Research Agenda to Assess the Effectiveness of Technologically Mediated Instructional Strategies, 2004!

Donna L. McAlister Kizzier
Information Systems, College of Business, Morehead State University
Morehead, Kentucky, USA
Kizzier1234@earthlink.net

Research Track Refereed Proceedings
23rd Annual Organizational Systems Research Association (OSRA) Conference
Pittsburgh, Pennsylvania
February 4-7, 2004

Abstract

The purpose of this paper is to present the latest iteration of a comprehensive research agenda conceived by the researcher in the early 1990s to provide researchers with a grounded framework to study the effectiveness of technologically mediated instructional strategies. The updated research agenda is presently based on nearly 400 research studies.

The model is fluid and periodically revisited based on the latest research. The revised research agenda is compared against the previous iteration of the model which was last published for a national audience in 1992. Participants will be invited to share feedback to continue to update and validate the model.

The Technologically Mediated Instructional Strategies (TMIS) research model was originally inspired by Fred Fieldler's widely recognized Contingency Model of Leadership Effectiveness (1967). The TMIS Model is grounded in educational, technology, and business literature. It identifies 39 factors clustered into six constructs and recognizes diverse methods of inquiry. The purpose of the model is to structure the scholarly study of the effective use of technologically mediated instructional strategies across multiple disciplines and in diverse learning environments. The ultimate outcome is designed to inform better decision making in the learning environment.

Research Agenda to Assess the Effectiveness of Technologically Mediated Instructional Strategies, 2004!

Donna L. McAlister Kizzier

Introduction and Purpose

The purpose of this research is to present the latest iteration of a comprehensive research agenda conceived by the researcher in the early 1990s. The updated research agenda is based on nearly 400 research studies. The researcher has teamed with multiple research associates to apply the design to multiple successful academic research studies. The model was originally developed to provide the researcher's advisees with a grounded framework for doctoral research. However, the ultimate outcome is designed to inform better decision making in the learning environment.

The model is fluid and periodically revisited based on the latest research studies. The recently revised research agenda is compared against the previous iteration of the model, last published for a national audience in 1992. The OSRA audience will be invited to share feedback to continue to update and validate the model

The Technologically Mediated Instructional Strategies (TMIS) research model, originally inspired by Fieldler's Contingency Model, is grounded in educational, technology, and business literature. It identifies key factors clustered into multiple constructs and recognizes current qualitative and quantitative methods of inquiry. The purpose of the model is to structure the scholarly study of the effective use of technologically mediated instructional strategies across multiple disciplines and in diverse learning environments.

This research will be of particular interest to aspiring researchers who desire an informed, mature research framework to help focus research studies designed to determine the effectiveness of technologically mediated instructional strategies.

Need for the Study

The selection of appropriate TMIS continues to be recognized as an integral part of the total instructional development process (Rosenberg, 2001; Anderson, 1983; Gagne, Briggs & Wager, 1988; Briggs & Wager, 1981; Boucher, Gottlieb & Marganlander, 1973; and Sleeman, Cobun & Rockwell, 1979). Because decisions regarding TMIS are based on a combination of factors studied in diverse fields, the process is inherently complex (Anderson, 1983).

Several researchers have recognized the dynamic context of the learning environment and have identified a need to study how TMIS fits into that overall instructional context (Rosenberg, 2001; Brody, 1984; Chao, Legree, Gillis & Sanders, 1990). Although research has studied the relationship among selected contingency factors in the learning environment, a continuing need exists to study the inter-relationship of the various components in a more holistic manner (Rosenberg, 2001; Brody, 1984; Chao, Legree, Gillis & Sanders, 1990).

The results of metaresearch can produce a model which could be used by educators and trainers in diverse settings to determine if TMIS can be effectively implemented based on various contingencies. Many years ago, Hannafin (1985) identified the need for an adequate research agenda to provide other researchers direction into the instructional dimensions of TMIS. This agenda, originally designed in the late 1980's, fits that need and is designed to evolve with current research and technological developments.

Research Methods

In 1987, a team of researchers at the University of Nebraska-Lincoln began systematic development of a three-phased study. In Phase I, a model TMIS laboratory was established, a national survey of educators and trainers was conducted to develop a baseline database of research, and research questions and variables were culled from the literature (Kizzier & Pollard, 1992). During Phase II, survey, experimental, qualitative, and observational studies were conducted to investigate contingency relationships among the variables identified. Phase III continues toward the ongoing refinement of the contingency model through additional studies and literature reviews.

Research Agenda

As illustrated in Figure 1, the research agenda depicts a conceptual format for an organized, grounded research strategy. The agenda illustrates relevant factors and research methods culled from over 400 research studies to date. The literature suggests six constructs, in addition to technology. The constructs are: (1) environment, (2) learner, (3) instructor, (4) learning process, (5) content and (6) cost/benefit. Several factors have been clustered within each of these constructs.

To determine the effectiveness of a TMIS within a particular learning environment, the technology is examined in relation to each of the relevant factors, holistically as well as individually. The components within the model are inter-related as needed based on the study purpose. A brief description of each construct follows.

<u>Environment</u>. The internal and external environment conditions which may influence the effectiveness of various TMIS may be studied; for example, instructional setting; group dynamics; communication patterns and modes; institutional goals; organizational climate, cultural factors; political climate; distance/time factors, capability and security of technological infrastructures and management of the learning environment and technology.

<u>Learner.</u> The research studies how the learner's performance and/or achievement level are affected by the delivery system. Other relevant variables might include cognitive style; attitude; personality profile, or various learner demographic variables.

Instructor. The research might investigate instructor(s) attitude toward TMIS; cognitive style and/or personality profile of the instructor(s); and various demographic variables.

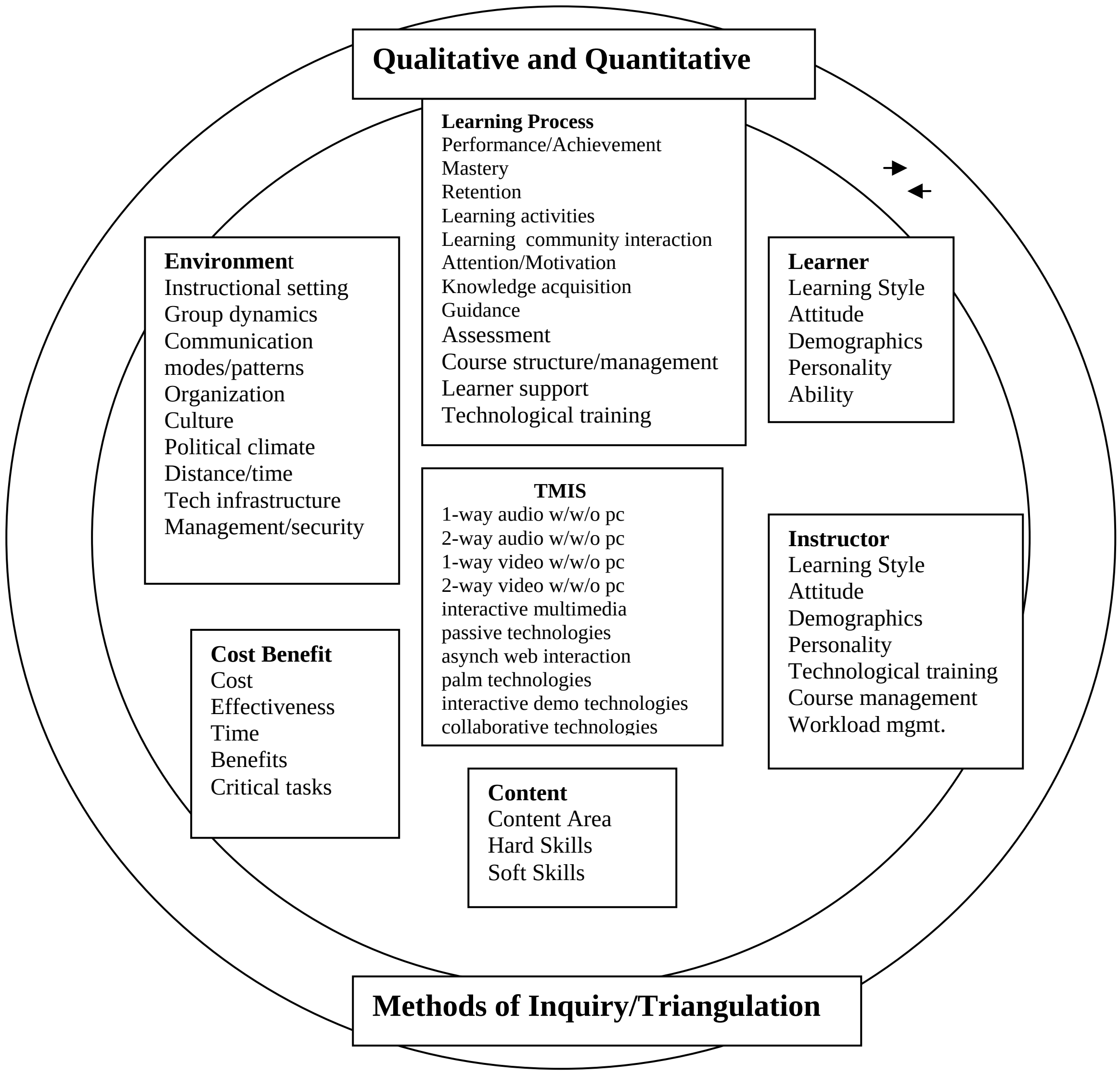
Learning process. Research into the variables influencing the learning process might include the effect of TMIS on student performance; level of mastery attained through the use of a TMIS; accommodation of the learning process at the various levels of Bloom's taxonomy; short and long-term retention rates of learners, learner assessment; attention/motivational factors; knowledge acquisition; learning activities; interaction among learners and instructor (development of learning community and situated learning); guidance and structuring activities; course structure and management strategies; and technological training needed for learners.

Content. The effect of TMIS on learner performance, given the content and/or desired outcomes, may be studied by investigating the effectiveness of a particular TMIS on teaching "hard" or "soft" content. "Hard" content is what which can be measured by competency-based, objective assessments while "soft content involves a high-level assimilation of knowledge and a synthesis of abstract information more difficult to measure.

Cost/Benefit. Because implementing TMIS can involve an initially expensive investment, cost-benefit assessments consider the benefits and drawbacks of TMIS within particular contexts. Researchers may examine critical factors involved in using TMIS to develop criteria for determining the effectiveness of the TMIS.

The outer circles of Figure 1 recognize how studies related to this research agenda lend themselves to various forms of quantitative, qualitative and multiple methods of inquiry, based on the research purposes. The inside list of technologies is representative of current technology, but not all inclusive.

Figure 1
TMIS Research Agenda


Qualitative and Quantitative
Learning Process
Performance/Achievement
Mastery
Retention
Learning activities
Learning community interaction
Attention/Motivation
Knowledge acquisition
Guidance
Assessment
Course structure/management
Learner support
Technological training
Environment
Instructional setting
Group dynamics
Communication modes/patterns
Organization
Culture
Political climate
Distance/time
Tech infrastructure
Management/security
Learner
Learning Style
Attitude
Demographics
Personality
Ability
TMIS
1-way audio w/w/o pc
2-way audio w/w/o pc
1-way video w/w/o pc
2-way video w/w/o pc
interactive multimedia
passive technologies
asynch web interaction
palm technologies
interactive demo technologies
collaborative technologies
Instructor
Learning Style
Attitude
Demographics
Personality
Technological training
Course management
Workload mgmt.
Cost Benefit
Cost
Effectiveness
Time
Benefits
Critical tasks
Content
Content Area
Hard Skills
Soft Skills
Methods of Inquiry/Triangulation

Direction for further research

A variety of approaches are used by researchers to study the effectiveness of TMIS. For example, cognitive researchers focus upon the intellectual processes engaged by TMIS and study how and why TMIS affects the learner and the learning process. Some researchers study how TMIS is used effectively by individuals or groups of learners. Others study decision making in planning and implementing TMIS.

A key criticism of TMIS effectiveness research is that researchers often ask the wrong question—the wrong question is "Which TMIS is the best?" This is the wrong question because TMIS does not influence instructional effectiveness; this error in research design was noted in the early 1980s by Clark (1983a. 1983b). This error in conceptualizing the research was noted as recently as 2001 by Rosenberg (2001). Rather than focusing uni-dimensionally on technology, the research should focus upon the mix of variables that influence effectiveness in the learning environment. The mix of relevant variables is illustrated in the research agenda provided in Figure 1.

The author concludes through tracking research in the field over the last 17 years that the major constructs in the agenda have remained intact; however, the variables within each construct have transformed as educators/trainers devise ways to effectively use new instructional technology in evolving virtual learning environments and high-tech classrooms. Another major shift enabled by the power of the technology is the shift from a teaching to a learning paradigm (Rosenberg, 2001; Boetcher, 1999). The agenda presented here retains integrity primarily because it focuses upon the learning process and uses a holistic paradigm rather than focusing upon technological tools.

Several researchers have reported the use of poor methodology in TMIS effectiveness studies, rendering many of them unusable (Becker, 1987; Kizzier & Lavin, 1993). Although the importance of carefully designed and controlled experimental methods is recognized, research should consider the use of structured observations, controlled correlational and multi-variate techniques, meta-analyses and qualitative methods of inquiry.

Conclusions and Recommendations

The following conclusions are offered:

1. The six major constructs originally conceived for the research agenda remain intact, affirming that, despite continued evolution of instructional technology, the focus on the elements in the learning environment remains valid.
2. The research agenda was last published in 1993; at that time 27 variables (excluding technology) were identified from the research in TMIS. At that time over 100 studies were reviewed. The current iteration, based on a review of over 400 studies, contains 39 variables, excluding technology. The research in this field is becoming significantly richer. Major changes in the TMIS model were effected primarily by developments in web, interactive and distance learning; the

increased complexity of managing such high-tech environments; and the shift to more of a learner-centered environment that applies more situated learning events (Wizer & Lynch, 1995).

3. The agenda still provides researchers with a solid conceptual map for conducting research to study the effectiveness of TMIS in educational and business environment.
4. A need still exists for TMIS research; particularly in the areas of palm, web and distance learning technologies. More diversity is found in the research approaches being employed for TMIS effectiveness studies; however, as is always true in solid research, the literature review, theoretical underpinning and purpose of the study should dictate the methods of inquiry.
5. Literature reviews in this stream of research still report poorly-designed studies and studies which focus upon the technology rather than incorporating a more wholistic approach.

The following recommendations are offered:

1. Carefully designed and executed research should be conducted to define contingency relationships among variables in the revised research agenda, using a holistic approach that focuses on learning..
2. Research questions, similar to those generated by Kizzier and Pollard (1992), coded to the research agenda, should be updated and published.
3. Contingency models can be developed in a number of fields, based on the research conducted related to the TMIS model. A sample contingency model is provided by Kizzier and Pollard (1992).
4. The research agenda should continue to be validated as research on all related area matures.
5. Because of the complex nature of the knowledge base related to the TMIS model, multidisciplinary research is encouraged.

References

Anderson, R. H. (1983). Selecting and developing media for instruction (2nd ed.). New York: Van Nostrand Reinhold.

Boettcher, J. The shift from a teaching to a learning paradigm. Syllabus, August, 1999, pp. 50-51.

Boucher, B. G., Gottlieb, M. J. & Marganlander, M. L. (1973). Handbook and catalog for instructional media selection. Englewood Cliffs, NJ: Educational Technology Publications.

Briggs, J. & Wager, W. W. (1981). Handbook of procedures for the design of instruction (2nd ed.). Englewood Cliffs, NY: Educational Technology Pub.

Brody, P. J. (1984, April). Research on and research with interactive video. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Chao, P. Legree. J., Gillis & Sanders, (1990, October). Using expert systems approaches to solve media selection problems: matrix format, in Dalton, D. W. (ed.) Proceedings of the 32nd annual conference for the Association for the development of Computer-Based Instructional Systems San Diego, CA (ERIC Document Reproduction Service No. ED 328 231).

Ferrante, Anne M. Student Profiles: Implications for Design and Delivery. AACSB Distance Learning Conference, June 3, 2003. Villanova University, Villanova, Pennsylvania.

Fiedler, Fred E. A Theory of Leadership Effectiveness, McGraw-Hill, New York, 1967, pp. 13-144.

Gagne, R. M., Briggs, L. J. & Wager, W. W. (1988). Principles of instructional design (3rd ed.). New York: Holt, Rinehart and Winston, Inc.

Gay, Greg. Using Research to design effective distance education. Ontario Institute for Studies in Education, April 1997. http://www.oise, utoronto.ca/~ggay/distance.htm.

Hannafin, M. J. (1985). Empirical issues in the study of computer-assisted interactive video. Educational Communication and Technology Journal. 33. 235-247.

Kizzier, D. L. & C. Pollard. A Research Agenda for Studying Technologically Mediated Instructional Strategies in Business and Education. Delta Pi Epsilon 1992 National Research Conference Proceedings, Nov 12-14, Los Angeles, California, pp. 117-125.

Kizzier, D. L. & R. Lavin. A Research Agenda for Technologically Mediated Instructional Strategies in Adult Education. Proceedings of the Adult Education Research Conference AERC 1993, Penn State University, University Park, Pennsylvania. Pp. 155-160.

Lagoze, C. & H. Van de Sompel, The making of the open archives initiative protocol of metadata harvesting. Library Hi Tech, Vol 21 (2), 2003. pp. 118-128.

Rosenberg, Marc J. Building Successful Online Learning in your Organization: e-Learning. McGraw Hill. 2001.

Sleeman, P. J., Cobun, T. C. & Rockwell, D. M. 1979). Instructional media and technology: a guide to accountable learning systems. New York: Longman Inc.

Schutte, J. G. Virtual Teaching in Higher Education: The New Intellectual Superhighway or Just Another Traffic Jam? California State University, Northridge, 1997. http://www.csun.edu/sociology/virexp.htm.

Wellburn, Elizabeth. The Status of Technology in the Education System: A Literature Review, Technology and Distance Education Branch, Ministry of Education, Skills and Training, British Columbia, May 1996.

Wizer, D. & Lynch, W. (1995, April). The Benefits of Online Education in Graduate Studies. Presented at AERA Annual Conference, San Francisco, CA.