Chapter 1
An Ontological Approach to Online Instructional Design

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ABSTRACT

This chapter introduces the ontological instructional design as an alternative to the traditional instructional design in teaching and learning. By comparing the differences between traditional instructional design and e-Learning, the authors suggest that instructional design in e-Learning require a different model than the existing traditional models due to the idiosyncratic nature of e-Learning in terms of population, environment, and resources. An ontological instructional design model is proposed with a focus on the sharability, reusability and interoperability of ontological entities and design components within the ontological entities, which provides a holistic approach to online instructional design compared to the segmented, linear design approach in traditional instructional design models. A case study is included to illustrate the use and application of the ontological instructional design model in an online business course. Finally, guidelines for implementing the model are made with suggestions for future research.

INTRODUCTION

The proliferation of web technology in education, particularly with the introduction and implementation of semantic web, has called for the need of re-examining the traditional instructional design in online learning (Snelbecker, Miller, & Zheng, 2007; Zheng & Ferris, 2007). The traditional instructional design models focus primarily on epistemological approach in design by examining the experiential process related to knowledge representation as well as the means related to the production of knowledge based on various principles in instructional design (Han & Park, 2008; Spector, 2001). Although the epistemological approach contributes to a general understanding of the relationship between the knowledge representation and the knowledge production, the implementation of epistemological approach in terms of shared conceptualization of domains in online learning remains an area that

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warrants further exploration and validation. In other words, how to implement instruction, particularly online instruction from an ontological perspective has been the focus of many online instructional designers and researchers (Abel et al., 2004; Berners-Lee, Hendler, & Lassila, 2001). The present chapter offers a discussion on (1) issues in applying traditional instructional design models to online learning; (2) differences between epistemological design and ontological design in instruction; (3) the need to apply ontological design to e-learning with respect to recent development in semantic web; finally (4) a conceptual framework for ontological instructional design in online teaching and learning.

ISSUES OF APPLYING TRADITIONAL INSTRUCTIONAL DESIGN MODELS TO ONLINE LEARNING

Studies over the last decade have focused on the issues related to the applicability of traditional instructional design models to e-Learning (Akbulut, 2007; Rutherford & Kerr, 2008). Research in this field has so far produced mixed results. Some believe that traditional instructional design models can be universally applied to any instruction, online or offline (Anglada, 2008; Bi, 2000). Others argue that traditional instructional design models may not fit e-Learning due to their rigidity and lack of flexibility in design (DeSchryver & Spiro, 2008; Gunawardena, Ortegano-Layne, & Carabajal, 2006; Koh & Branch, 2004). Crawford (2004) explored online learning and traditional instructional design and found that there were apparent discrepancies between the two models. According to Crawford, the e-Learning model allows for exploratory, constructivist concept building whereas the traditional instructional design model is procedure-centric which allows little room for creative learning. Consistent with Crawford's finding, Barron, Orwig, Ivers, and Lilavois (2002) found mismatches between traditional design models and e-Learning models in terms of individualized learning, collaboration, instructional delivery, and instructional design.

Individualized Learning

There are significant differences regarding the theoretical assumptions of individualized learning between traditional design models and e-Learning models (Barron et al., 2002; Harris, 1998). Traditional design models assume that all learners must learn at exactly the same pace and at the same level of content mastery. As such, instructional goals and learning objectives in traditional instructional design are routinely set to fit the normal curve, with little concern for the individual outliers (Moller, Foshay, & Huett, 2008). The above theoretical assumptions and their resultant approaches in traditional instructional design can be problematic because it is difficult to fit online learners into this traditional normal curve. An online learning community is characterized by its diversity in terms of prior knowledge, learner characteristics, motivation, social and economic status, and so forth (Moller et al., 2008; Proske, Narciss, & Korndle, 2007). Therefore, designing online instruction based on normal curve practice and the assumptions of traditional design theory would adversely affect the online learning community where individualized support at various levels is needed.

Collaborative Learning

Although both traditional instructional design and online learning emphasize the importance of collaboration in learning, there are fundamental differences between the two due to the distinct learning mode that each takes in learning. In the traditional classroom, collaborative learning occurs in a face-to-face environment where students concurrently interact with each other in the same place (Topper, 2007). The physical and time constraints thus restrict the mode of