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Identification of Factors that Lead to Perceived Skill Development when Using Multimedia Materials

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Abstract

Considering conflicting research findings on the impact of multimedia on perceived skill development, this research investigates whether intervening variables such as task-technology fit factors might explain the difference in the findings. A pilot study was conducted where 39 students worked on a case study using both paper-based and multimedia based technologies. The findings from the pilot study suggested a strong indirect relationship between multimedia and perceived skill development with learning-driven constructs playing a major role. An exploratory factor analysis design employing a structural equation model will be used to further investigate whether other intervening variables such as the inclusion of an expert choice software, gender, and student major would influence perceived skill development.

Introduction

There have been, and there continue to be an increased use of multimedia training. Some corporate experts predict that 50% of personnel training will be delivered by multimedia-based instructional systems for the next decade, up from the current 20% (Allerton, 1996). Newren and Lasher (1993) document that education students get a variety of audio-visual and multimedia equipment training, but computer skills are only a small percentage of their pre-service training.

Since researchers disagree over what impact multimedia has on individual performance, this research investigates this area. The research questions addressed by this dissertation include:

- Does the inclusion of solutions from an expert choice software in a case study impact the decisions made?
- Is there a direct relationship between technology characteristics and perceived skill development?
- Is there an indirect relationship between the technology characteristics (paper-based and multimedia-based) and perceived skill development with learning-driven factors and content-driven factors accounting for the difference?
- Are there any gender effects that would influence perceived skill development considering the intervening variables?

- Are there any student major (engineering versus business) effects that would influence perceived skill development considering the intervening variables?

The primary research area of this study is the impact multimedia has on individual performance.

Literature Review

Researchers disagree over the impact of multimedia on perceived skill development. Some of the positive findings are from Nielsen, Collier, Barrett, Jonassen, Delany and Gilbert. Nieslen reports that multimedia enables non-linear access to vast amounts of information (Nielsen 1995). Other researchers show that with multimedia, users can explore information in-depth on demand and interact with instructional material on a self-paced mode (Collier, 1987; Barrett, 1988). Others state that multimedia is attention-capturing or engaging to use and represents a natural form of representation with respect to the workings of the human mind (Jonassen, 1989; Delany and Gilbert, 1991).

Some of the negative findings are reported by Dillon, Gabbard, Orr, Poindexter, Allen, Clark, and Landauer. Dillon and Gabbard (1999) report that there is not convincing evidence for increased learning in multimedia environments. Orr, Poindexter and Allen (1998) concluded that using multimedia-based information technology in computer-related courses will not positively impact learning. Clark (1985) had suggested that positive student perceptions and performance in such situations may result as much from the novelty of the information technology environment as from the impact of the technology on the teaching and learning process. Landauer (1995) reported that despite numerous published reports on the topic of multimedia use, only nine studies of human performance with this technology met minimally acceptable scientific criteria.

Pilot study

As part of the research, a pilot study was first conducted at a Southeastern University. The use of multimedia technologies in this pilot study showed significant improvement in students' perceived skill development. In order to reconcile the results of this assessment with current literature, it became essential to identify the

intervening variables that might not have been considered in the past research. A literature review identified task-technology fit (TTF) factors as a potential intervening variable. Therefore we created a model and a set of hypotheses in order to analyze whether the TTF factors could explain the difference in the research findings. Constructs were developed from past literature in order to measure perceived skill development and the intervening variables of TTF.

An experiment was conducted where 39 students worked on a case study using both paper-based and multimedia based technologies. An exploratory factor analysis design was used to analyze the data. The findings from this study suggested a strong indirect relationship between multimedia and perceived skill development with learning-driven constructs (challenging, learning interest, self-reported learning, and learned from others) playing a major role (Figure 1). The study showed that it is critical to consider these factors in developing multi-media instructional materials. Furthermore, the results from the study led to the above research questions about the impact of multimedia on individual performance.

Planned Methodology

This research will use a field experiment to answer the research questions. The approach here will be to divide a series of classes separately into two groups: one that will be exposed to the paper-based case study and the other will be provided the multimedia-based case study. Both groups will be treated in a well-controlled environment that will minimize the interaction of the two groups. Students will be randomly assigned to both groups. Their ability to produce the expected results, problem solving performance and user satisfaction will be measured with validated instruments.

This study will use an exploratory factor analysis design employing structural equations modeling to examine the relationships between technology characteristics, gender and student major on perceived skill development. A path analysis will be used to examine the direct and indirect relationship between technology characteristics (paper-based and multimedia-based) and perceived skill development with the intervening variable. The results from the expert choice software will be varied and its effect on the student choices will be examined.

The findings from this study will contribute to the literature by improving our understanding of the role of multimedia in improving perceived skills development. It could add value in identifying the intervening variables that account for improved perceived skill development. This, in turn, could be used to create multimedia packages that provide value to their customers. The results could be helpful to Chief Information Officers as they decide on the amount of resources to be expended on multimedia in the future.

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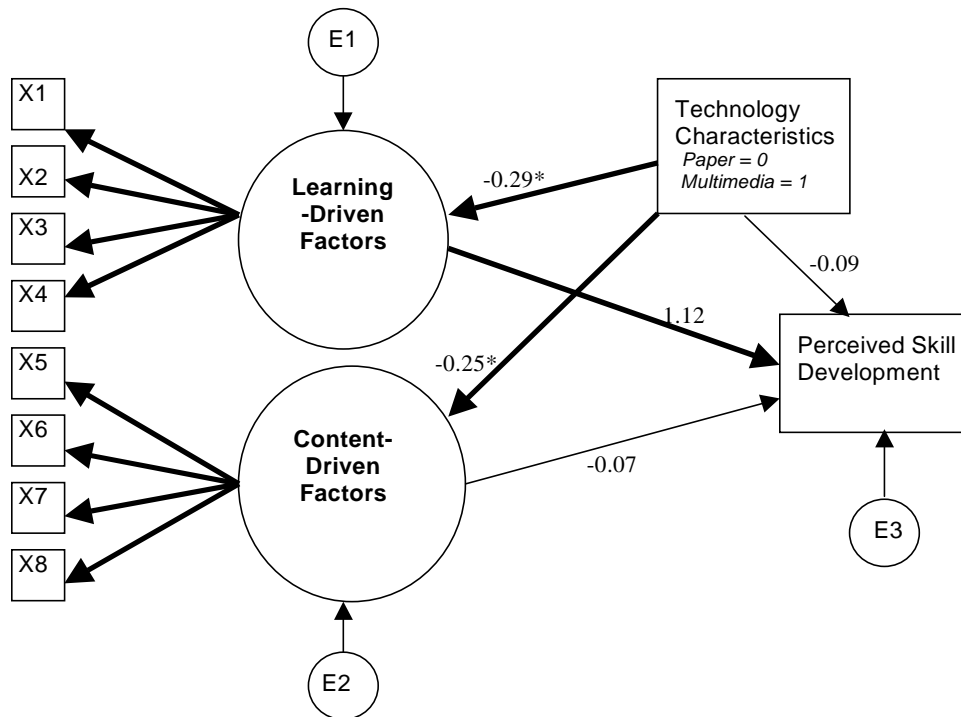


Figure 1(From Pilot Study): Direct and indirect relationship between technology characteristics and perceived skill development.

Where:

- | | | | |
|------------------------|-------------------|-----------------------------|--------------------------|
| X1 = learning interest | X2 = challenging | X3 = self reported learning | X4 = learned from others |
| X5 = quality | X6 = locatability | X7 = ease of use | X8 = timeliness |
- E1, E2 and E3 = Error Terms

➔ Significant relationships

➔ Non-Significant relationships

* = A lower value is better since technology characteristics is a dummy variable, and where Multimedia = 1.

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