in regard to learner motivation. However, the aims of ID are not only concerned with usability, but also with other issues although all are interconnected. By putting the usability issue as Layer 1, the model tries to separate other

design techniques according to whether they fall more into the hygiene levels, which are positioned below this level, or the motivation levels that lie above it (Figure 1).

3 Layers below Level 1: Avoiding Deception and Pain

3.1 Level 0: No Deception

One layer below Level 1 is Layer 0 which includes analysis and concerns of the potential for deception in e-Learning programs. If the content is not accurate, valid, or reliable, then attaining effective usability of such content has no meaning. Being thus placed one layer below Level 1 illustrates the prerequisite importance this issue over information design (Level 1). ID techniques used during the analysis phase, such as needs analysis, contents and task analysis, deal with this issue.

Needs analysis is an ID technique to specify the reason why any e-Learning must be provided for a certain potential group of users. Needs may come from job-related knowledge/skill deficiencies, changes in environment, such as a release of a new version of software, or prospective future trends in a proactive mode of training. Often times the analysis of needs will call upon specification of changes in job-related behaviours as a result of training. In order to connect training result to performance change in application settings, Kirkpatrick's 4 level evaluation scheme (Reaction, Learning, Behaviour, and Result) is the most well-known ID model ^[2].

Content and task analysis refers to the process of specifying how many components are there between learner's current status and goal status, and how each of the components is related to each other. Starting from Gagne's classical hierarchical analysis ^[3], many techniques have been proposed as to how to conduct content and task analysis ^[4].

Having conducted content and task analysis, the designer of e-Learning can be sure as to what should be covered in the course, and which of the components can be covered prior to/only after the others. Each component should have a clear statement of learning objective, which is accompanied with a set of test items. Defining clear objectives and writing corresponding test items has been one of the traditional techniques of ID.

Subject Matter Experts (SMEs), who provide expertise in the area of target contents, would play a major role in determining the components. SMEs can provide for content accuracy, validity of learning scope, validity of interpretation, indication of equivocality, freshness of information, rational and reliable contents, as well as intellectual property handling of material, in assisting the instructional designer in charge of e-Learning design and development.

3.2 Level -1: No Pain

An even more elemental layer (Level -1) concerns the issue of avoiding irritation by having proper learning environment via adequate bandwidth, audio quality, and stability of the service. Such issues should be met to avoid learner's "pain," in regard to the "hygiene" elements of design ^[5]. The presence of such technological problems would distract any audience from learning but would not, in and of themselves, produce learning which is why this layer has a negative number. Activities at this level include learning environment analysis, media selection techniques, and technology support ^[6].

Learning environment analysis represents techniques to assess existing environment for learning in terms of media attributes of contents and available supports for learning. Media selection models have long been investigated in the field of ID, to attain not only attractiveness of environment, but also effectiveness and efficiency. Although “simple media, active students” is the conclusion derived from media studies^[7], many have argued various effects of media on learning. It has been widely accepted that different media can provide different learning environment serving for more/less effectiveness in producing learning. It has also been widely known that different media cost more/less in preparing and implementing learning environment. Thus, making proper combination in selecting and utilizing media is critical in composing learning environment.

4 Layers above Level 1: Effectiveness and Appeal

4.1 Level 2: Effectiveness

The layer just above Level 1 concerns the effectiveness of the e-Learning (Level 2). Most of the work in ID fields is concerned with how to make the learning effective. In other words, the goal is to ensure that the instructional interventions match both learner characteristics and task requirements in a given environment. Various ID models such as the ones in Reigeluth’s “Green Books”^[8] are the examples in this layer.

Since effective e-Learning will facilitate the learners attaining objectives, by definition, ID models typically relate such factors as learner’s characteristics, nature of the learning task, and learning environment to instructional strategies, in search of the best fit among elements in the learning environment. Gagne’s learning outcome and conditions for effective learning is one of the classical models in this direction^[9]. Further advancement has been made to reflect the paradigm shift in the fields of constructivist psychology and learning science, which was well represented in Reigeluth’s second volume “Green Book II”^[10].

To sum up the recent trends, Merrill has proposed “The First Principle of Instruction”^[11]. Any effective learning environment, including e-Learning, should be equipped with at least five principles: (1) Real-World Task, (2) Activation of learner’s prior knowledge/experiences, (3) Demonstration with examples, (4) Application of the new skill/knowledge, and (5) Integration into the real-world environment. Many ID models and theories have been proposed, and much more would be proposed in the future, stemming from design efforts in various setting for various circumstances. Efforts in integrating those models, such as Merrill’s, would be necessary to find out what are in common across different ID models.

4.2 Level 3: Appeal

The top layer (Level 3) is about the appeal of e-Learning, in the sense of keeping learners motivated and engaged in learning, wanting to be involved in the learning activities, even when they are not required, or being happy about belonging to the organization. Appeal of instruction has been considered to be one of the three main goals of ID: effectiveness, efficiency, and appeal^[12]. Activities at this level include systematic motivational design^[13] based on a model of learner motivation and the concepts of adult learning^[14].

The ARCS model of motivational design has been one of the major ID models that geared directly toward the attainment of appeal of instruction. It has been widely used in various sectors of e-Learning practices world-wide. The ARCS stands for four major factors associated with learner motivation: Attention, Relevance, Confidence, and Satisfaction.

Numerous motivational strategies have been suggested and validated in various learning settings, each of which is classified into one of the four categories. The model also has a set of procedures to deploy the motivational design, from learner analysis, selection of motivational objectives, to test and revise the e-Learning environment.

5 Concluding Remarks

Based on these concepts and examples, this model can provide a useful frame of reference among practitioners in e-Learning, so that proper techniques are to be utilized for proper aims. Other models using layers have been widely used in ID. These include the Cone of Experiences proposed by E. Dale ^[15] to categorize various forms of educational media, Maslow’s hierarchy of human needs ^[16] which helps identify learning readiness based on motivational states, and Tessmer & Wedman’s layers-of-necessity model ^[17] that helps explain a progression from limited, or rapid, prototyping prior to engaging in a more full-featured development process depending on the needs of the situation. But, none of the other “layered models” has illustrated the various levels of design activities in relation to learner satisfaction (hygiene factors), learning, and motivation. It is authors’ hope that the proposed model shall serve such a function.

Quality of e-Learning	Achievement Index	Major ID Techniques
Level 3: Willing to Learn (Appeal)	Continuing motivation, engagement, Did I do this many without noticing? Link to future self, Self-selected, self-responsible, individual taste and persistency, Brand, Pride	Motivation Design (ARCS Model) Principles of Andragogy
Level 2: Easy to Learn (Effectiveness)	Learning environment matching nature of the task, learning support elements matching learner needs, interaction effects of collaborative members, self-regulated learning, responsive environment	Learning facilitation Design (9 Events of Instruction) Structuring & Sequencing
Level 1: Easy to Use (Information Design)	Operatability, Usability, Navigation and Layout, Technical writing	Prototyping, Formative evaluation
Level 0: No Deception (SME)	Content accuracy, Validity of Learning Scope, Validity of interpretation, Indication of equivocality, Freshness of Information, Rational and reliable, Intellectual Property Handling	Needs Analysis Task Analysis Content Analysis
Level -1: No Pain (Hygiene)	Access environment, Adequate network speed, Substitute alternatives for different IT environment, Stability of service, Feeling of security	Learning Environment Analysis Media Selection

Figure 1: A Layer Model of e-Learning Design

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Authors:

Katsuaki Suzuki, Ph. D., Professor and Chair
Instructional Systems Program, Graduate School of Social and Cultural Sciences, Kumamoto University, 086-8555 JAPAN ksuzuki@kumamoto-u.ac.jp

John M. Keller, Ph. D., Professor
Instructional Systems Program, Graduate School of Educational Research, Florida State University, 32306 FL, U.S.A. jkeller@mailers.fsu.edu