

Chapter XLVII

A Model of Modeling in Research and Practice: Technology Integration and Online Career Counseling

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ABSTRACT

Modeling is a tool that can be used in research and educational practices. In this chapter, modeling is defined as a systematic process in which scientific methods are used to identify and detect critical components in a field and the connections or relationship among them. This chapter focuses on the modeling procedures for research and practice in the field of using information technology in education and career counseling. Six types of modeling are included: theory-based modeling, literature-based modeling, data-based modeling, case-based modeling, meta-analysis modeling, and propensity modeling. A model of the research modeling process is summarized at the end.

INTRODUCTION

Modeling has been a useful tool to present research findings, and provide practical insights of the research experiences (Liu, 2007a; Liu & Johnson, 1998; Liu & Jones, 2004; Liu & Maddux, 2005; Low, 2003; Rojewski & Bakeman, 1997; Rowe & Hill, 1998; van Batenburg & Laros, 2002; Wilkins & Ma, 2003). In educational research, modeling is a systematic process in which sci-

entific methods are used to identify, detect, and illustrate the critical components in a field and the connections or relationship among them (Liu & Johnson, 1999; Liu & Cummings, 2001). In many manuscripts submitted to (or articles published in) academic journals in the field of using information technology in education, very often, the term of “model” is used; however, the concept of this term is either misinterpreted or inappropriately used; the described “model” is not a model as defined

above. Findings from those studies may be very valuable, but the modeling procedure does not apply a scientific method, which has weakened the findings to a certain extent. This is why the author decided to devote the present chapter to the methods of model development and application.

The purposes of this chapter are: (a) to introduce a method of research modeling in the field of using information technology in education, (b) to demonstrate modeling procedures in research and technology integration practices, and (c) present a case to use a technology integration model in the design and completion of online career counseling. Notice that there are many advanced statistics modeling methods discussed in the literature; those methods require many mathematics procedures, which is not the focus of this chapter. The current chapter has taken a more applied approach, focusing on the general modeling methods in research with different research design and data analysis methods. Specifically, six types of modeling are included: theory-based modeling, literature-based modeling, data-based modeling, case-based modeling, meta-analysis modeling, and propensity modeling.

BACKGROUND

Definitions

The online Webster Dictionary (at <http://www.m-w.com/>) provides a list of definitions on the term “model.” A model is “a pattern of something to be made,” “a description or analogy used to help visualize something that cannot be directly observed,” or “a system of postulates, data, and inferences presented as a mathematical description of an entity or state of affairs.” Using a daily life example, if we say we want to build a house on the model of an old fashion farmhouse, that old farmhouse would be the model: its structure, style, shape, color, and all other components together formulate the “model.” In short, a model has its

particular components, and the components connect to one another in a specific way.

In the present chapter, the term “modeling” is defined as the procedures to develop, formulate, and evaluate a new model. In the farmhouse example, the model is an existing model that has been developed before, and is available for people to use. However, it is much more complex to develop a new research model that accurately reflects the major components, methods, and findings from a study. Careful decisions need to be made on the types of model, methods of modeling, and context or research area the model might apply to. It may take years to complete the entire modeling procedures.

Types of Modeling

In the field of using information technology in education, the types of modeling are usually sorted according to three factors: (a) the purpose to develop this model, (b) the components involved in the model, or the types of information based on which the model is developed; and (c) the methods of modeling, which includes the methods to collect information, analyze the information, and summarize the results. Six types of modeling are usually used in the research of the field:

1. Theory-Based Modeling
2. Literature-Based Modeling
3. Data-Based Modeling
4. Case-Based Modeling
5. Meta-Analysis Modeling
6. Propensity Modeling

First, when a theoretical framework is needed for a study or any educational practice, *theory-based modeling* is conducted. There have been well developed models existing in many theories; however, those models may not fit the purpose of the study or practice. Generally, a study can be based on several relevant theories, and very often, based on certain components from each

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