LINKING TEACHING AND LEARNING STYLES THROUGH MEDIA DELIVERY SYSTEMS DESIGNED WITH KOLB'S LEARNING MODEL

by

Steven N. Ulosevich, Ed.D.
Adjunct Assistant Professor
Embry-Riddle Aeronautical University
College of Career Education, Randolph AFB Resident Center, Texas

ABSTRACT

The major premise of this paper proposes that current and emerging applications of electronic and computer technologies can assist educators in teaching students both task-related and critical thinking skills. The purpose of this paper is to: (1) review selected learning style and teaching style literature, (2) propose a framework that can serve as an organizing structure for choosing an appropriate multimedia delivery system, and (3) briefly outline implications for researchers, educators and students.

INTRODUCTION

Since instructors often determine teaching methods on the basis of their teaching preferences, it appears that they may not be designing their learning environments compatible with the learning styles of their students (Gail & Calvert, 1984). It has been suggested that educators make greater use of active modes of teaching, and that they require students to take greater responsibility for their learning (DoE, 1984). Similarly, educational institutions have been encouraged to consider changed student expectations and the impact of electronics and technology on education as a way of addressing student needs more fully (Osterman, 1982).

The major premise of this paper is that current and emerging applications of electronic and computer technologies can assist educators in teaching students both *task-related* (i.e., how to) and *critical thinking* (i.e., conceptualizing) skills. The purpose of the paper is to propose a framework that can serve as an organizing structure for choosing an appropriate multimedia delivery system. The term "multimedia" is defined as the combination or integration of electronic, video, audio, and/or computer technologies. A delivery system is created when one or more of these media is adapted to an educational setting to accomplish a learning objective.

Specifically, this paper is developed along three lines. First, selected learning style and teaching method literature are briefly reviewed. Second, a framework is presented. Finally, implications for students, educators, and researchers are provided.

LEARNING PROCESS VARIABLES

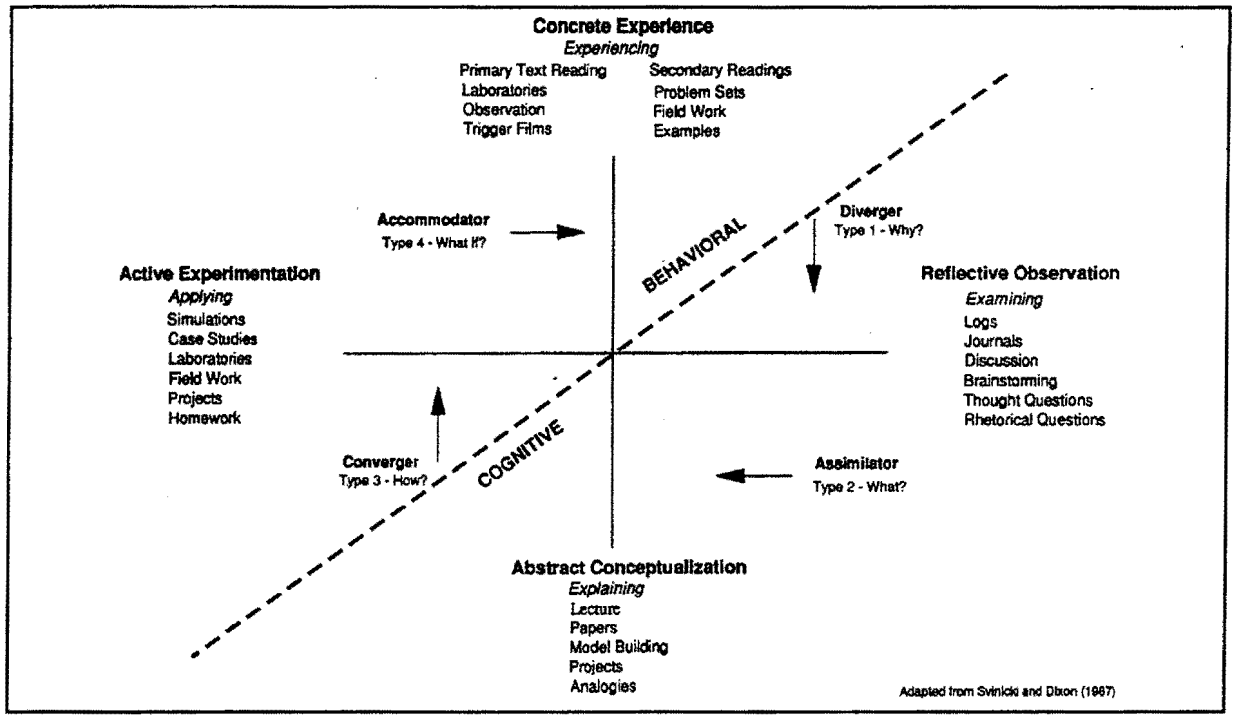
Educators have increasingly recognized that while educational objectives are necessarily a key consideration in course and curriculum design, the learning process itself is a function of the learning environment, teaching method, and student learning style (Frontczak, 1990b). A number of studies have measured student learning styles in terms of psychological, cognitive, sociological, and communicative constructs (Eison, 1979; Kolb, 1976); while Clark offers specific instructional methods as motivators for students who differ in their study styles (Clark, 1984). Rumelhart and Norman have proposed that learning objectives be divided into procedural (i.e., practical) or declarative (i.e., conceptual) categories, and have highlighted various student learning and study styles, methods of instruction, and educational objectives as components of the learning process (Rumelhart & Norman, 1981).

Although scholars have not reached consensus on a single learning style model, Kolb's Learning Style Inventory (LSI) (Kolb, 1976) has been widely utilized with college students and "adult learners"

(Dorsey & Pierson, 1984), defined as students whose education has been interrupted by family or career commitments. Although the LSI is not without its critics (Certo & Lamb, 1980; Hunsaker, 1980), it has received support as a functional framework when implementing an experiential approach to classroom teaching (Svinicki & Dixon, 1987). Conceptually, Frontczak has provided educators with teaching methods considered appropriate for Kolb's student learning styles (Frontczak, 1990b).

The LSI provides a two-dimensional view (see Figure 1, Page 5) of the learning process. Concrete experience and abstract conceptualization are graphed on the vertical axis, while reflective observation and active experimentation are depicted on the horizontal axis. In this model, an individual acquires knowledge by means of a series of steps moving through the bipolar dimensions. Moreover, McCarthy has identified the types of questions likely to be asked by individuals in each of the four quadrants: Type One learners ask *Why?*, Type Two ask *What?*, Type Three ask *How?*, and Type Four ask *What if?*. Figure 1 displays the LSI's sequential and circular learning pattern.

Kolb observes that learning styles are influenced by personality, academic training, current job and task, and career choice (Kolb, 1986). Divergers, for instance, tend to be trained in the humanities or social sciences, while physical science-based professionals are typically Convergers or Assimilators, and administrators/business oriented or academicians generally tend to be Accomodators or Convergers (Bilgan, 1973; Kolb, 1976). Approximately one of every five individuals tested demonstrates two different learning styles; presumably these individuals require both styles in order to accomplish tasks requiring different skills.



Study type is another variable that impacts the student's learning process. The *constructive student* is an independent learner who works at her or his own pace, and attempts to discover relationships between new information and principles, and the student's past experiences and values. In contrast, a *defensive learner* is more concerned with conforming to established standards, so that performance on homework and tests is a major concern, and focuses on details and memorization of presented material. Instructional methods that help motivate the constructive student include self-paced learning plans, unstructured assignments, and inquiry or discovery methods, while the defensive learner requires clear learning objectives, frequent review and summarization of the material, and regular testing.

INSTRUCTIONAL PROCESS VARIABLES

Rumelhart and Nelson distinguish between *Procedural* objectives, which require learning a series or sequence of steps, and *Declarative* objectives, which include concepts and principles that can be applied to solve "new" problems (Rumelhart & Norman, 1981; Clark & Voogel, 1985). Examples of procedural objectives are task-related competency-based skills that course graduates need to perform on the job, while declarative objectives are typically taught in a course in which students must integrate and synthesize basic concepts in order to solve complex problems.

Figure 1 also provides examples of teaching methods and students activities, each of which is listed under the corresponding learning dimension of the LSI (McCarthy, 1980). Due to their cognitive nature, the Reflective Observation and Abstract Conceptualization methods require examination or explanation, as students mentally interact with the instructional material in order to modify previous knowledge (Clark and Voogel, 1985). Active Experimentation and Concrete Experience, on the other hand, require application and concrete realization, which are behavioral processes. Typically such behavioral teaching methods involve: (1) procedural objectives that influence instruction and evaluation, (2) techniques that direct and monitor student progress, and (3) instructional sessions in which language is standardized, practice is encouraged, and corrective feedback and reinforcement are provided.

This overview of the literature has focused on two vital ingredients of the learning process: student learning and instructor teaching variables. Multimedia can be part of the learning environment as well as the means by which instruction is formatted and stored, thereby impacting both learning style and teaching method variables (Schwen, 1977). Next, selected multimedia are briefly reviewed.

MULTIMEDIA EDUCATIONAL APPLICATIONS

Electronic, computer and video technologies have been utilized by educators to aid in developing critical thinking and functional-competencies of students, including computer-based simulations (Cadotte & Rinehart, 1986) and expert systems (Cook & Jenicke, 1989), video-taped cases (Doutt, 1979) and role-playing (Castleberry, 1989); audio cassette commentary on written reports (Wilkins & Madden, 1986) and computer-based grading of written case analyses (Barnes & Smith, 1986); effectiveness of audio-visual presentations (Lipson & Gur-Arie, 1981); student construction of examination questions on the microcomputer (McIntyre & Munson, (1986); and a teleconferencing application for the classroom (Murdock & Bellizzi, 1981). Rapid advances in several related disciplines have contributed to the continually expanding applications of electronic technologies for instructional uses such as computer-generated audio-visual (A/V) aids, computer-based training (CBT), interactive video instruction (IVI), and multimedia classrooms.

MEDIA EFFECTIVENESS

Benefits of IVI include consistent teaching delivery and more efficient student learning: Leadership Studies, Inc. found greater retention and 50% more rapid learning using the Situational Leadership IVI (1990). Andersen Consulting found training time to be reduced 30-50% on average with IVI, and IBM observed that the Advanced Technology Classroom (ATC) significantly reduces classroom time and improves learning by as much as 40 percent (1989).

Such impressive findings should not, of course, be taken to mean that media educational delivery is a uniquely effective educational tool, in and of itself. Clark, for instance, concludes that the educational content delivered by media, and not the media per se, influences learning (Clark, 1983). To support this position, he points to possible uncontrolled effects of instructional method, or of content differences between treatments that are compared, and to the novelty of the new media, which seems to dissipate over time. However, although he argues that media delivery vehicles do not directly impact learning, nonetheless he agrees that particular characteristics of some media may provide conditions that assist in the learning process (Frontczak, 1990b; Clark, 1985; Clark, 1987).

On the other hand, different individuals tend to prefer certain media or to attribute to these media differing levels of difficulty and entertainment effect. This, in turn, could conceivably affect certain educational outcomes (Clark, 1983). Students, after all, are consumers of an educational product, and the use of media in delivering this service makes sense. Moreover, Frontczak suggests that since learning styles may have implications for career paths, a specific promotional approach and media vehicle might be useful for various LSI learning types (Frontczak, 1990a).

The next section of the paper introduces a framework to help guide educators in selecting an appropriate medium to achieve selected educational objectives.

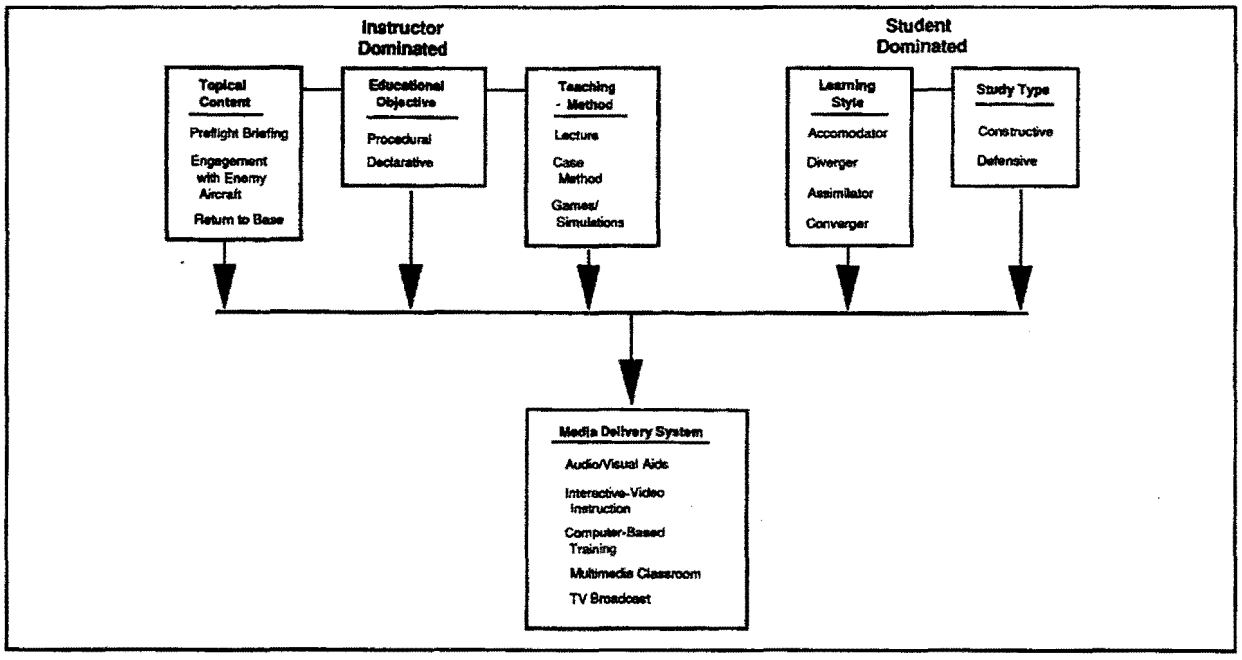
USING MULTIMEDIA TECHNOLOGY TO LINK STUDENT-DOMINATED VARIABLES WITH INSTRUCTOR-DOMINATED VARIABLES

Figure 2, Page 8 is intended to link student-dominated and instructor-dominated variables with media delivery systems, allowing educators to simultaneously consider teaching and learning variables when selecting a media system. The arrows depict an interactive relationship among the instructor and student variables. For example, an instructor would be influenced by her or his selection of a teaching method by the particular educational objective, while a student's learning style likely impacts her or his attitude and motivation towards study.

This figure and the literature review suggest a number of directions in which educators might move when deciding upon a media delivery system. Utilizing Figure 2 in conjunction with Figure 1 should provide instructors a level of assurance that the media system planned for their courses can be partially supported on empirical and conceptual grounds.

Clearly, an important first question when using this framework is "where to begin?" Although it is beyond the scope of this paper, educators first need to consider larger curriculum issues, so that courses can be constructed and sequenced according to the learning needs of the students and the teaching objectives of the instructors. Furthermore, courses can be interrelated in such a way that each bears a relationship to

the others in terms of content and learning objectives, thus helping to insure an appropriate mix of complementary and supplementary materials. In this way educators can have some confidence that the student has had the opportunity to acquire both task-related and critical thinking skills.



IMPLICATIONS FOR STUDENTS, EDUCATORS AND RESEARCHERS

Students would benefit from this media/learning process approach in at least two ways. First, students are afforded the opportunity to learn in a manner more consistent with their preferred learning and study styles. Just as importantly, they can also be trained to develop both behavioral and cognitive skills that will be necessary to successfully complete tasks that are vital to accomplishment of a mission in the field of aviation.

Second, media educational modules that are explicitly designed to integrate teaching methods, content objectives, and student learning and study types reasonably increase the opportunity for all individuals to reach their highest potential. Logically,

performance by students working in these circumstances should exceed that of those who lack the benefit of learning systems particularly designed to work with their characteristic learning styles.

Similarly, this approach provides several advantages to educators. First, instructors can begin to model training in terms of an interrelated set composed of teaching method, learning/teaching styles and objectives, and multimedia. This in turn increases the likelihood of meeting the educational goals within the training environment. Second, multimedia system designers can choose a variety of technologies in order to provide a training simulation which can maximize the learning environment, since they are able to consider the interactive effects of student and instructor variables. Third, educators should be able to increase both the efficiency and the effectiveness of their teaching programs. Classroom and self-study periods carry the potential of providing nearly optimal conditions for learning, simply because they have been designed more specifically for this purpose. Efficiency may be realized by savings in: (1) the time required for a student to achieve an objective, (2) the cost of developing an instructional program, (3) financial resources for committed facilities, and (4) the cost of access to media by students. Lastly, the effectiveness of any particular course is often measured in terms of both quantity and quality, quantity usually being determined on the basis of the number of concepts presented during the term. Quality can be judged from the perspectives of both the student and the instructor: students rate the instructor and course on evaluation forms, while instructors assess performance graded exercises as one indicator of excellence in learning concepts. In each case, however, these measurements fail to capture all the key components of the learning process. Realistically, instructors and students will give high scores on quantity and quality to a course whose design incorporates important learning variables.

This learning process approach also suggests several directions for investigation by researchers. First, preliminary evidence indicates a relationship between media teaching method and educational objectives. Research exploring this relationship, through experimental design and/or field studies utilizing causal modeling techniques is necessary to determine the extent of the association, and what the potential mediating and moderating variables are. Second, certain concepts or topics may lend themselves more readily to the use of media delivery systems. Moreover, certain topics may be more suited to *Procedural*, or task-related, versus *Declarative* or critical thinking objectives. Intuitively, one's attitude and motivation towards either educational objective would appear dependent upon the student study type. Thus, field studies investigating which methods are more successful with which topics is an important avenue to pursue.

Given the variety of teaching methods and media delivery options, the issue of multimedia andragogy and pedagogy provides a focus for additional research regarding what combination of teaching methods is most likely to result in: (1) the rapid achievement of learning objectives, (2)

the greatest benefit to each student's learning style, (3) the most appeal to either the constructive or defensive study type, and (4) the optimal design for a particular course or sequence in an educational program. As noted in this paper, both experimental designs and causal modeling techniques could provide methodologies to test hypotheses.

CONCLUSION

Media learning process models hold promise for advancing andragogy and pedagogy. Improvements in computer and electronic technologies can dramatically affect both student and teacher variables within the learning process. Certainly developing and implementing efficient and effective media learning systems for courses will be expensive in terms of financial, technical, and resource commitments by instructors, administrators, publishers, and software and hardware designers. Yet our students deserve continued efforts to provide the best educational technology, andragogy and pedagogy available. Exploring multimedia educational systems which are based on Kolb's Learning Model is one way of addressing these challenges.

REFERENCES

Andersen Consulting (1989). **Computer-Based Applications Bulletin**, Lake Charles, IL: Andersen Consulting, Arthur Andersen & Co., SC.

Barnes, H. & Smith, S. (1988). "Improving Case Evaluations Through Computer-Based Grading: An Experiment Applying a Developmental Model to Case Evaluation," Journal of Marketing Education, Summer, 63-73.

Bilgan, A. ((1973). "The Characteristics of Subject Matter in Different Academic Areas," Journal of Applied Psychology, 57, 195-203.

Cadotte, E. & Rinehart, L. (1986). "'Chips': A Strategic Distribution Game," Journal of Marketing Education, Summer, 51-58.

Castleberry, S. (1989). "Videotaped Role Playing in the Personal Selling Classroom," Journal of Marketing Education, Spring, 33-39.

Certo, S. & Lamb, S. (1980). Investigation of Bias Within the Learning Style Inventory Through Factor Analysis," Journal of Experiential Learning and Simulation, 2 (June), 1-7.

Clark, R. (1983). "Reconsidering Research on Learning from Media," Review of Educational Research, Winter, 53(4), 445-459.

Clark, R. (1984). "Current Findings on Motivational Techniques," CMLEA Journal, 7(2), 4-5.

Clark, R. (1985). "Evidence from Confounding in Computer-Based Instruction Studies: Analyzing the Meta-Analyses," ECTJ, 33(4), 249-262.

Clark, R. (1987). "A Psychological Perspective on Six Arguments Concerning the Use of Media in Education," lecture delivered to Spanish Universities by Invitation of Spanish-North American Joint Committee.

Clark, R. & Voogel, A (1985). "Transfer of Training Principles for Instructional Design," ECTJ, 33(2), 113-123.

Cook, R. & Jenicke, L. (1989). "Expert Systems Technology Applied to Marketing Decision Making: An Interdisciplinary Term Project," Journal of Marketing Education,

Spring, 45-52.

Dorsey, O. & Pierson, M. (1984). "A Descriptive Study of Adult Learning Styles in a Nontraditional Program," Lifelong Learning, 7(8), 8-11.

Doutt, J. (1979). "Marketing Case-Study Analysis Using Video-Tape Simulation," Journal of Marketing Education, November, 79-81.

Eison, J. (1979). "A New Instrument for Assessing Students' Orientations Towards Grades and Learning," Psychological Reports, 48, 919-924.

Frontczak, N. (1990a). "Consumer Learning Styles: Implications for Promotional Strategy," in Proceedings of the Thirteenth Annual Conference of the Academy of Marketing Science, Vol. XIII, B.J. Dunlap, ed., Academy of Marketing Science, 330-334.

Frontczak, N. (1990b). "The Role of Learning Styles in Marketing Education," in Western Marketing Educators' Association 1990 Conference Proceedings, Jeffrey T. Doutt and Gary F. McKinnon, eds., Provo, UT: The Brigham Young University Press, 57-62.

Gail, T. & Calvert, S. (1984). "Learning Style as a Predictor of Student Performance and Instructor Evaluations," Journal of Marketing Education, Summer, 14-17.

Hunsaker, J. (1980). "The Experiential Learning Model and the Learning Style Inventory: An Assessment of Current Findings," Journal of Experiential Learning and Simulation, 2 (September), 145-152.

Kolb, D. (1976). **The Learning Style Inventory: Technical Manual**. Boston, MA: McBer and Company.

Kolb, D. (1986). **User Memorandum**. Boston, MA: McBer and Company.
Leadership Studies, Inc. (1990). Promotional Literature for Situational Leadership Interactive Videodisk Instruction, Escondido, CA.

Lipson, H. & Gur-Arie, O. (1981). "The Effectiveness of Audio-Visual Presentation," Journal of Marketing Education, Spring, 46-49.

McIntyre, S. & Munnson, J. (1986). "A Testing Experiment in the Principles Course: Students Learn More by Composing Test Questions on a Microcomputer," Journal of Marketing Education, Summer, 39-46.

Murdock, G. & Bellizzi, J. (1981). "Teaching Marketing with Telecommunications:

Conference Calls Bring Corporate Executives into the Classroom," Journal of Marketing Education, Spring, 42-45.

McCarthy, B. (1980). **The 4-MAT System: Teaching to Learning Styles with Right/Left Mode Techniques**, Barrington, IL: EXCEL Inc.

Rumelhart, D. & Norman, D. (1981). "Analogical Processes in Learning," in **Cognitive Skills and Their Acquisition**, J.R. Anderson, ed., Hillsdale, NJ: Lawrence Erlbaum.

Schwen, J. (1977). "Professional Scholarship in Educational Technology: Criteria for Inquiry," AV Communication Review, 25, 35-79.

Svinicki, M. & Dixon, N. (1987). "The Kolb Model Modified for Classroom Activities," College Teaching, 35(4), 141-146.

U.S. Department of Education (1984). Study Group on the Conditions of Excellence in American Higher Education, Involvement in **Training: Realizing the Potential of American Higher Education**, Washington, D.C.: National Institute of Education.

Wilkins, H. & Madden, R. (1986). "An Analysis of How Marketing Students Perceived Benefits from Cassette Tape-Recorded Instructor Commentary on Writing Efforts," Journal of Marketing Education, Spring, 61-65.